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ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

A SYSTEM DYNAMIC APPROACH FOR DETERMINATION OF OPTIMAL MONETARY POLICY DURING THE COVID-19 ECONOMIC CRISIS: A CASE OF TURKEY

SİSTEM DİNAMİĞİ YAKLAŞIMI İLE COVID-19 EKONOMİK KRİZİ SIRASINDA OPTİMAL PARA POLİTİKASININ BELİRLENMESİ: TÜRKİYE ÖRNEĞİ

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Abstract

Starting from mid-March 2020, Covid-19 outbreak spread across the world, the implementation of the social distance and closing the country borders led to the shutdown of economic activities and bring uncertainties for financial markets. Uncertainties have caused a decrease in global risk appetite and resulted to important portfolio outflows from emerging countries. In this process CBRT has started to adopt monetary expansion measures through rate cuts asset purchases to stimulate the financial markets. In this context, this article aims to explore the effects of expansionary monetary policies of CBRT on economic growth, inflation and financial stability in Turkey with a holistic approach. Using a dynamic model, two scenarios were developed covering the

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period from January 2010 to May 2020. In the first scenario, when monetary expansion policy is implemented, it is assumed that the policy rate and required reserves will not change, but a growth-oriented policy will continue. In the second model, a tight monetary policy, foreign capital inflow and, if necessary, a foreign currency intervention scenario was designed. It was observed that an expansionary monetary policy scenario that is not based on external resources did not fully realize the expected economic recovery. The findings obtained in the second scenario are more effective than the first scenario. Besides that, the second scenario is found more effective on growth, inflation and financial stability.

Keywords: Expansionary Monetary Policy, System Dynamics Modeling, Simulation, CBRT, Turkey, Covid-19.

Jel Codes: F42, F43, G18, G28, H12

Öz

Covid-19 virüsünün ortaya çıkmasıyla birlikte küresel çapta sosyal mesafe kuralı uygulanmaya başlanmış, sınırlar kapatılmıştır. Halen devam eden bu salgın, küresel ticaretin durmasına, küresel tedarik zincirinin kopmasına, işyerlerinin kapatılmasına, işsizliğe yol açmaktadır. Bu süreçte, merkez bankaları muhtemel bir ekonomik küresel finansal krizi önlemek için parasal genişleme programlarına yönelmişlerdir. Bu bağlamda bu makale Türkiye Cumhuriyet Merkez Bankası'nın (TCMB) uyguladığı parasal genişleme politikalarının etkilerini bütüncül bir yaklaşımla incelemeyi amaçlamaktadır. Dinamik bir model kullanılarak, Ocak 2010'dan Mayıs 2020'ye kadar olan dönemi kapsayan iki senaryo geliştirilmiştir. Seçilen veriler; zorunlu karşılık, politika faiz oranı, enflasyon, emisyon hacmi, USD / TL döviz kuru, hazine bonosu değişimi, cari işlemler dengesi, doğrudan yatırımlar, merkez bankası döviz rezervlerini kapsamaktadır. İlk senaryoda, Merkez Bankası parasal genişleme politikasını uygulandığında politika faizinin ve zorunlu karşılıkların değişmeyeceği, ancak büyümeye yönelik bir politikanın devam edeceği varsayılmaktadır. İkinci modelde, sıkı para politikası, yabancı sermaye girişi ve gerektiğinde yabancı paraya müdahale senaryosu tasarlanmıştır. Sistem düşüncesine dayanan önerilen modelde Stella yazılımı kullanılmıştır. Dış kaynaklara dayalı olmayan genişletici bir para politikası senaryosunun beklenen ekonomik toparlanmayı tam olarak gerçekleştirmediği görülmüştür. İkinci senaryoda elde edilen bulgular ilk senaryoya oranla daha etkindir; büyüme, enflasyon ve finansal istikrar üzerinde daha optimal sonuçlar elde edilmiştir.

Anahtar Kelimeler: Genişletici Para Politikası, Sistem Dinamiği Modellemesi, Simülasyon, TCMB, Türkiye, Covid-19.

Jel Kodlar: F42, F43, G18, G28, H12

Introduction

The spread of the virus to the whole world emerging in China has caused countries to resort various measures such as quarantines and restrictions. Production and transfers have almost stopped due to such measures which caused unpredictable processes. Additionally, uncertainty of the processes made people and markets worried. These quarantines and uncertainty caused huge shocks in consumption in addition to the cessation of production. While people experience hesitation about spending and consumption, countries are also concerned with ensuring circulation. Therefore, the world faced a mutual supply-demand shock. Almost all countries faced economic crises due to quarantines and cessation of production because of the virus. In order to overcome this global economic crisis, countries have taken and continue to take various economic measures. Various precautions

have been taken in previous global economic crises, some have been successful, and some have failed. As observed in previous economic crises as a result of the rapid collapse in the financial markets and the high shrinkage in the economies, the conventional monetary policy instruments were insufficient in the face of the efforts of the developed countries to restore financial stability and the protection of the developing countries from the negative effects of the fluctuations in the capital movements. Therefore, central banks have shifted from conventional policies to unconventional policies such as quantity expansion, interest commitment and interest rate corridor (Yılmaz, 2019). Following 2008 global financial crisis, central banks have been started to implement unconventional policies in order to prevent economic recession which is occurred in the world. While the concept of flexible inflation targeting as emerged instead of inflation targeting, conventional policies started to lose their effectiveness. Financial variables such as stock prices and various measures of credit have experienced large boom-and-bust cycles, with an average duration much longer than that of standard business cycles. The boom-and-bust cycle ending with the Great Recession is an iconic example of how the pursuit of price stability may not be sufficient to achieve real economic activity stability in the presence of financial disturbances (Furlanetto et al., 2020). The optimism of monetary policies repeating flexible price allocations is the cornerstone of modern macroeconomic theory (Angeletos & La'o, 2012).

Unconventional policies contain comprehensive measures and tools to ease financial conditions. The CBRT reviewed the inflation targeting regime within the framework of the new monetary policy that it has implemented as of 2010, which takes into account macroeconomic risks, and adopted financial stability as a supportive goal and developed additional tools for this purpose. The new policy program is designed to strengthen the resilience of the economy to the fragilities (Yılmaz, 2019). Households' precautionary saving response to uninsured unemployment risk may generate substantial aggregate volatility relative to a hypothetical situation of perfect insurance. Uninsured unemployment risk also affects the optimal response of the policy rate to productivity shocks in important ways (Challe, 2020).

System dynamics which is a computer simulating technique is created in 1956 in order to control of industrial system. Then System Dynamics Approach started to use the problems of social systems (Radzicki, 2008). System Dynamics Models are created by defining and combining relevant parts of a system structure and simulating the behavior that this structure produces (Sansarcı et al., 2014a). This model consists of stocks, flows and auxiliary variables (Bahri, 2008). The stock variables collect the flow variables which are linked the flow variable. Flow variables depend on time, and they could affect by stock variables. Flow variables are variables that take different values over time and can also be affected by in-model stock variables. The interactions between these stock-flow variables add intrinsic dynamism to the model. Auxiliary variables are variables that affect the degree and direction of this interaction. According to Garača the system dynamics model starts with an effort to understand the system of forces that has created a problem and continues to sustain it. A computer model constructed and used by an economic policymaking group may have the following advantages (Garača, 2006b):

- It requires economic policymakers to improve and complete fully the rough mental sketch of the causes of the problem that they inevitably have in their heads.

- In the process of formal model-building the builders discover and resolve various self-contradictions and ambiguities among their implicit assumptions about the problem.
- Once the model is running, even in a rudimentary fashion, logical "bootstrapping" becomes possible.
- Once an acceptable standard of validity has been achieved formal policy experiments reveal quickly the probable outcomes of many policy alternatives and "what if" situations can be explored.
- An operating model is always complete, though in a sense never completed. Unlike many planning aids, which tend to be episodic and terminal, a model is organic and iterative.
- Sensitivity analysis of the model reveals the areas in which genuine debate is needed and guides empirical investigation to important questions.
- A model can be used to communicate with people who were not involved in building the model.
- The purpose of this study is to analyze the impact of the monetary policies implemented during the global economic crisis caused by Covid-19 pandemic on Turkey. Accordingly, system dynamics model and simulations were used in the analysis.

