DRIVERS OF INFLATION IN DEVELOPING COUNTRIES

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ABSTRACT

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This study aims to examine the drivers of inflation for selected developing countries to compare the relative roles of internal and external factors. The study covers the period from 1995 to 2019, using PVAR and VAR Models. In this study, we want to test the hypothesis that the drivers of inflation have changed after the globalization. According to our results, as the world economy globalized, the inflation dynamics changed in favor of the external drivers. The exchange rate is the common driver of inflation in developing countries in our subsample, and the country characteristics have an important effect on the relative roles of different drivers.

Keywords: Inflation, VAR Model, Developing countries, Exchange Rate

ÖZ

GELİŞMEKTE OLAN ÜLKELERDE ENFLASYONUN BELİRLEYİCİLERİ

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Bu çalışma 1995-2019 arası dönemde seçili gelişmekte olan ülkelerin enflasyon yapılarını PVAR ve VAR modellerle inceleyerek, içsel ve dışsal faktörlerin enflasyon üzerindeki görece konumlarını karşılaştırmayı amaçlamaktadır. Biz bu çalışmada küreselleşmenin enflasyon dinamiklerini değiştirip değiştirmediğini test etmek istiyoruz. Çalışmanın sonuçlarına göre, dünya ekonomisi küreselleştikçe enflasyon dinamikleri dışsal faktörler lehine değişmiştir. Bu dönemde seçili gelişmekte olan ülkelerde dışsal faktörlerin enflasyonu belirlemede daha etkili olduklarını söyleyebiliriz. Ayrıca, döviz kurundaki değişim örneklemimiz içerisindeki tüm gelişmekte olan ülkeler için geçerli bir faktör olurken, diğer dışsal değişkenlerin görece konumları ülkelerin yapılarına göre farklılıklar göstermektedir.

Anahtar Kelimeler: Enflasyon, VAR Model, Gelişmekte Olan Ülkeler, Döviz Kuru

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CHAPTER 1

INTRODUCTION

Inflation refers to a quantitative measure that indicates an increase in the overall price level, which lasts over a significant period. The role of inflation in an economy is significant since it is one of the main determinants of the standard of living. It is considered the basis for many adjustments, such as determining minimum wage by governments, change in annual rents by capital holders, setting interest rates by central banks, and wage bargaining process between trade unions and employers.

It is generally perceived that low inflation is a good thing for an economy since both periods of high/hyperinflation and deflation negatively impact economic activities, which creates uncertainty, shorter economic plans, and even separation of resources from production (Vansteenkiste, 2009). However, there is no unique range of this "low" inflation for all countries. The threshold that the negative impacts of inflation on economic activity start depend on the country's characteristics (Ha et al. ,2019). In addition, just like high inflation, the extremely low inflation is also problematic for economic activity since it restricts central banks' movements to conduct effective monetary policy. When the inflation rate falls below zero percent, it affects real interest rates by causing an upward trend. It harms the public/private debt dynamics. Besides, as an extreme case, it might result in the volatility of the economic agents' inflation expectations, with the eventual problem of deflation. In such an environment, central banks focus mainly on handling the "fear of deflation" by implementing the unconventional monetary policy actions like large scale purchases of assets (Berganza, del Rio, & Borralo, 2016).

After gradually rising in the 1960s and the beginning of the 70s, global inflation reached 16.6 percent in 1974, almost eight times the global inflation rate in 2019, 2.3 percent[1]. Not surprisingly, the median consumer price inflation of

[1] 16.6 refers to the median value. The peak was 18.41 on average, in the same year, 1974.

developing and developed countries also reached the highest rate in 1974, 15.27, and 18.49, respectively. After this rising tendency, the global economy experienced a significant fall in inflation rates over the past two decades. Median global consumer price inflation declined to 1.8 percent in 2015, which is the lowest rate in almost half a century. The developing world followed the same path; inflation fell to about 2.05 percent in 2016[2].

This disinflationary period began in advanced countries in the mid-80s and in developing countries in the mid-90s coincided with the decrease in wage growth and unit cost, which is associated with China's rise in the world economy (Berganza and Borallo, 2017). By the 2000s, inflation started to stabilize and decreased to historically low levels. Encouragingly, this disinflationary period emerged in almost all developing countries, especially in Latin America and Sub-Saharan Africa, which have hyperinflation episodes in their histories.[3] (Ha, Köse, & Ohnsorge, 2019).

Although many countries experienced a decline in inflation, it is not clear whether this decline results from good policies or just global trends driven by developed countries. If the latter is the answer, we can conclude that developing countries may experience high inflation rates again in the future.

The movements of inflation have followed different patterns throughout time. Like the rising trend in the 1960s and 1970s, the declining trend in the 1990s can be attributed to some developments in the world economy and domestic economies. The drivers of inflation and their relative roles have evolved for decades. As a result, central banks and other policymakers have focused on understanding inflation dynamics' evolution and determining the appropriate policy frameworks to control it.

Moreover, since the developing and developed countries have many differences in their economic structures, the sources of inflation in these groups may differ from each other. The subjective conditions of countries need attention in this context. For example, whether a country is a commodity or an oil exporter and the role

[2] The main reason why the median value is used instead of mean is that since many countries have some high and even hyperinflation episodes in some periods, their inflation rates increase the volatility across the countries and in such a situation, mean might not be a good indicator as a measure for central tendency

[3] Especially in these regions, inflation rate declined from triple digit figures in the late 80's to single digit by the end of 2001.

of imports in the domestic economy are important in understanding a specific country's inflation dynamics. [4]

As the world economy has globalized, the role of global factors on domestic economies has changed. In this era, the range of goods and services that are subject to international trade expanded. Moreover, globalization caused tradable goods to become cheaper because of the lower production costs in some emerging economies like China. Since the main principle of the globalization is to encourage free trade internationally, the decline or abolishment of tariffs and restrictions on capital accounts allowed external factors to be more important in both domestic economies and inflation dynamics. For example, in today's world, the relative roles of external and internal factors have changed in favor of external ones since the volume of international trade and financial transactions increased. This development has contributed to the exchange rate pass-through to increase in the last three decades (Zorzi et al. , 2007).

Whenever a developing country is exposed to a negative external shock, its currency tends to depreciate, which creates inflationary pressure on the economy since most of the developing countries depend on imported intermediate goods in their domestic production. This kind of shock may also cause a balance sheet crisis in developing countries because of their asset-liability mismatch problem. Thus, movements of exchange and the other global factors deserve special attention in examining the inflation dynamics in developing countries.

The disinflationary period began in the second half of the 1990s; some developments contributed to the declining trend in inflation in developing countries (Ha, et al. ,2019). The most important factors contributing to this trend are the appreciation of developing countries' currencies and a positive global environment decreasing pressure on inflation worldwide. In addition, the decline in the oil prices in the first half of the '90s, which is one of the most important supply-side factors in the inflation in developing countries, contributed to the decline in the inflation rates

[4] These differences may be caused by many reasons. For example, since all of the developing countries have the problem of asset-liability mismatch, which refers to situation where the assets of a country do not fully match the liabilities because of the dollarization of liabilities, any depreciation in foreign exchange rate have increasing effect on liabilities, which affects price level and thereby the inflation. However, since developed countries in general don’t encounter such a problem due to globalization of their currencies, they have different dynamics in inflation.