1. Literature

Atılgan indicated that the main reason of implementation of quantity easy policies is political factors for countries that have both political and economic instability (Atılgan, 2009). Kesbiç et al. stated that the effect of budget deficits on monetary growth depends on the attitudes of financial authorities, regardless of the financing method applied. Financial authorities can choose to adapt to the increase in the budget deficit, by allowing or not to expand the money supply. Focusing on short-term costs, regardless of medium and long-term risks, is a dangerous strategy. Transactions that seem inexpensive may pose major risks to the treasury's and thus the government's debt repayment ability over the long term (Kesbiç et al., 2005).

According to Ergin Ünal and Yetiz (2017), following the 2008 global crisis, Federal Reserve Bank started to apply zero interest rate and finally negative interest rate policies. However, these policies could increase the risk of financial instability. In this context, the study conducted a review on the theoretical infrastructure, possible outcomes, and expectations for interest rate decisions, which is one of the monetary policy measures taken by the central banks of the country after the global crisis. (Ergin Ünal & Yetiz, 2017).

Aslan et al. spoke of the existence of a bidirectional causality relationship between short-term capital movements and the real exchange rate. While short-term capital movements affect the real exchange rate, the real exchange rate has an effect on short-term capital movements (Aslan et al., 2014). The exchange rate is an important relative price in international finance. The exchange rate is closely associated with the Government's budget policy should also be noted that there is a significant effect

on net exports in Turkey's economy (Gülcan & Bilman, 2005). It has also been shown that the widening effect of a certain increase in money supply will always be more than a flat rate if the country has a floating exchange rate (Fleming, 1962).

Liviatan, 1981; examines the effect of the change in the monetary expansion rate on real exchange rate dynamics under completely flexible domestic prices and floating exchange rates. The model created in the study is based on the consumers having an infinite planning horizon and perfect foresight in the long run. One of the main findings is that the increase in the monetary expansion rate has the effect of creating real appreciation of the exchange rate and distortion of the balance of payments (Liviatan, 1981).

Husain and Mahmood, 1999; tried to examine the causal relationship between money supply and stock prices in Pakistan's economy, using monthly data between June 1991 to June 1999 and applying Common Integration and Error Correction Models. The co-integration analysis revealed that in general, there is a long-term relationship between money supply and stock prices. The Error Correction Model confirmed the long-term relationship between stock prices and M2 and showed a one-way causality from M2 to stock prices. The model also shows evidence of the short-term effects of M2 on stock prices. The analysis showed that the stock market is not efficient in terms of money supply (Husain & Mahmood, 1999).

According to Barlas and Kaya, 2013; following the global financial crisis, with the understanding that lowering interest rates is not enough to revive shattered economies, developed countries have started to use unconventional tools that lead to excessive liquidity on a global scale to alleviate monetary policies. From this point of view, in this study, it analyzed how capital flows to emerging markets are affected by these recent monetary policy actions of developed countries and investigated the determinants of capital flows under a portfolio investment portfolio (Barlas & Kaya, 2013).

Kang et al. examined the effect of the rapid expansion of China's money supply on the US dollar within the framework of monetary models of exchange rates. Using the global data for 1996, they developed non-exemplary estimates for the US dollar exchange rate, using price level, output and interest rates, and money supply data for the USA, China and the rest of the world (Kang et al., 2016).

The aim of Garača's study is to present the simulation model of the national macroeconomic system. The study focuses on developing a simulation model rather than proposing some concrete macroeconomic policies, although it includes experiments with some simple scenarios on monetary policy. The model primarily focuses on changes in GDP, external debt and budget deficit, based on the main problems of the Croatian economy. The market is at the center of the model and the market balance is achieved at the total supply and demand level expressed in quantities. This model also includes the basic accompanying income and expense categories and sub-model of government budgeting, as well as employment, debt financing, inflation and exchange rate sub-models. The conclusion of the article provides a simulation experiment that follows a simple scenario regarding government budget deficit financing (Garača, 2006a).

In their study conducted in 2005, Öner et al. established a simulative model by using many current variables associated with 6 stock parameters (Competitiveness, CBRT Foreign Exchange Reserves, National Credibility, Foreign Investment, Unemployment, Economic Mobility Level) and the

data set of the auxiliary variables between 1991-2002. With this model, a macro change that will occur as a result of the decisions made by economic actors until 2023 is simulated (Öner et al., 2005).

Sansarcı et al. argued that there is an empirical negative correlation between wage inflation and unemployment rate. This link is called the Phillips Curve, and this negative link between inflation and the unemployment rate is considered a trade-off (Sansarcı et al., 2014a). However, Sansarcı et al. with their study, they have made it open to debate that the interpretation of the trade-off is wrong and there is an out-of-balance account of the empirical inverse relationship (Sansarcı et al., 2014b).

In Bahri's work, a model was established with the system dynamics approach. In the model, the decisions taken to reach the "2030 Vision" planned by Indonesia as an advanced economic power are simulated. Thus, an analysis made with a system dynamics approach reveals that if the development is aimed at increasing the economic growth of Indonesia by increasing technology development investments, the Indonesian economy has the chance to realize its 2030 vision. It has shown that doing business as usual in the Indonesian economy will not be enough to guide Indonesia's achievement of the 2030 vision (Bahri, 2013).

2. Materials and Method

The established model consists of 4 sectors formed by 4 different economic decision-making units and 2 separate sectors and 1 module that react with the interactions of these decision-makers. These are households (consumers), firms, public central bank, external realm transactions, money markets and economic indicators module.

Quarterly data of required reserves, policy rate, inflation, emission volume, USD / TL exchange rate, central bank bond stock change, current balance, direct investments, central bank foreign exchange reserves data were used between 1 January 2010 and May 2020 in the scenarios. In the first scenario, it is assumed that when the Central Bank implement monetary expansion policy, the policy rate and required reserves will not change, but a growth-oriented policy will pursue. $15 billions of sales will be made from net foreign currency reserves to money markets to support monetary expansion. In the second modeling, a scenario where a tight monetary policy is implemented, focusing on inflation targeting and accessing international financing resources in the long term, and intervening in foreign currency when necessary, has been designed. An interactive system dynamics model of the Turkish Economy was obtained by adding an interface to the model to apply the desired scenarios. In the first scenario, it is concluded that inflation and monetary losses. The exchange rate, which was at the level of $ 6.90 / TL at the beginning of the crisis, reached 12.20 at the end of 3 years.

The functioning of the model is as follows. A relationship has been established between households, firms and the public sectors, with the expenditure of one being the income of the other two. For example, households, i.e. consumers' expenditures, return to firms as revenue, and to the public as consumption tax revenues. Public revenues, on the other hand, return to households and firms as infrastructure investments and wage payments (social transfers). Firms, on the other hand, spend their current yield in the form of wages, taxes, raw materials and investments, and return to other sectors. Since one person's debt is another's asset, creditors have to be induced to spend less by high real interest rates (Benigno et al., 2020).

Expenditure and income cycles of firms, public and household are given in the figure 1a-1b and 1c.

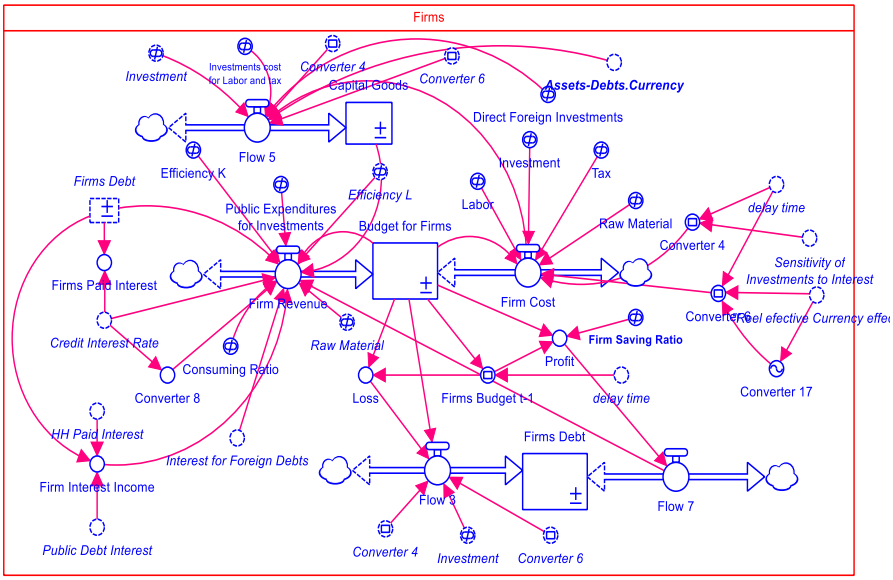

Figure 1a. SDMEM Top Structural Diagram (Level 1)

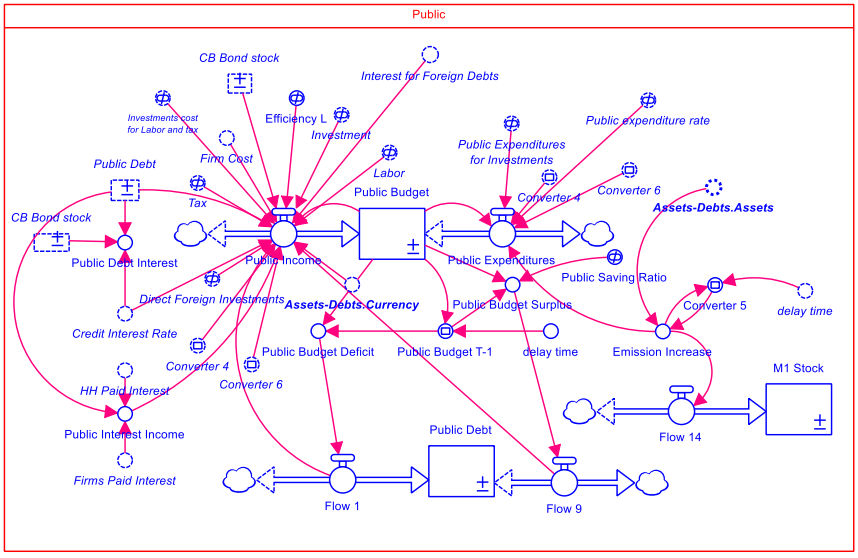

Figure 1b. SDMEM Top Structural Diagram (Level 1)

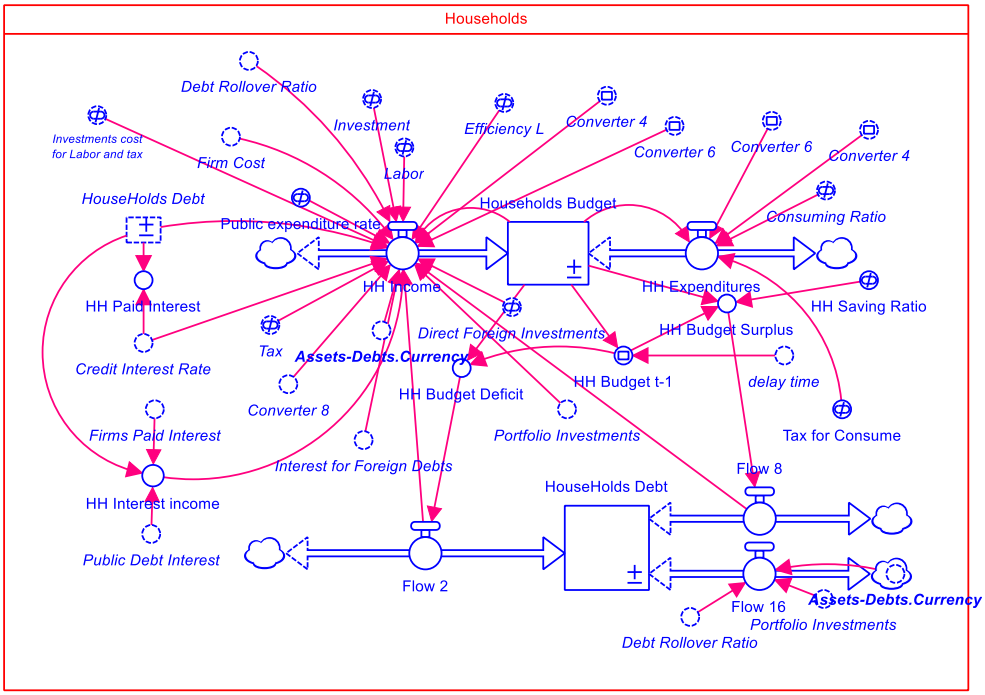

Figure 1c. SDMEM Top Structural Diagram (Level 1)

As seen in the figures 1a.-1b.-1c, the expenditures of one party cause an increase in the income of the other parties and a cycle occurs between the parties with all other variables.

If the total expenditures are above the total revenues, the model provides savings and ensures the expenditure income balance. Domestic savings are shown in the household sector, and debtors are firms and the public sector. The debt of the companies is the credit volume, and the debt of the public is the domestic debt stock. In case the internal savings cannot meet the total expenditures, the model creates current account deficit data and closes this gap through external borrowing. Depending on the current account balance and portfolio entries, the external debt stock of the economy is affected in the module of external realms. The amount of portfolio flows varies according to the perception of risk in the economy and real interest yield. In the high real interest environment, portfolio flows are positive and increase, and vice versa. This situation reflects its reflection in the money markets and as a result of the change in foreign exchange liquidity and M3 money supply, exchange rate, inflation, growth and some other macroeconomic variables are affected. Risk perception can be changed with the crisis button added to the model, when the button is activated, portfolio outputs increase, and the investment level decreases. In addition, another factor that increases the risk perception placed on the model is the ratio of net foreign exchange reserves held in the Central Bank to foreign debt.

Sector-based agents of the economy are given in figure 2a.-2b.