(Domaç and Yücel, 2004)[5]. Moreover, some argue that most developing countries experienced many institutional changes in their monetary policies, such as implementing inflation targeting as a monetary regime. Switching to a floating exchange rate might have played a role in the disinflationary trend (Ha et al. ,2019).

Although all of these developments caused similar patterns, since there is heterogeneity among the developing countries, these factors' relative roles change from country to country. The heterogeneity in developing countries caused different trends in inflation rates, especially in the post-crisis era. For example, after the global financial crisis, while some countries in East Europe, new members of the European Union and emerging Asia like China, experienced relatively low inflation rates, in many developing countries like India, Turkey, Russia, Brazil, and Indonesia, inflation rates stayed high (Berganza, del Rio, & Borralo, 2016).

In this study, we investigate the determinants of inflation for a selected group of countries by utilizing some econometric techniques. This study's first objective is to determine internal and external factors affecting inflation in developing and developed countries. Second, we aim to determine if there is a change in these drivers' relative roles. The main questions of the study are as follows:

- What are the main drivers of inflation, and is there any evolution of these drivers throughout time for developing countries?
- How important the country characteristics in determining the main drivers of inflation?
- Is there any change in the relative roles of internal and external factors?

Overall, this study aims to test the hypothesis that drivers of inflation have changed throughout globalization, and external shocks have been increasingly crucial in inflation in today's world. Although some studies tend to focus on the increasing role of external factors in the literature, the time-varying changes in external drivers' role, especially the exchange rate and the effects of exchange rate depreciation, have not been adequately examined yet. In this study, we examine whether inflation in developing countries is driven mainly by global or domestic factors in today's globalized world economy for developing countries.

[5] There are some ups and downs in the price of oil in his time. This falling trend occurred in second half of 90s and ended in 2000s.

This study aims to contribute to the literature by examining the inflation dynamics of multiple countries to find whether there is a common driver for different countries and how the country characteristics affect inflation dynamics. In general, the literature on inflation dynamics analyses a single country or countries with similar characteristics. However, in this study, we investigate countries' inflation dynamics with different characteristics with panel vector autoregressive models. In addition to that, the standard vector autoregressive model completes PVAR by also examining the country characteristics.

The outline of this study is as follows. In the second chapter, the stylized facts about inflation will be summarized by using some descriptive statistics. Different measures in calculating inflation, the global and domestic inflation rates, and various components that affect inflation are discussed in this part. The second chapter's findings are that, first, it seems that globalization decreases the correlation among different measures of inflation. Second, developing and developed countries have different inflation experiences. The developing world has higher and more volatile inflation rates historically; however, this spread began to decline after the second part of the 1990s. Third, the inflation dynamics are also different; for example, the correlation between the exchange rate and inflation is much higher in the developing countries.

In the third chapter, the existing literature on inflation dynamics and the evolution of these dynamics with globalization will be discussed to have a broad picture of inflation in developed and developing countries. It seems that there was a change in the focus of the literature on inflation before and after globalization. While the traditional theories regarding the sources of inflation focus on internal factors such as excess money supply and budget deficits, the literature focuses on external drivers growing, especially after the 1990s, when almost all countries started to open their domestic economies to the globalized world economy.

In the fourth chapter, we utilize some econometric models to understand the dynamics of inflation for selected countries. In this part, we use two main econometric methods, panel vector autoregressive model (PVAR) and vector autoregressive model (VAR). We use the PVAR model since we want to examine the inflation dynamics of multiple countries together. Since PVAR models are not common in the literature on drivers of inflation, this study is one of the first examples in this field.

Although this study's main objective is to determine the sources of inflation in developing countries, we also investigate some developed countries to see whether there is a difference in these country groups' inflation dynamics. This chapter starts with estimating the panel vector autoregressive (PVAR) model to examine whether there is an important common driver of inflation for all developing countries in our subsample for a relatively long period (1995-2019).

We use the PVAR model for our study. The relative studies focus on single country determinants of a little group of countries with similar characteristics. There is a need to investigate countries under different conditions. Different from other studies, we examine whether there is a common driver for countries under different conditions. For this estimation, we use nine inflation targeting developing countries since we also want to test whether or not the main idea of inflation targeting that is internal drivers mainly drive inflation, and it can be controlled by policy rate, which is valid for developing countries.

According to the PVAR model results, the exchange rate is the common driver of inflation in all developing countries under investigation. As the number of countries included in the model increases, while the importance of other variables changes, foreign exchange stands as a main factor of inflation in all cases.

We estimate vector autoregressive models for three selected developing countries (Brazil, Hungary, and Turkey) in our sample and three major developed countries (Japan, UK, and the US) to see how the country characteristics affect the inflation dynamics. For developing countries, we want to see the inflation dynamics of countries with considerably different characteristics. The Latin American hyperinflation experienced Brazil, The East European Hungary, which has relatively low inflation, and Turkey, which is in the middle of these two cases. For the developed countries, we use the three developed countries with three major currencies, US Dollar, Sterlin, and Yen. Since countries in the Eurozone do not have independent monetary policies, we don't include a country that uses Euro[6] in our sample.

According to the results, first, for all countries, external variables are the leading factors of inflation (WCPI, FX, Imports); however, there are differences in the relative roles of these variables. In addition, when we compare the inflation dynamics of

[6] The policy rates are announced by European Central Bank for all countries.

developing and developed countries, while the role of FX is so important in developing countries, we don't see such importance for developed countries.

CHAPTER 2

SOME STYLIZED FACTS ABOUT INFLATION

2.1. Introduction

Throughout time, inflation has been an important issue for developing countries since instability in prices undermines economic activity and causes low economic growth rates. Policymakers in those countries have struggled to take inflation under control as a primary goal to create stable economic conditions (Ha et al. ,2019). However, since inflation is a complex and serious problem, it is impossible to understand what drivers cause and control it easily. In this vein, it is useful to examine the historical movements of inflation and inflation factors. The descriptive statistics will help to understand the general picture of inflation.

Although there is a generally accepted definition of it, there are many ways of calculating inflation. Different measures are used for different purposes in economics. The core of headline inflation, Consumer Price Index (CPI), Producer Price Index (PPI), and GDP Deflator gives different answers. Moreover, country characteristics have an important role in understanding inflation dynamics because of the differences in developing and developed countries' economic structures.

To see how these differences, affect inflation dynamics among these countries, the relationship between inflation and different macroeconomic variables should be examined. The main findings of this chapter are as follows. First, inflation has followed different trends globally since the late 1960s. Second, although there are some exceptions, there has been a decline in inflation rates in developed and developing countries since the 1990s. Besides, there has been a convergence of inflation rates among countries; that is, the inflation spread between developed and developing countries has decreased. Third, developing countries have higher and more volatile inflation rates than developed countries historically because of their debt and more fragile economic structure against external shocks, especially the exchange rate

shocks. Fourth, some global factors, such as a change in oil, food, and commodity prices, influence inflation in developed and developing countries[7]. The next section investigates descriptive statistics regarding inflation, the different ways of calculating inflation (CPI, PPI, and Deflator), the historical trends in inflation, the relationship of domestic and global factors with inflation rates, and the last part summarizes the findings.

2.2. Descriptive statistics About Inflation

Before exploring the factors triggering inflation, some conceptual discussion would be useful. There are different measures of inflation for different purposes.

The most commonly used inflation measures are headline and core inflation. Headline inflation generally refers to the percentage change in a representative subject's consumption basket without excluding any goods (Worldbank, 2019). On the other hand, core inflation has the same definition, but it excludes the price of goods and services that are the most volatile in particular food and energy prices.