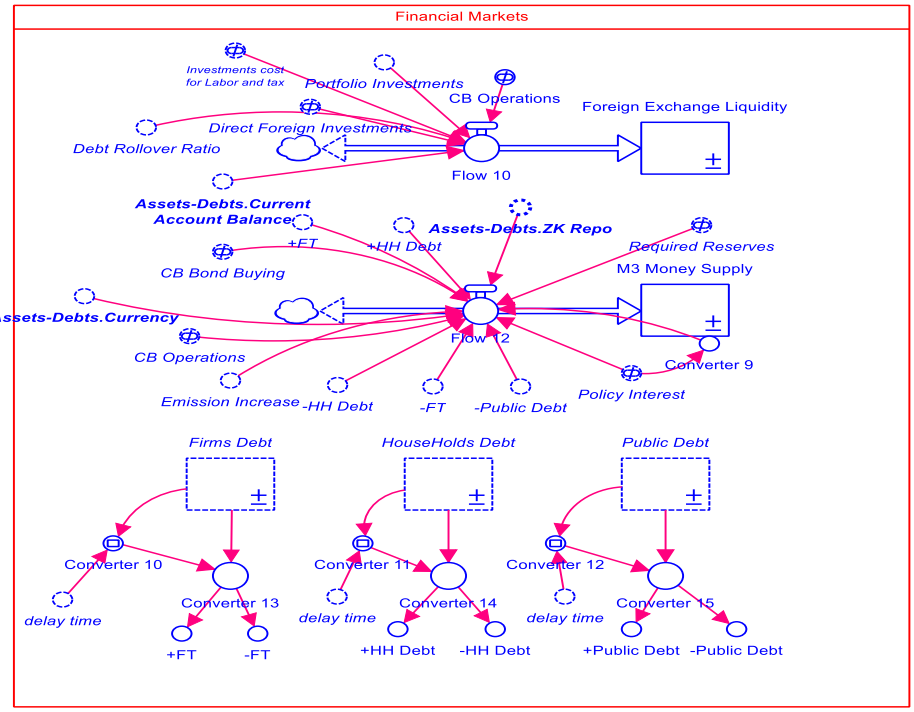

Figure 2a: Economic Agents Expressed as Sectors

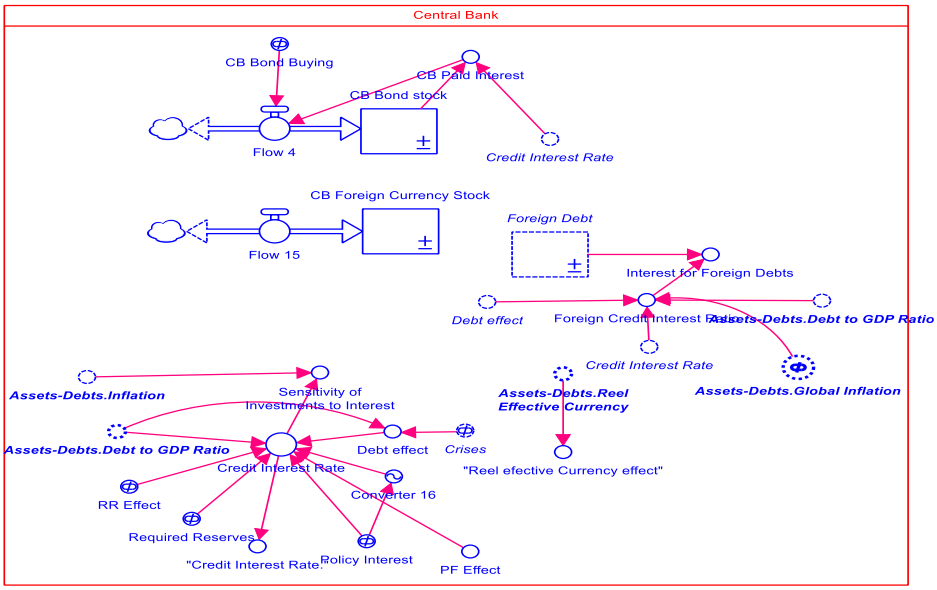

Figure 2b: Economic Agents Expressed as Sectors

In Figure 2a-2b, the interactions of the Central Bank's monetary policy (liquidity management, funding rate) on loan rates, monetary base and market FX liquidity are seen.

Other Sectoral Representations are given in the Figure 3 as follows.

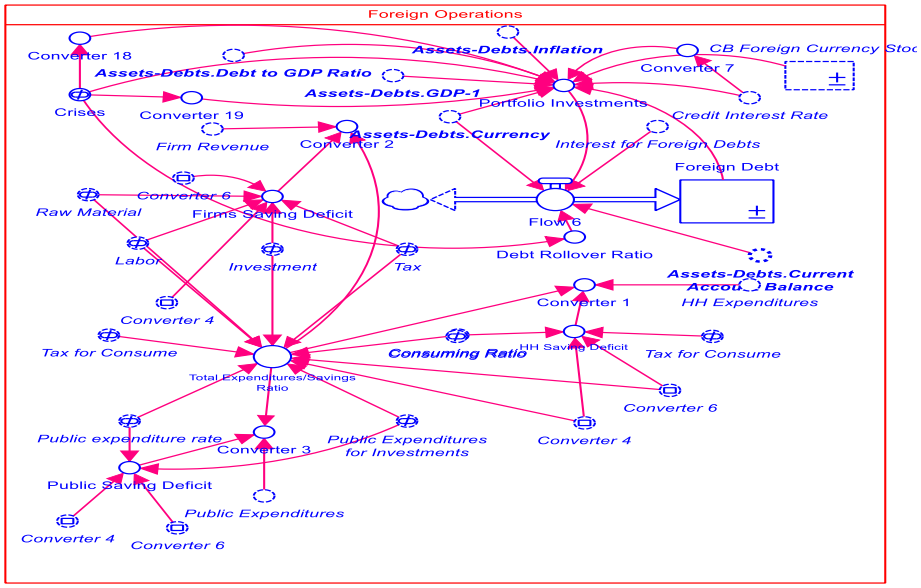

Figure 3: Other Sectoral Representations

Figure 3 shows the change in the external debt stock through the outflow of portfolio investments in case of triggering possible crises. The risk level increases when the crisis button is pressed or the ratio of external debts to net foreign exchange reserves increases. Direct investments from abroad are shown in the model with the variable of direct investments in the firms' sector. Total Factor Productivity (assuming that the level of technology does not change in the current period) is shown with capital and labor productivity rates. Credit interest rates affect investments, and the real effective exchange rate affects all spending in sectors. As the prices of imported goods will increase relatively at a falling real effective exchange rate, consumption expenditures decrease, and the current balance is positively affected. The real effective exchange rate changes according to the domestic, foreign inflation difference and the current period and the exchange rate difference of the previous period. International inflation data is used as 3% annually in simulations.

3. Result of the Model

After the model framework is created, model has been calibrated by using the three months Turkey's economy data between January 2010 May 2020. What is meant by the calibration of the model is to be able to determine the values of the auxiliary variables that form the degrees of causality relationships established with the stock and flow variables in the relevant period. These auxiliary value

variables are used by accepting that they do not change when future simulations are made and support the reality level of the model. The game interface to be used for models and simulations has been created using software used in the system dynamics field called STELLA.

Quarterly flow variables used for calibration are: Model calibration has been made by using reserve requirements, policy rate, inflation, emission volume, USD / TL exchange rate, central bank bond stock change, current balance, direct investments, central bank foreign exchange transactions, net deficit values. The data were obtained from the CBRT electronic data distribution system. Variables used as benchmarks in calibration are M3 Money Supply, interbank loan interest rate and portfolio investment level. Calibration results are shown in table 1.

Table 1: Calibration Results

Method	maxiter	init_step	tolerance			
Powell	5000	1	0,00001			
Payoff:	Payoff					
Action	minimize					
Kind	Calibration					
Element	M3 Money Supply	Credit Interest Rate	Portfolio Investments			
Weight	0,005	0,005	0,005			
Comparison Variable	M3 Money Supply	Credit Interest Rate	Portfolio Investments			
Comparison Run	Data	Data	Data			
Comparison Type	Squared Error	Squared Error	Squared Error			
Comparison Tolerance	0,0001	0,0001	0,0001			
Parameter:	PF Effect	ZK Effect	Productivity K	Productivity L	Investment	
min_value	0	0	0	0	0	
max_value	1	1	1	1	1	
scaling	1	1	1	1	1	
	PF Effect	ZK Effect	Productivity K	Productivity L	Investment	Payoff
Starting at	0,447505	0,64619124	0,010526271	0,0083418	0,25593016	
After 73 runs	0,4169358	0,49520498	0,179549748	0,0449193	0,36038726	5,75754

The values calculated as a result of the calibration are the labor coefficients of the interest rate and the required reserves on the loan interest rates in the relevant period. These values are the basic values to be used in simulations.

In the simulation interface, there are foreign direct investments, domestic investments, labor and capital efficiencies, savings rates and global inflation level with the Central Bank monetary policy console. In macroeconomic indicators, inflation, growth, exchange rate, domestic and foreign debt ratio to GDP, loan interest rates, current balance level, foreign exchange reserves, foreign debt level, M3 money supply and real effective exchange level. Using this interface, two different scenarios can be simulated to determine which monetary policy will be more accurate. Simulations will be made for a twelve-quarter period, and in the second quarter, risk perception will be increased by pressing the crisis button due to COVID-19 disease. The effects of this crisis will continue for five quarters, and the economy will be managed without the effects of the global crisis in the next six quarters. The model's initial values (foreign currency stock, foreign debt stock, M3 money supply, etc.) were validated based on the beginning of May 2020.

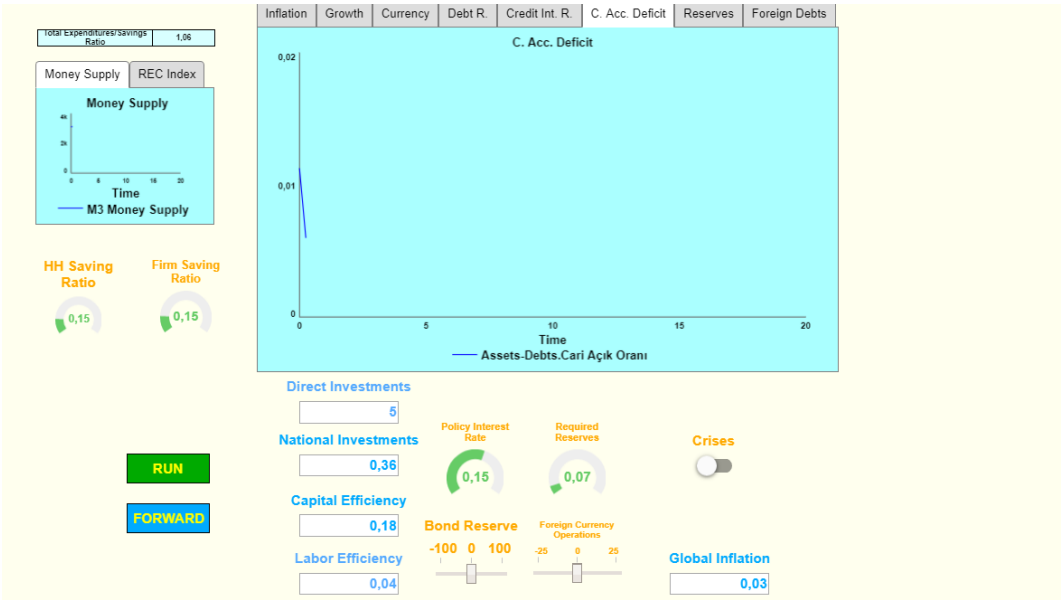

Figure 4. The Interface Designed for The Model

Against the crisis in the first scenario, the central bank will make monetary expansion by purchasing 100 billion TL of bonds. It will follow a growth-oriented policy rather than inflation targeting by forcing the loan rates to be low by not changing the policy rate and required reserves. In order to support monetary expansion, 15 billion dollars will be sold from net foreign exchange reserves to money markets.

In the second scenario, a monetary policy, which was kept tight in line with the inflation target and reached long-term international financing resources, and where required foreign currency

intervention in the money markets, was followed. The funding in question is such that $ 50 billion will enter central bank reserves with the onset of the crisis. These sources will intervene in the markets with $ 20 billion and bond purchases will be made with TL 50 billion.