These two different measures are useful for different purposes. For instance, to examine the change in purchasing power and households' wealth, the headline inflation would be more useful than core inflation. On the other hand, to evaluate the monetary policy's success, core inflation is used mainly by central banks. As will be explained, central banks' main objective is to reach the targeted inflation rate using monetary policy. As the actual inflation approaches the targeted rate, the central bank is considered successful. However, since the energy and food prices are externally determined, which means they are out of control of monetary policy, a type of inflation that excludes these two variables might better evaluate the monetary policy. Besides, we would encounter different inflation rates for different groups in society, such as producers, consumers, and even in different income groups since they all different consumption bundles. Thus, an index for inflation can be adjusted for consumers, producers, or reflecting changes in the economy (GDP deflator).

The most common measure is the Consumer Price Index (CPI), which covers the cost of a representative household’s consumption basket. The Producer Price Index (PPI) refers to the same changes for the representative producer. The GDP deflator

[7] For example, rise in oil prices were the primary reason of the globally high inflation rates in 1970s.

covers the change in the price of a country's output (Worldbank,2019). Its main difference is that it excludes the prices of imported goods.

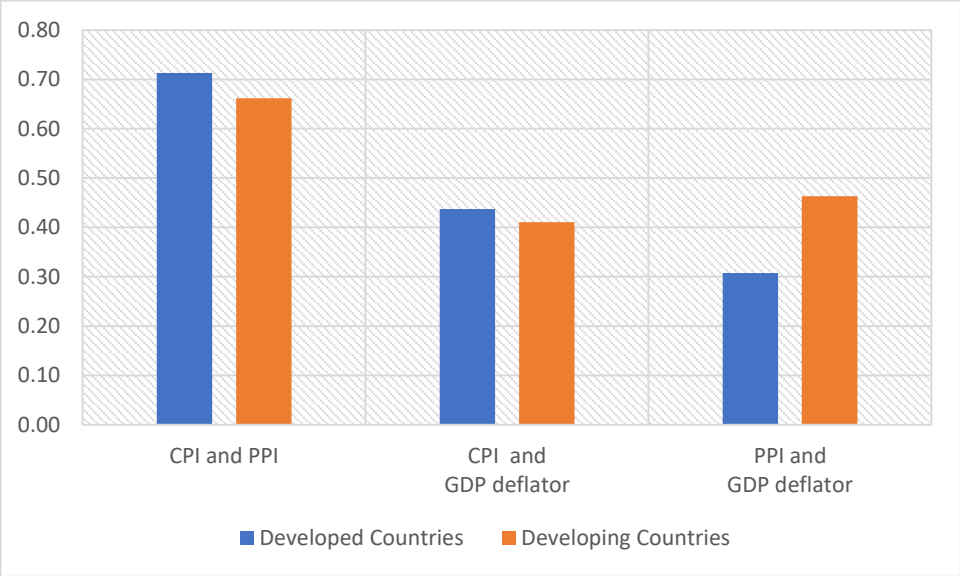


Figure 2.1 The correlation Among Different Measures of Inflation

Source: Author's calculations based on WB data.

Note: The correlation coefficients are calculated for 53 countries (23 developed- 30 developing), in which all data for these variables are available.

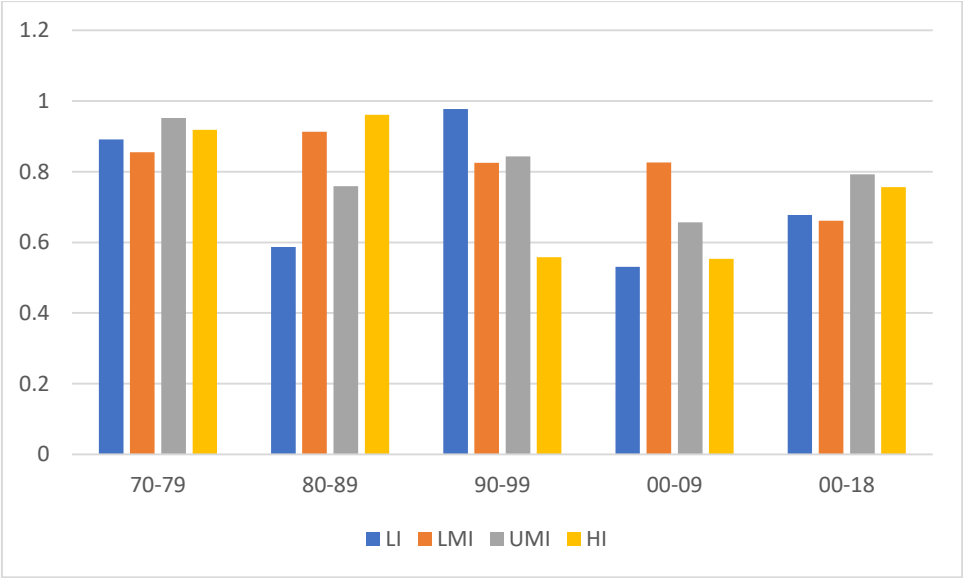


Figure 2.2 The Correlation Between CPI and GDP Deflator Inflation of Countries (1970-2018)

Source: Author's calculations and WB/ WDI

Note: For all periods, they are ordered from left to right in this way: Low-Income Countries, Lower-middle Income Countries, Upper Middle-Income Countries, and High-Income countries.

As seen from the figures 2.1.1 and 2.1.2, the CPI and PPI movements are highly correlated for developing and developed countries. On the other hand, the correlation between CPI and PPI and GDP deflator are relatively lower in these countries since imported goods consist of a significant part of the consumption and production baskets. Figure 2.1.2 shows the highest correlation for all income groups experienced in the 1970-79 period when the world economy was less globalized than the other periods. As the neoliberal economic policies become more popular among countries, the inclusion of the imported goods in consumption baskets increased. As the weight of the imported goods in the whole economy rises, the inflation rate becomes more sensitive to the exchange rate movements[8]. The exchange rate movements and removing the barriers to free trade raised the percentage of imported goods in the

[8] In this case, decrease in the correlation between CPI and GDP Deflator based inflation rates might be arised from the role of imported goods in the consumption baskets. The main difference between the GDP Deflator and CPI is that while the Deflator excludes the imported goods, CPI includes all goods that representative household consumes.

consumption baskets. On the global side, as China and some other developing countries became important actors in the world trade, this increased the world economy's competition. The import prices around the world pushed down. In addition, especially in developed countries, tax and subsidy policies of governments cause a divergence between the PPI and the GDP deflator; as a result, the correlation between the PPI and the GDP deflator in developed countries is significantly less than the developing countries (Ha, Köse, & Ohnsorge, 2019)

Although there are some differences in drivers of inflation in developing and developed countries, some global developments affect both of them[9]. Thus, it is beneficial to examine the historical movements and trends of inflation.