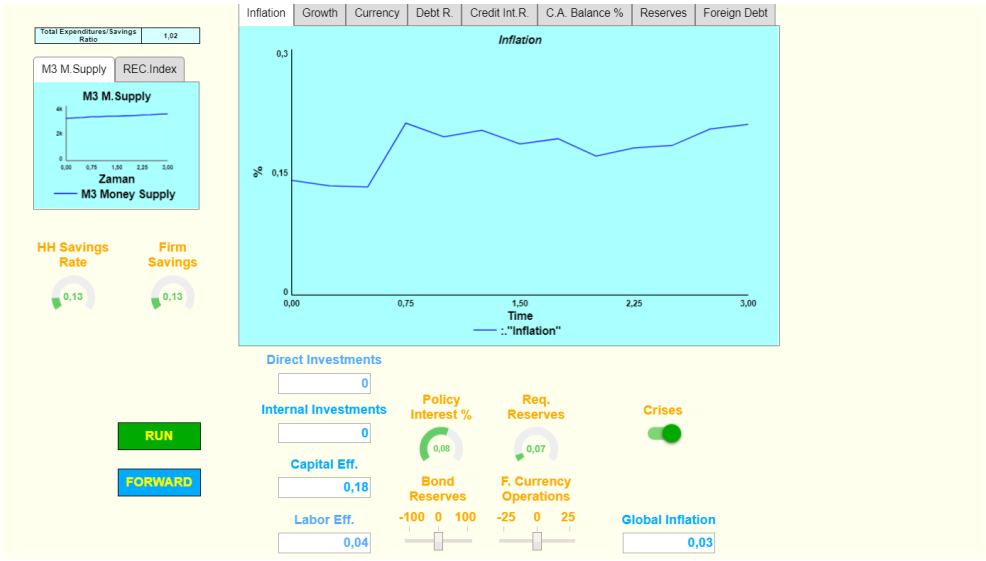

Figure 5. Interface View for the First Scenario

Figure 6. Growth Rate for the First Scenario

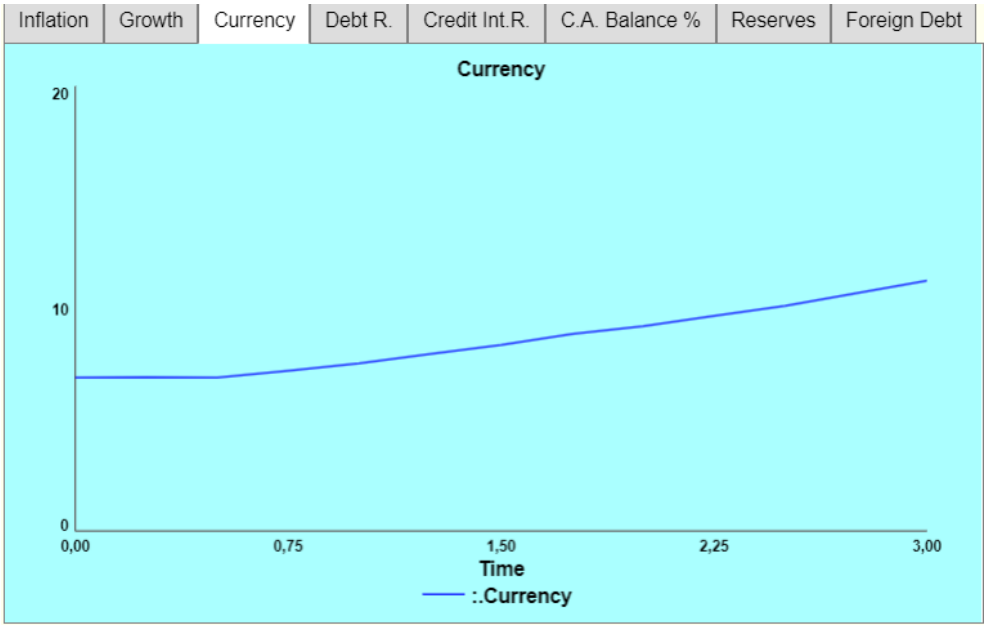

Figure 7. $ / TL Exchange Level for the First Scenario

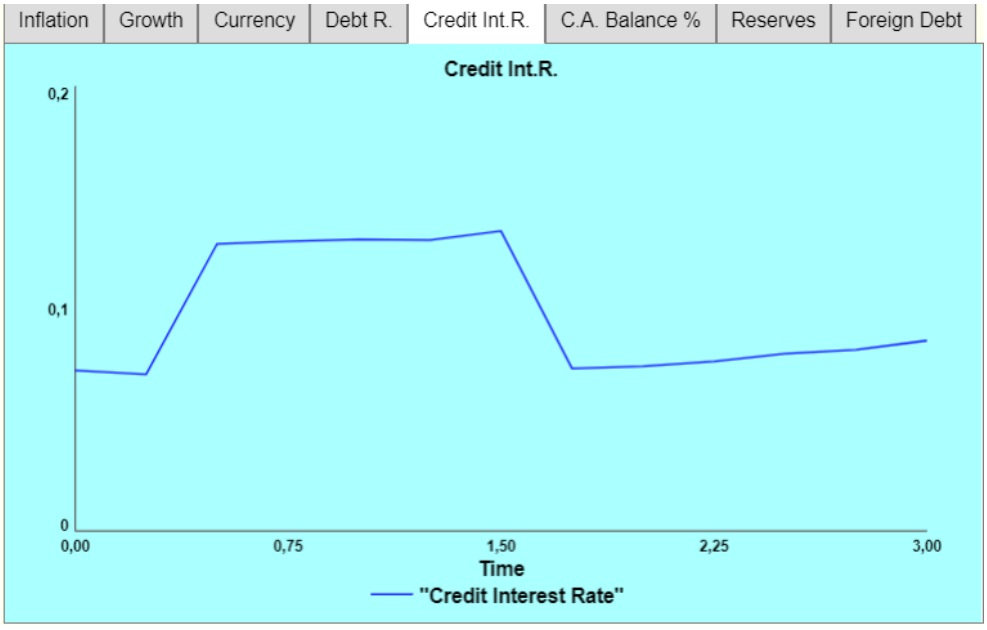

Figure 8. Loan Interests for the First Scenario

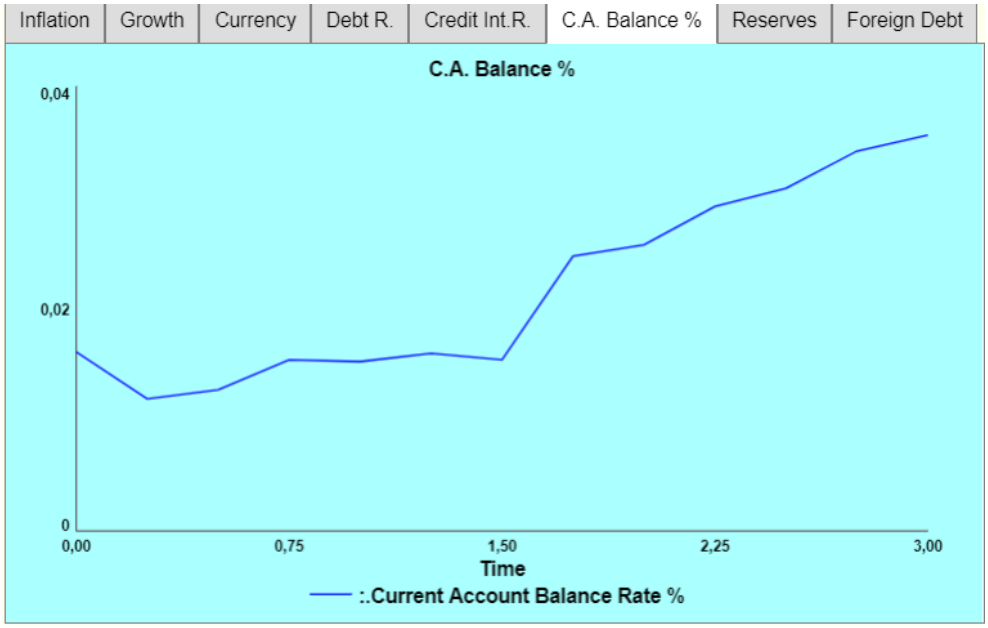

Figure 9. Current Balance for the First Scenario

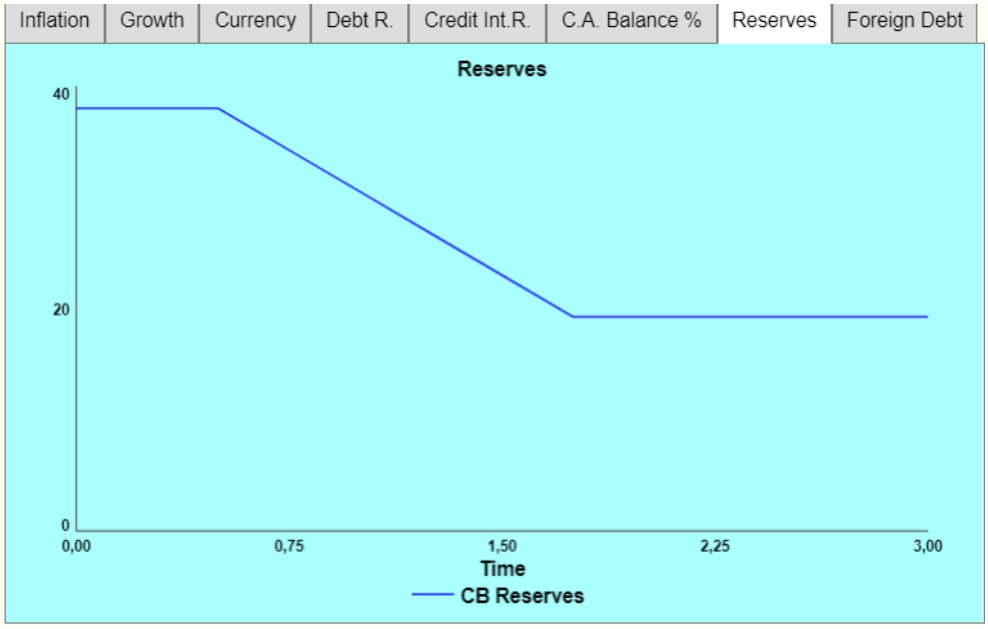

Figure 10. Central Bank Net Foreign Exchange Reserves Change for the First Scenario

As can be seen from the graphs, with the beginning of the crisis, the growth rates were stabilized around 1.5% despite the monetary expansion and foreign exchange liquidity to the markets. With the end of the effects of the crisis, these enlargements were stopped, and despite the return of the normal domestic investment environment and direct investments, the transition from the growth zone to the negative zone. This may be because portfolio flows continue to rise, increasing the $ level and holding inflation above 23% during and after the crisis, as interest rates are kept below inflation. The high inflation level and monetary expansion keep import demand alive, and the current balance is increasingly open during and after the crisis. This is another reason for pressure above the exchange rate. The exchange rate, which was at the level of $ 6.90 / TL at the beginning of the crisis, reached 12.20 at the end of 3 years. In addition, net foreign exchange reserves decreased by $ 15 billion to $ 23 billion from $ 38 billion. This decrease in net reserves is another factor that nourishes the perception of risk.

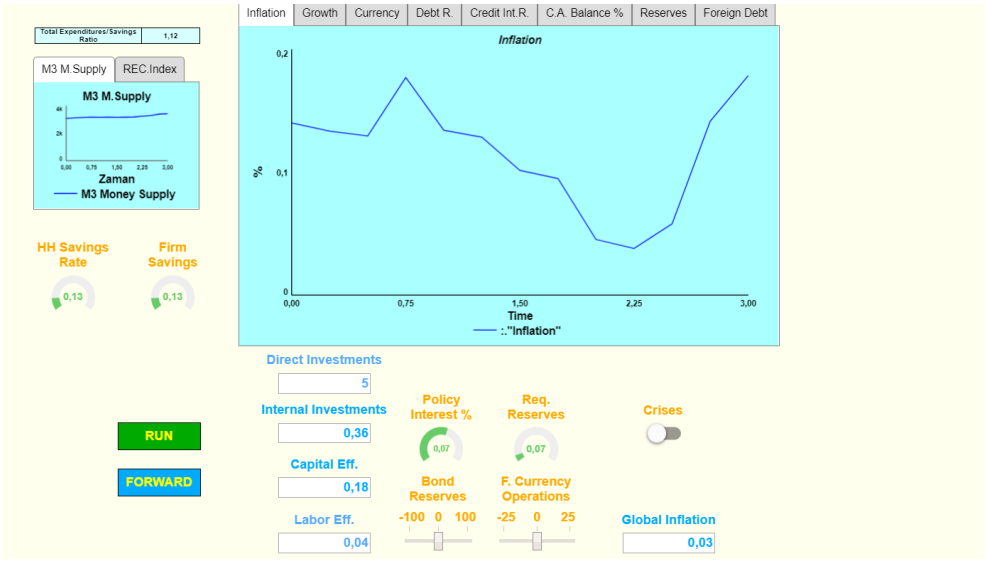

Figure 11. Interface View for The Second Scenario

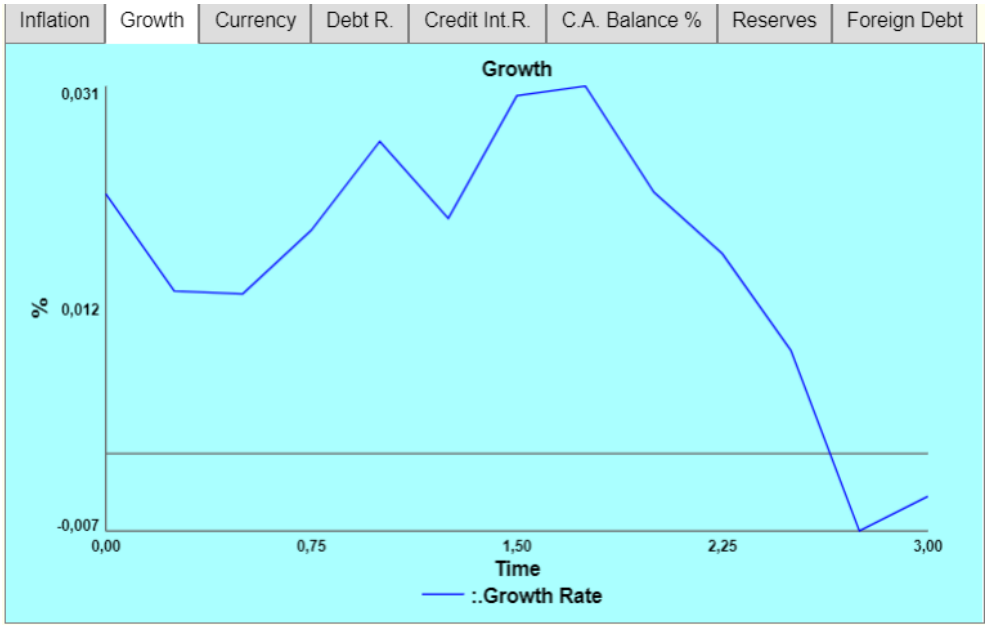

Figure 12. Growth Rates for The Second Scenario

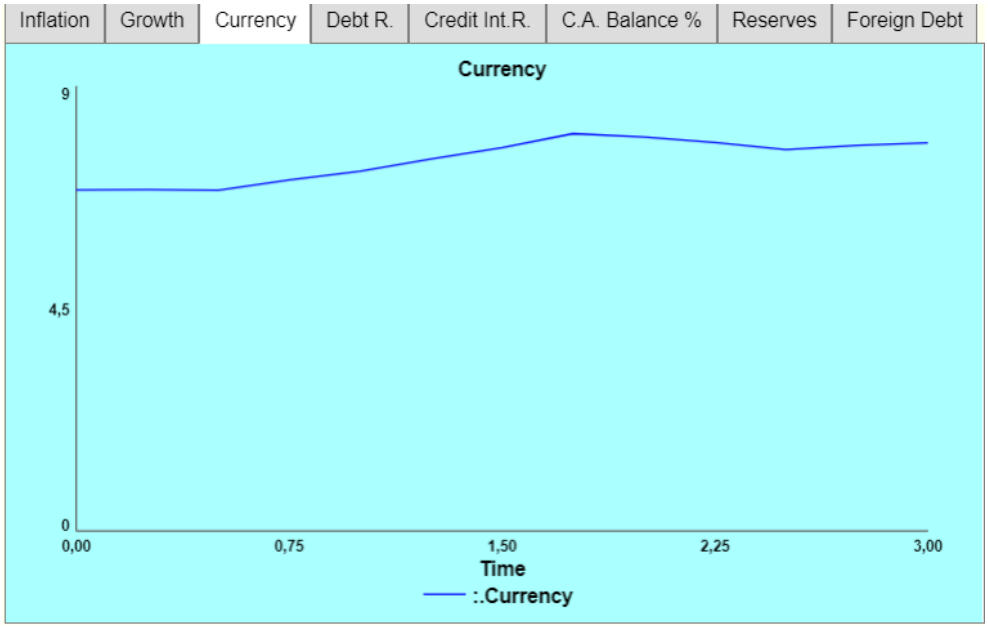

Figure 13. $ / TL Exchange Rate for The Second Scenario

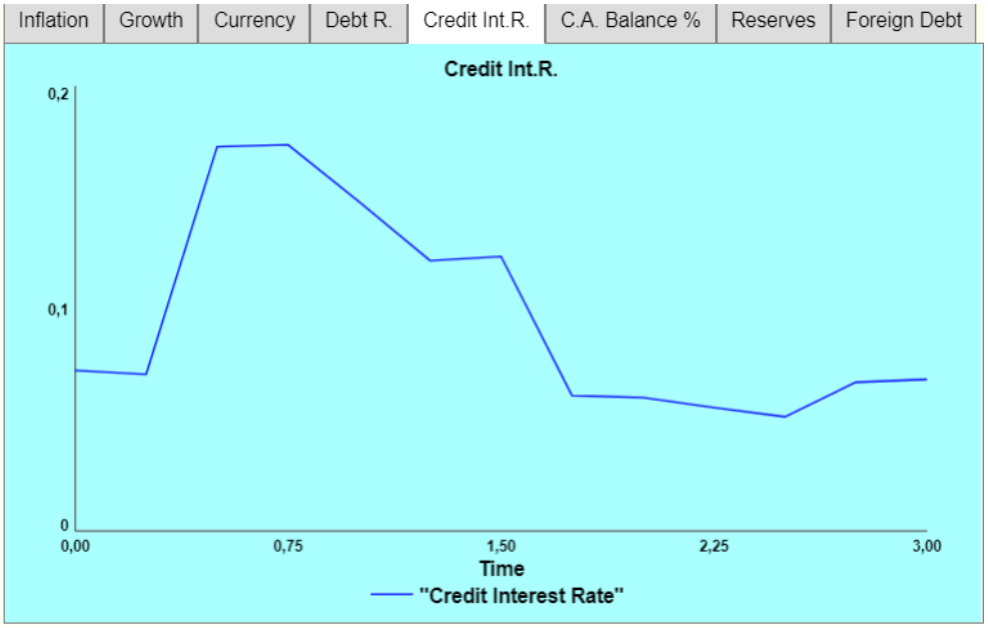

Figure 14. Loan Interest Rates for The Second Scenario

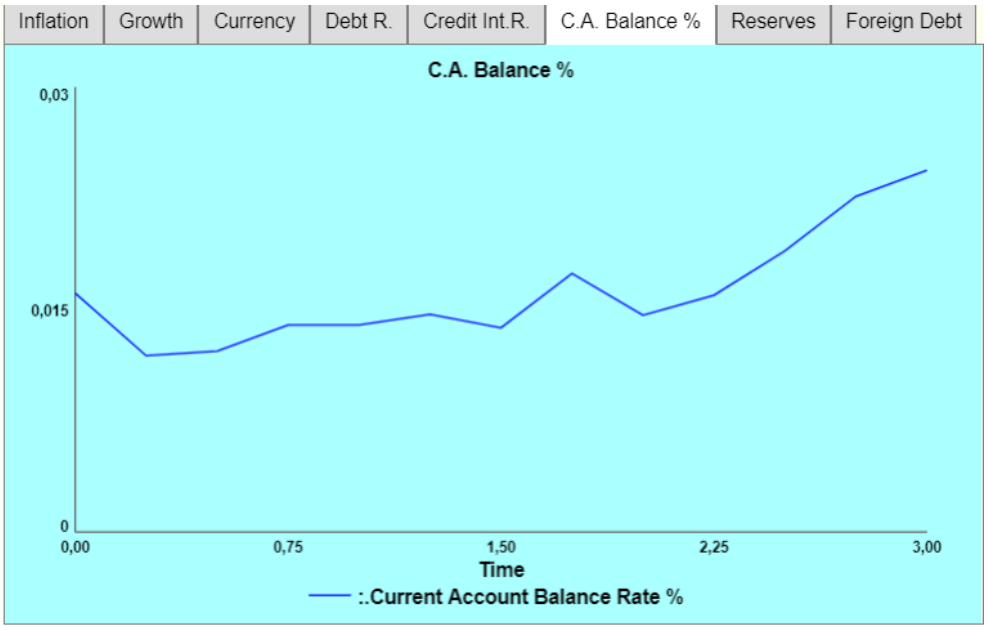

Figure 15. Current Balance Ratios for The Second Scenario

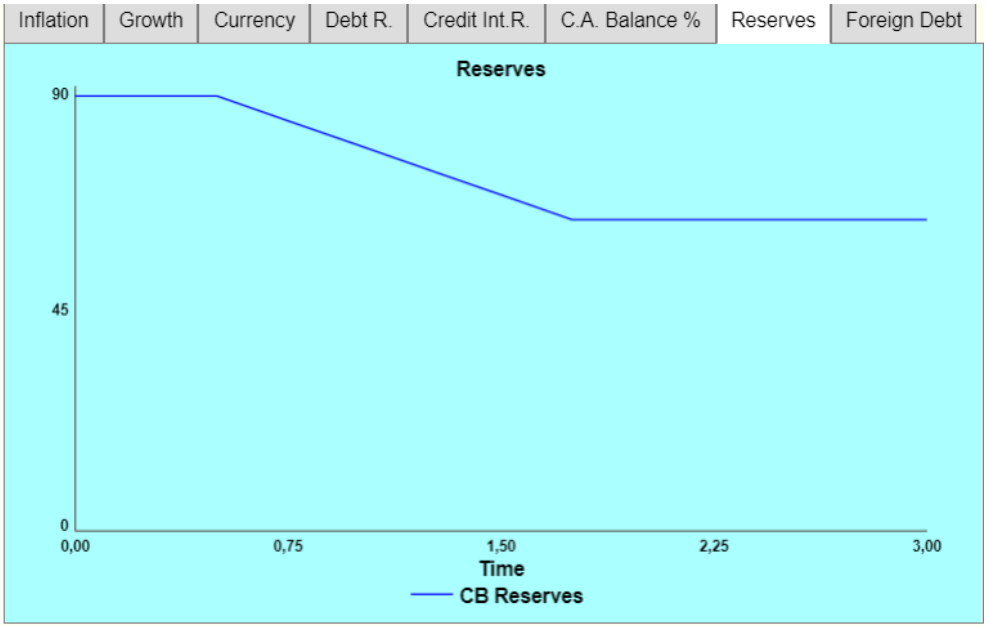

Figure 16: Central Bank Net Foreign Exchange Reserves Change for The Second Scenario

According to the simulation in the second scenario, the Central Bank meets the crisis and follows an inflation-sensitive monetary policy with a long-term external financing source of $ 50 billion added to its reserves. In order to support the markets, 50 billion TL of treasury bonds were purchased annually, and $ 20 billion foreign currency was sold. With this operation, the money supply in the market was expanded and the amount of TL given to the market was sterilized, and inflation was prevented from rising excessively while supporting growth.

The inflation level was kept at an average of 13% due to the tight monetary policy, and a lower level of inflation was achieved compared to the first scenario. On the growth side, an average level of 2% was maintained, and the negative zone was never crossed, including the post-crisis period. As of the last quarter, growth has turned its direction up again.

Starting at the level of 6.90, the $ / TL level has stabilized at the level of 8.65 at the end of three years. Thus, both the inflation side and the growth side were more positively affected than the first scenario, as the exchange rates did not show excessive volatility. Due to the adequacy of the central bank net reserves, the risk perception was kept at a controllable level. This situation affected the portfolio investments positively and exchange volatility decreased.

According to the first scenario simulation, market interest rates were kept above inflation by using Central Bank monetary policy tools. With the impact of this, although some investments were adversely affected, financial and economic stability has been maintained and the possible destructive

effects of the crisis have been minimized. Moreover, with the effect of real interest rates, consumption expenditures did not increase excessively, and a higher quality growth and a lower current account deficit level were reached. In the first scenario, despite the current account deficit level reaching up to 4% of the national income, in the second scenario, the simulation was completed with an average current deficit of around 1.5%. Foreign currency reserves are also used efficiently and completed the simulation of $ 80 billion from $ 87 billion without the need for excessive intervention. Even after the sixth quarter of the crisis, some repurchases were made and reserves were increased.

Conclusion and Discussion