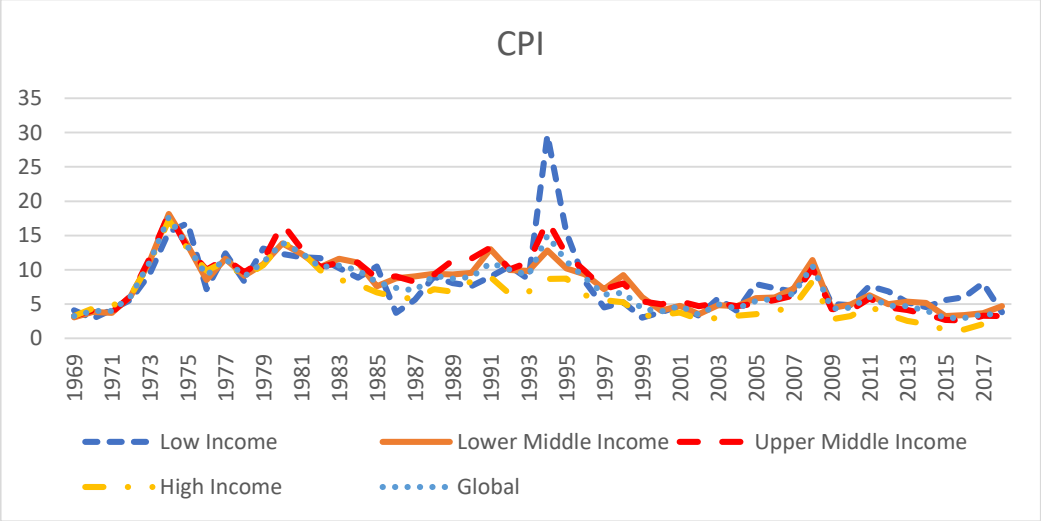


Figure 2.3 Inflation based on CPI (1970-2018)

Source: WB/WDI

[9] For example, increase in oil prices by OPEC countries.

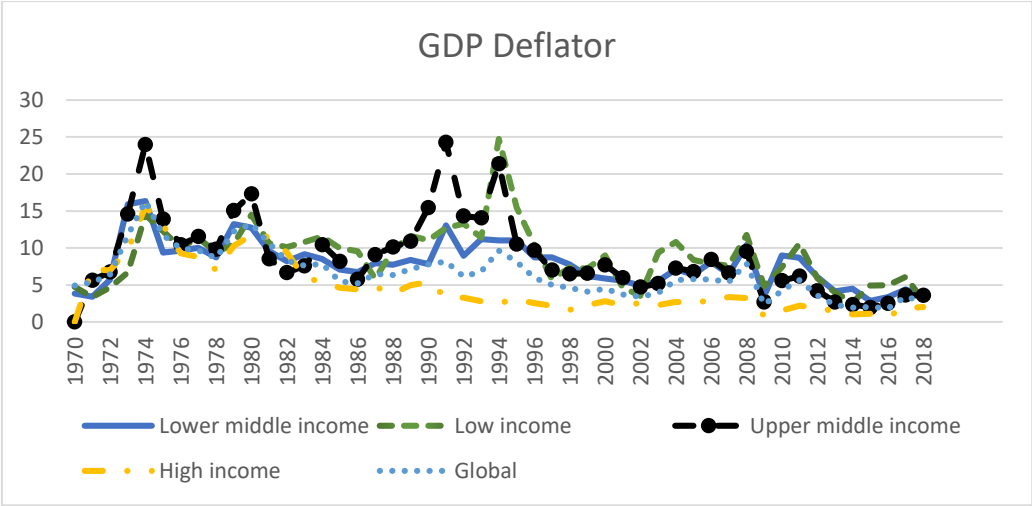


Figure 2.4 The Inflation rates based on GDP Deflator, (1970-2018)

Source: WB/WDI

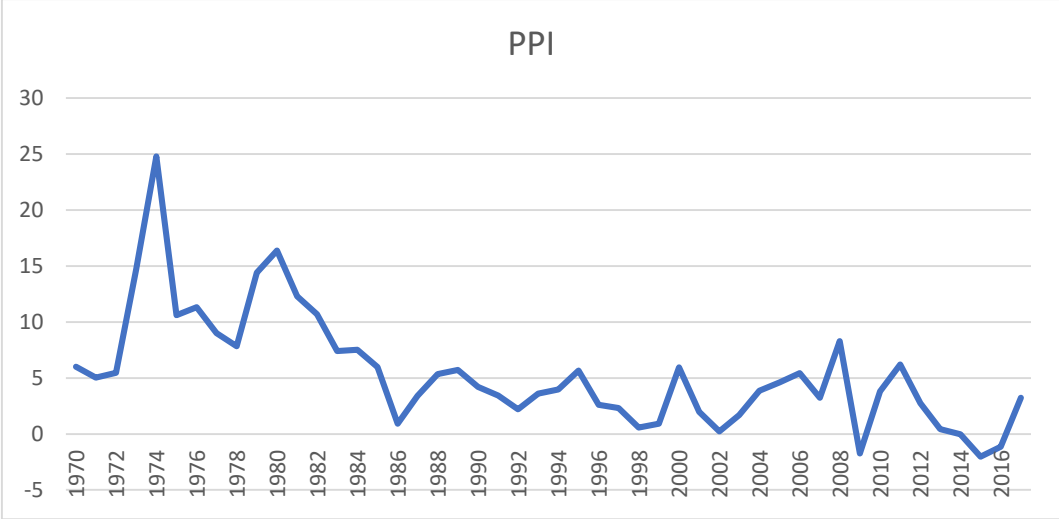


Figure 2.5 The Inflation rates based on PPI, (1970-2018)

Source: WB/WDI

Note: These are the annual consumer price inflation rates of all countries available in the World Development Indicators, World Bank. Since the PPI is not available for different income groups, the global PPI based inflation is represented.

The disinflationary period is about 25 years old, dating around the mid-1990s, has continued after the Global Financial Crisis for some countries. Although the inflation rate has increased in both advanced and developing countries at the dawn of the Global Financial Crisis (GFC), inflation started to fall sharply around the world after 2009, especially for developed countries. In figures 2.2, 2.3, and 2.4, inflation movements in different income groups in a given period are demonstrated. The figure shows that the world economy has experienced many ups and downs in inflation rates. Besides, although, in general, the inflation rates in different countries have been moving together for a long time, in some periods, different income groups reacted differently from others. For instance, while during the 1970s, all income groups were affected by the oil shock. They all experienced high rates of inflation. During the mid-1990s, the developed world did not experience such an increase in inflation as developing countries[10]. In this vein, to understand these trends, it is essential to have a historical and institutional background.

The 1970s was very problematic for all income groups in the world. Because in this period, the world economy witnessed major oil crises, which caused oil prices to quadruple, from 2.7 percent to 11 percent in 1974 and 35.52 percent in 1980, which increased the global median inflation about 4 percent (Figure 2.5). Also, as a critical institutional turning point, the Bretton Woods agreement ended in this period. After eliminating the fixed exchange rates as a nominal anchor, some developed country central banks conducted monetary policies to support economic activity. However, in that environment, they experienced stagflation, an inflationary wage-price spiral. For developing countries' case, they have affected both the oil shocks and the spreading inflationary effect of developed countries (Ha et al., 2019).

[10] In fact, the heterogeneity of developing world can be another implication from the graph, since different income groups reacted at different degrees in some periods.