The Covid-19 pandemic has adversely affected the economies of all countries of the world and continues to affect. Countries are constantly taking new economic measures in order to eliminate these negative effects. Although the measures taken will relieve the economy in the short term, it is very important to foresee their long-term effects. From this point this study aims to explore the effects of expansionary monetary policies of CBRT on economic growth, inflation and financial stability in Turkey with a holistic approach. Although the ultimate goal of the monetary policy implemented by the central banks, which are mostly the monetary authorities of the countries, is to maximize welfare, the main objectives generally accepted within the scope of this ultimate goal; price stability, full employment, economic growth, interest stability, financial stability, exchange rate stability and stability of the balance of payments. It is known that there is a significant relationship between monetary policy and inflation, and central banks' monetary policies can affect inflation. The ultimate goal of central banks is to achieve price stability. They use various strategies to achieve this goal. Therefore primarily, the variables discussed in the study and the relationships between them are expressed with visuals.

In this study which aims to analyze the impact of the monetary policies implemented during the global economic crisis caused by Covid-19 pandemic on Turkey, it was observed that an expansionary monetary policy scenario that is not based on external resources did not fully realize the expected economic recovery. It also had negative effects on other macroeconomic data such as inflation, current account balance and exchange rate. In the second scenario, a monetary policy sensitive to inflation was applied by obtaining a serious external source. The macroeconomic findings obtained are better than the results of the first scenario; more successful results were obtained in cases such as growth, inflation and financial stability. The main reason for this can be seen as a positive impact from capital movements as a result of a monetary policy that real returns adjusted for inflation as a country open to foreign capital flows Turkey. In addition, the stimulation of total demand with external sources of finance and the application of an interest rate policy above inflation prevented excessive deterioration of the current balance. In an economic crisis that has destructive effects and gained a global identity, foreign direct investments and portfolio investments are more important.

Creation the right monetary and reserves policy for Turkey's economy as minimizing risk perceptions can be evaluated as optimum. The resources obtained from the relevant period, dropping as the second scenario risk perception, if the time gained evaluated to increase the total factor productivity

of the economy, Turkey's economy by increasing the potential level of growth can proceed in a sustainable growth path.

It is thought that the framework created by the study will encourage other research to be conducted from now on. In this context, studies can be conducted to estimate the Central Bank response function by using different variables. Especially after the Covid-19 global crisis, applications for financial stability can be examined in more detail and financial variables can be added. Broader research can be conducted on the place of macroprudential measures in monetary policy. In addition to these, there may be studies in which different defined data sets related to variables will be used.

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