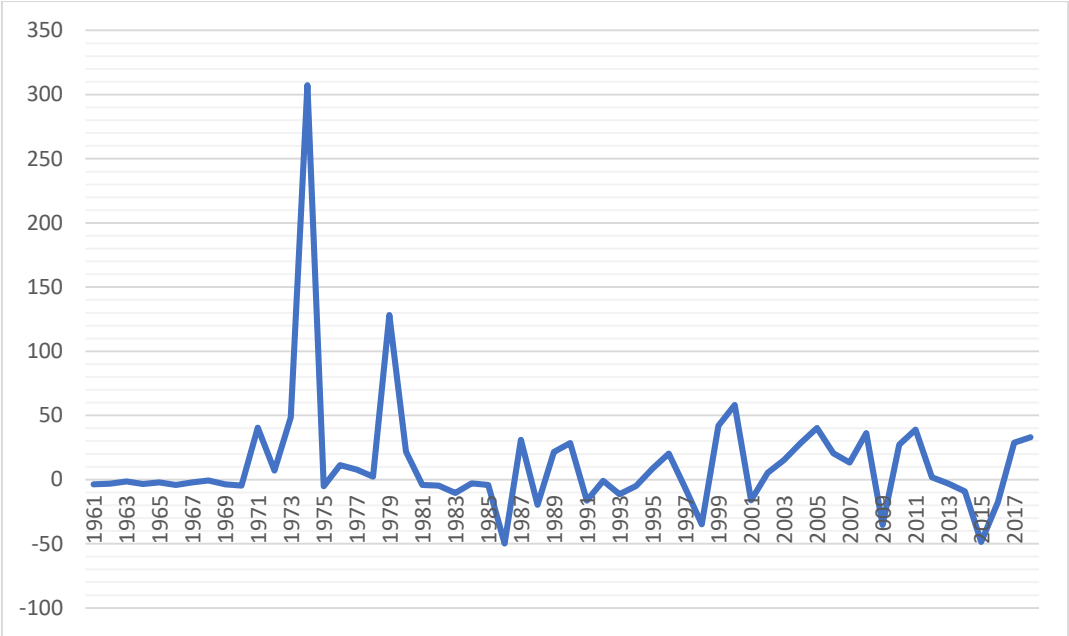


Figure 2.6 Percentage Change in Oil Prices (1960-2018)

Source: OPEC[11]

In the 1980s, in developed countries, inflation declined sharply from a historically high rate of 16.6 percent in 1974 to 5.8 percent in 1986. Although this decline in inflation can be considered a success, these countries increased their short-term interest rates much. This increase in interest rates undermined the economic activities in the advanced world[12] (Ha et al., 2019). For developing countries, the increase in budget and current account deficits coincided with the efforts to pursue a fixed exchange rate and political problems, making these countries experience a disinflationary period later than the developed world. (Dornbusch,1986; Edwards, 1989).

[12] For example, in 1981-82 period, the US output contracted by 2 percent

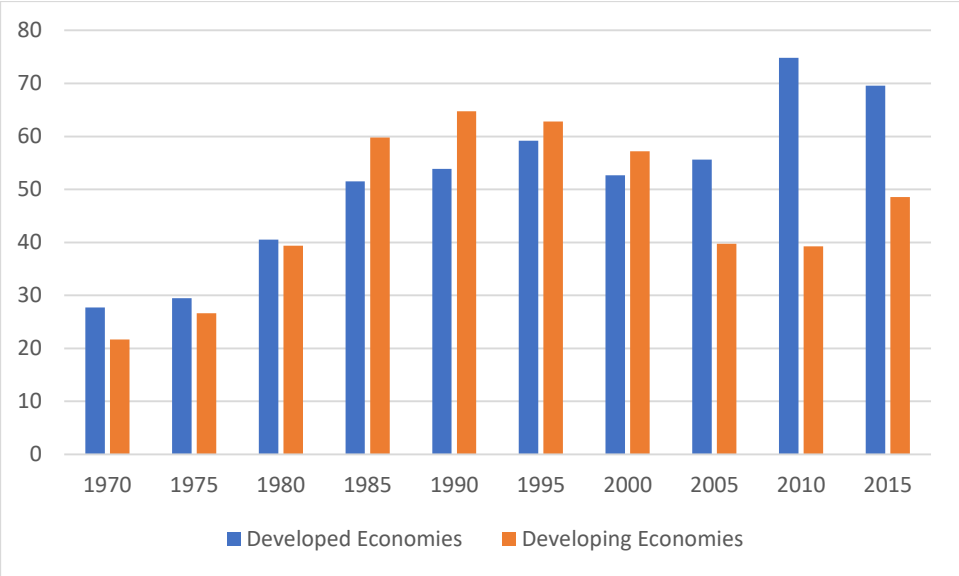


Figure 2.7 General Government Debt of Developed and Developing Countries

Source: Source: WB/WDI-IMF/WEO

Note1: In order to avoid the outlier effect, the median is used as an indicator. For any period, the left one is developed, and the right one is a developing country.

Note:2 For the period before 1990, the available data is taken from WB Inflation Report (2019)

In the first half of the 1990s, we see different directions in inflation between developed and developing countries. In that period, the developing world suffered from a series of financial crises that have started in the 1980s. In the first part of the 1990s, several currency crises caused a decline in central banks' foreign reserves and ended with their domestic currencies' devaluation. The currency crises resulted in several problems, such as the balance of payment and banking crises. Also, to offset the damages, governments increased their expenditures, which caused budget deficits. For example, in Latin America, Argentina, Peru, and Brazil experienced several crises, which resulted in high budget deficits. For the Latin American case, when access to international markets was limited, like most developing countries, they tried to finance these deficits using domestic sources. Other countries in the developing world, for example, Turkey and Israel, were suffering from the same problem. However, they did

not experience hyperinflationary episodes, although their inflation rates were still considered high (IMF, 2001). [13]

In that period, many developing countries implemented the IMF/WB supported stabilization programs, including structural and institutional reforms. These programs' general characteristics were to increase international capital access, abolish foreign exchange and domestic market controls, and implement fiscal consolidation. Also, since these programs prioritize lowering inflation, they ignored other problems in the economy, such as income distribution and unemployment (Jayadev,2008**).** Although in the first part of the 1990s, these programs brought about output losses and an increase in inequality in these countries, eventually, inflation started to decline in the second half of the 1990s. Although the developed and developing countries' disinflationary periods are different, the role of some factors is the same for both groups**.** This trend was mainly associated with the decline in prices due to rising competition in the world economy, mainly driven by China (Berganza and Borrallo 2017). The vastly expanded global workforce affected wages and wage growth, contributing to the decline in the prices[14]. As the imported consumer durables from Asia increased, the CPI inflation has begun to decline because of the growing role of the imported goods in the countries' inflation rates in globalization (White, 2008)**.**

[13] Although the relationship between the budget deficit and inflation is not simple, it may be one reason for the hyperinflation episodes of developing countries in the early 1990s. Likewise, the declining deficits/ surpluses in the 2000s may be another reason for disinflation after the 2000s.
[14] Not only China, but also for many developing countries, in that period although the nominal wages increased, since the productivity has grown even faster than the wages, the unit labor costs did not increase.

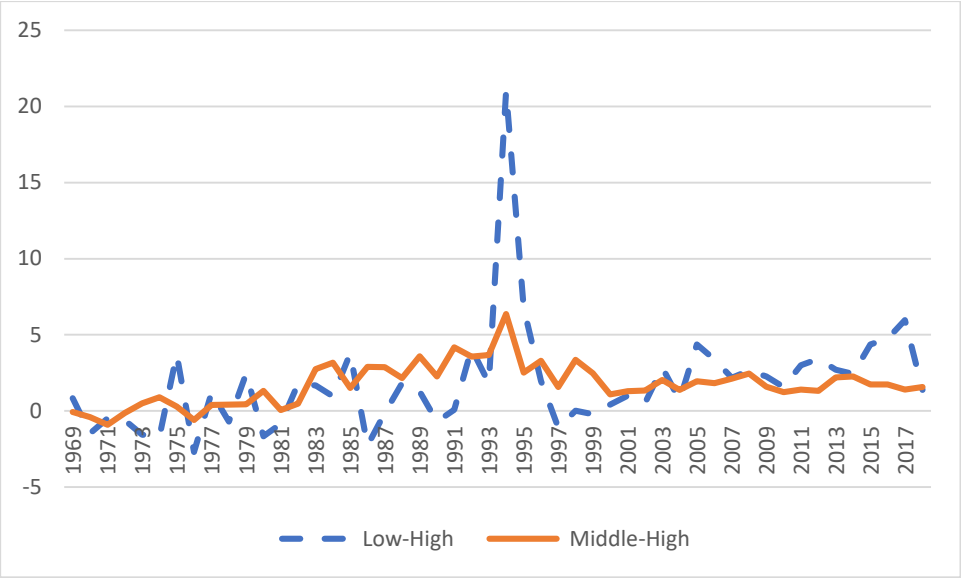


Figure 2.8 Inflation Spread Between Developing and Developed Countries[15]

Source: WB/WDI

Besides, after the Soviet Union's collapse, many East European countries have moved towards the liberal policies from centrally planned socialist policies. In that period, these transition economies suffered from inflation much and experienced low and even negative growth rates (Fischer et al. , 1996). As a result, in the first part of the 1990s, the inflation spread between developing and developed countries peaked at 6.35 between middle and high income and almost 21 percent for low and high-income countries (Figure 2.7). In addition to all, a declining trend began in the mid-90s, especially in some Latin American countries.

[15] Inflation spread is calculated as the difference of median inflations of developing and developed countries.

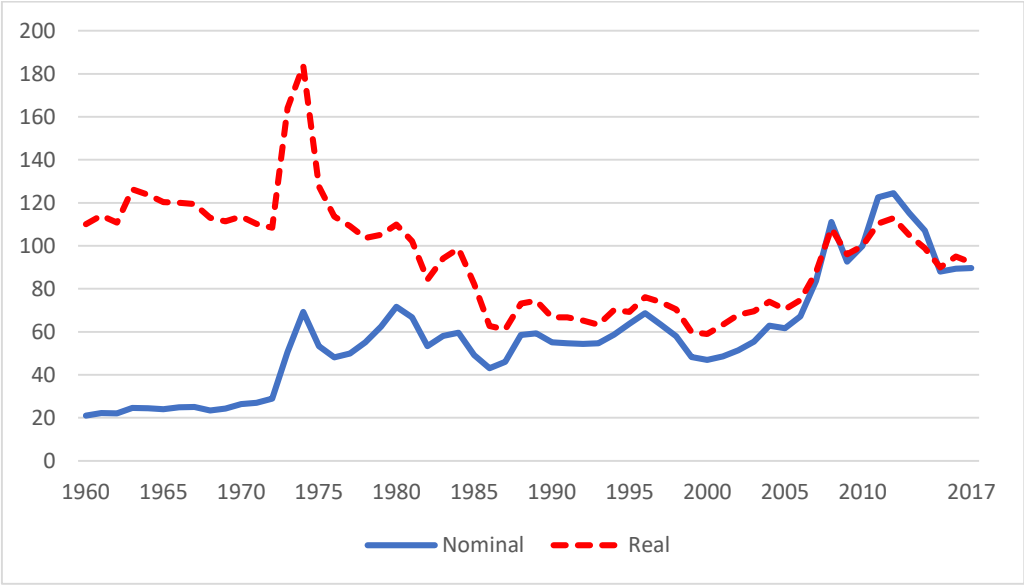


Figure 2.9 Global Food Prices (2010=100)

Source: WB

Figure 2.8 shows the change in food prices over the years. This graph is critical to understand why supply-side factors have an impact on inflation rates. According to the graph, there is a coincidence between food prices and global inflation trends after the 1990s[16]. There was a rising trend in food prices in the 2000s when the disinflation slowed, and the disinflationary period in the 1990s coincided with very significant declines in global food prices[17]**.** As a result, both high share in consumer expenditures and rising prices make food inflation can be considered as one of the most important drivers of CPI in developing countries (Akçelik, 2013)[18].

[16] In fact, we see the coincidence at different periods . Although, the majority of the literature agree that the oil prices are the main reason of high inflation rates at 1970s, we can say that the rising tendency of the food prices at same period contributed to this development.

[17] The post-crisis period can be another example for coincidence between inflation and food price movements

[18] Although there is a falling trend in 2012, it is still above the prices of the 1990s when the developing countries witnessed high rates of inflation.

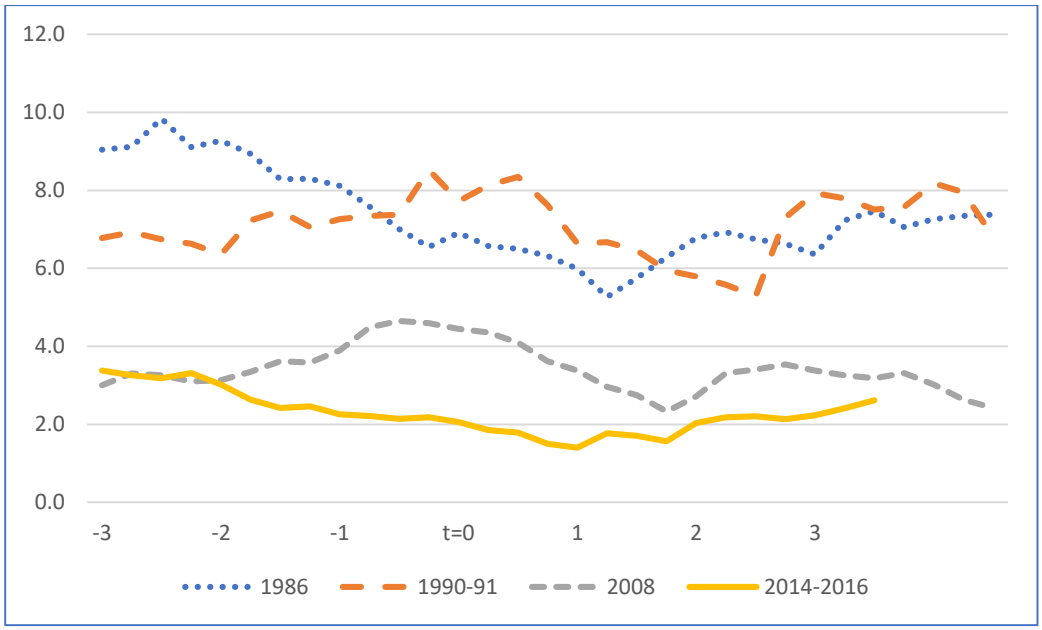


Figure 2.10 Global Inflation During the Oil Price Declines

Source: WB

Note: The term "t=0" refers to the time that a crisis occurs, "t=1" is one quarter later, and "t= -1" is one year before, respectively.

Besides, as mentioned in the 1970s inflation rates, global inflation reflects oil price innovations, which is another important supply-side factor. Like high inflation rates in the 1970s as a reflection of the gradual rise in the oil prices, the global inflation decreases in response to the decline in the oil prices (Figure 2.9)

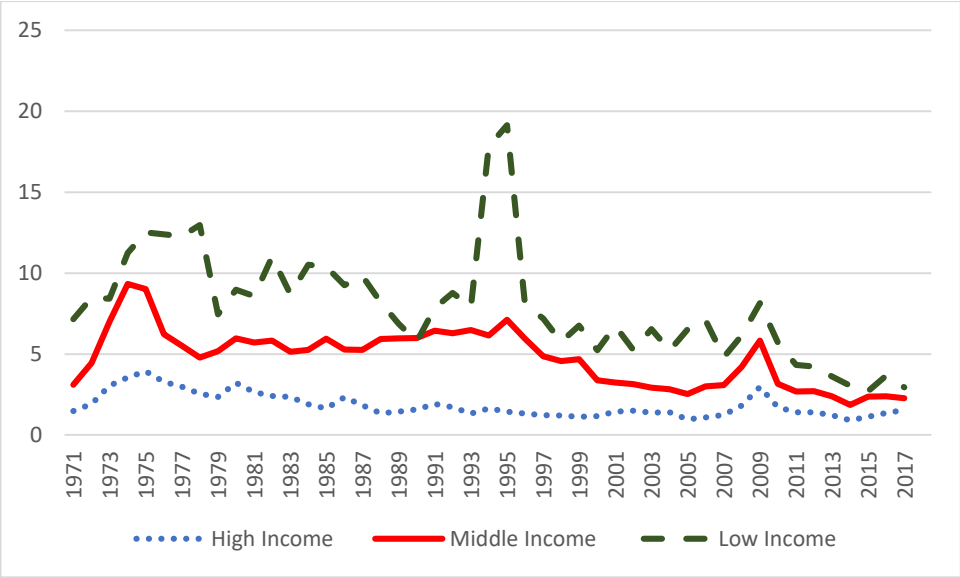


Figure 2.11 Inflation Volatility in Developed and Developing Countries[19]

Source: WB

Note: Since there is heterogeneity in the developing world, it is useful to separate them into two groups to make the changes more visible. The high income still refers to the developed countries.

In the 2000s, the declining trend in inflation almost paused until the global financial crisis because of the rapid increase in energy and food prices. However, in that period, developing countries experienced spectacular growth performances. They almost doubled their growth rates in the 2000s, benefited from financial inflows, and experienced an increase in exports thanks to the rise in demand in developed countries. Besides, in this period, developing countries' currencies appreciated, which helped them lower their inflation. More importantly, although there is no significant change in the median inflation in the first half of the period, the average inflation rate declined and converged to the median. This development implies that some countries that experienced high inflation in the 90s curbed their inflation rates, and in turn, inflation in these countries converged to the general level. Also, this convergence leads to a decline in inflation volatility.

[19] Since developig countries have heterogeneity in itself, it is more convinient to seperate them in two groups .

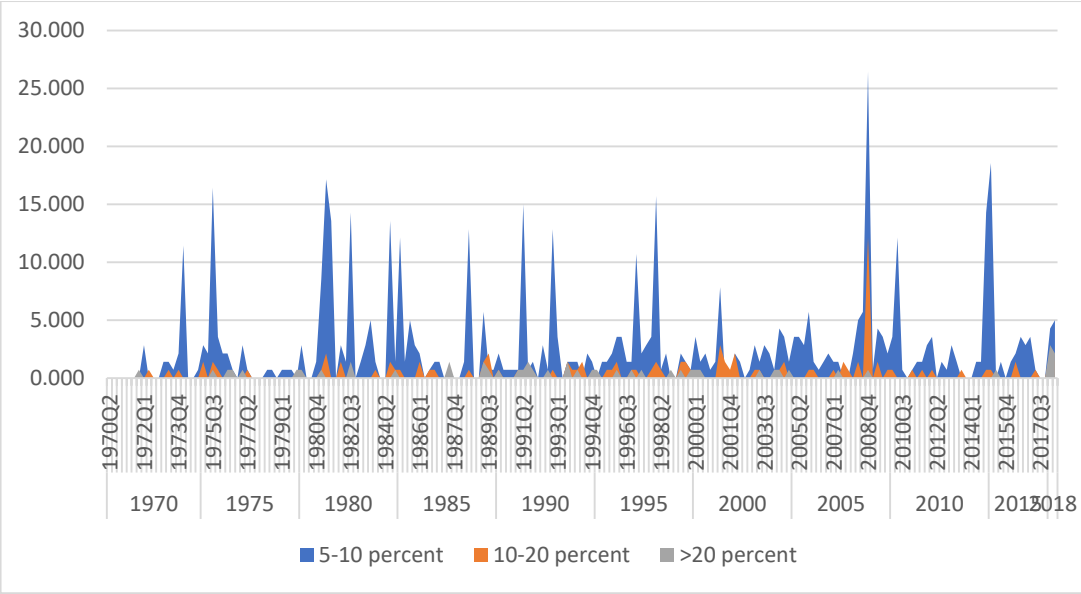


Figure 2.12 Percentage of Developing Countries' Currency Appreciations

Source: WB (2018)[20]

In addition, many developing countries experienced some institutional changes in the first half of the 2000s. Floating exchange rate regimes, independent central banks, and inflation targeting as a monetary regime became much more widespread[21]. In this period, the central banks in developing countries mainly reached their target inflation rates. In Table 2.1, the number of developing countries which adopted an inflation-targeting regime and their rate of success according to their targets are listed. According to the table, although the number of developing countries that conducted inflation targeting regimes are very few at the end of the 1990s, the number increases gradually after the new millennium. One important implication in the pre-crisis period was that most developing countries have a high success rate, defined as the actual

[20] The available data consists of 138 developing countries in time period between 1970 and 2018. The appreciation is defined as positive quarterly change in developing country's currency in the nominal effective exchange rate.

[21] In fact, the first two developments are results of the latter.

inflation within the targeting interval. In that period, there is a coincidence between the rate of success and appreciation rate. In the pre-crisis period, when there are a positive economic environment and the domestic currency's appreciation, it is easy for developing country CBs to hit the target. However, when the crisis erupted in 2008, and the global environment reversed, many central banks in the developing world failed to hit the targeted inflation**.** After that time, it is observed that the deviation from the actual inflation has been various, and the rate of success has been unstable.

Table 2.1: Number of IT Developing Countries and the Rate of Success[22]

Years	Below	Within	Above	% of success
1999	1	2	0	66.67
2000	0	3	3	50.00
2001	0	5	4	55.56
2002	3	4	4	36.36
2003	3	3	5	27.27
2004	2	4	5	36.36
2005	0	8	4	66.67
2006	1	8	5	57.14
2007	1	7	7	46.67
2008	0	1	14	6.67
2009	4	8	5	47.06
2010	2	8	8	44.44
2011	0	10	8	55.56
2012	4	10	6	50.00
2013	8	8	4	40.00
2014	5	8	7	40.00
2015	9	4	11	16.67
2016	9	6	9	25.00
2017	6	13	5	54.17

[22] Since not all the developing countries conduct inflation targeting regime and ones which conduct this regime in different years, the number of countries in the period is not same. Secondly, the success is defined as the percentage of countries whose inflation is within the target. The terms of Below and Above refers to the rate of actual inflation relative to the targeted one. For example, in 2008, the actual inflation in 14 countries was higher than the targeted inflation.

Source: WB

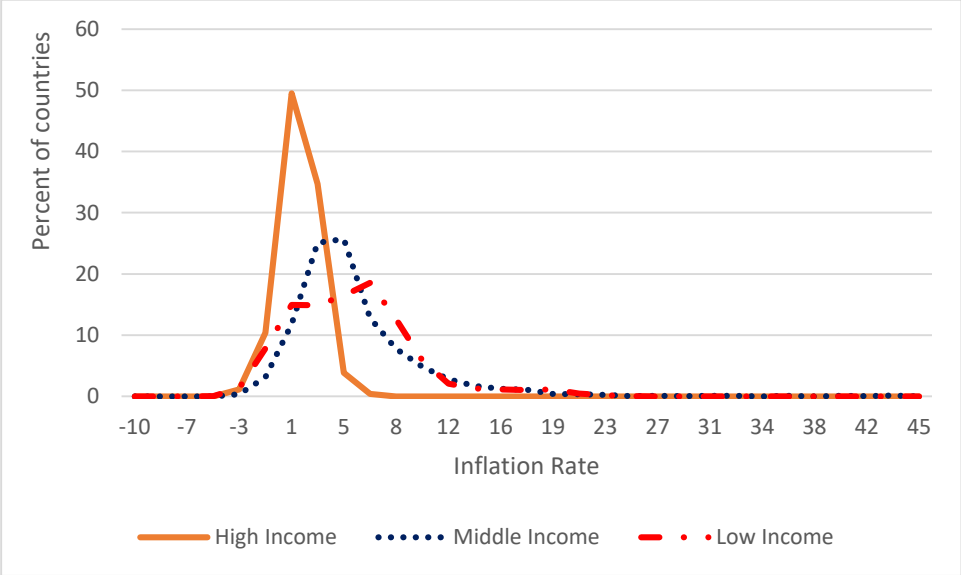


Figure 2.13 Inflation Distribution: 2010-2017

Source: WB/WDI

In the post-crisis period, the declining trend in inflation continued in some countries. In that period, the advanced economies encountered the fear of deflation. According to the WB report, in 2015, almost half of the developed countries experienced negative inflation. 60 percent of developing countries encountered below or within the inflation target rate instead of the crisis period. (Ha et al. , 2019). Some small, open European economies like Sweden, Switzerland, and Denmark, experienced deflation in the same period.

One critical difference between developing and developed countries in terms of inflation drivers is the sensitivity of macroeconomic variables to the exchange rate changes. Since the developing countries' currencies are not widely used in international trade relative to developed countries' currencies, especially the US Dollar and Euro, agents in developing countries need to acquire foreign currencies for international transactions. This causes the developing countries mainly have foreign currency-denominated liabilities as opposed to domestic currency denominated income. In such a position, any depreciation has a negative impact on both the goods and money market. However, for the developed countries' case, since their currencies

are more global or at least are not as weak as developing countries' currencies, such shocks do not have the same effects on their economies.

According to the figure, even though developing countries' inflation- fx rate change relation concentrates on the first region, which implies a strict positive relationship between these two variables, we cannot observe such a strict relation for the developed case.

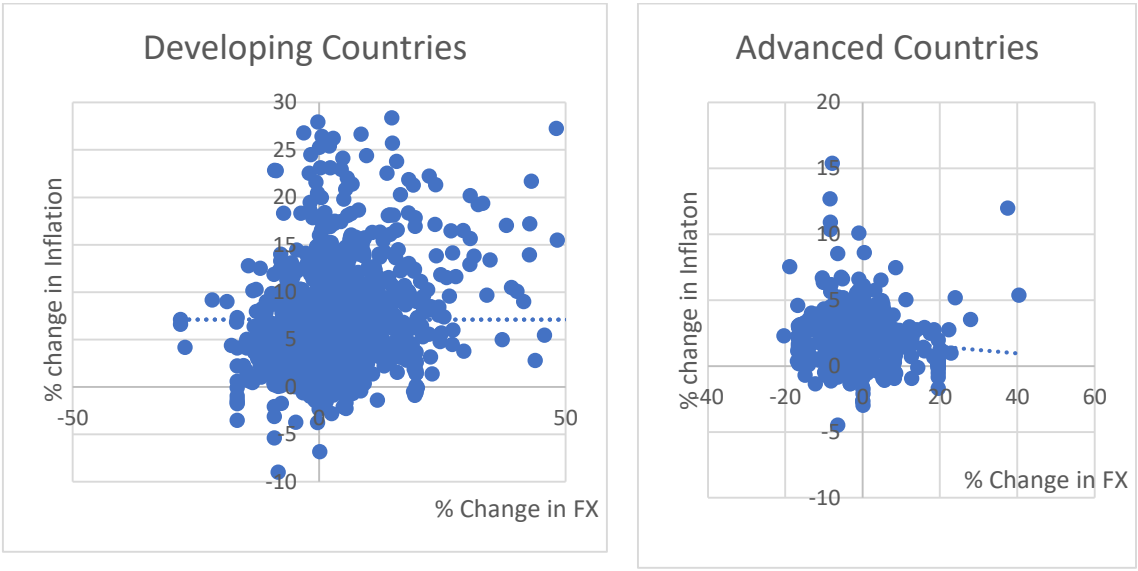


Figure 2.14 The Correlation Between Exchange Rate Changes and Inflation of Developing and Advanced Countries[23]

Source: Author's calculations based on WB data

In addition, another important implication regarding the relationship between inflation and fx rate in developing countries is that the correlation between these two variables is higher when the inflation rate is high as the inflation rate decreases, the correlation declines as well. For example, in Brazil, according to the monthly data, in the first half of the 1990s, when the country experienced hyperinflation (four digits),

[23] This scatter diagram represents all the developing countries in the period between 2002-2018. Countries conducting fixed exchange rate regime and soma small economies are not included. For the advanced countries' case, all developed countries are used in a given period. Moreover, in these two figures, the relation refers to the percentage change in annual nominal exchange rates of countries and inflation rates.Lastly, to avoid the outlier effect, the extreme values are excluded.

the correlation between change in fx and inflation is around 95 percent. However, as inflation started to decrease in the second half of this period, the corresponding correlation declined[24].

2.3. Conclusion

Explaining and forecasting inflation is one of the most challenging macroeconomics issues because inflation has very complex dynamics. We examine the historical movements of inflation and the dynamics behind these movements with the help of descriptive statistics; we make some conclusions. First, throughout time inflation has followed different trends. For instance, after the high inflation episodes in the 1970s and 1980s, almost all countries experienced lower inflation rates after the mid-1990s. In that period, many developing countries curbed their inflation rates. Although this process paused in the pre-crisis period, the declining trend continued for many countries after the global crisis. Second, the inflation spread between developing and developed countries decreased after the mid-1990s, which implies that the inflation rates converged. Third, developing countries have higher and more volatile inflation rates than developed countries historically because of their debt and more fragile economic structure against external shocks, especially the exchange rate shocks. The correlation between change in and inflation is higher in developing countries. Lastly, some global factors influence inflation in developed and developing countries, such as a change in oil, energy, food, and commodity prices.

[24] This information is true for many countries. For example, in Turkey, the correlation coefficient is around 70 percent at the 1990s and early 2000s, where the country experienced relatively high inflation, an it declined to 30 percent at the second part of the 2000s when the inflation declined to one digit levels.

CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

After examining the stylized facts about inflation, a critical literature review plays a crucial role in understanding how different dynamics become important in different countries and periods. As explained in the previous parts, many factors affect inflation, and previous research experiences give special attention to different dynamics for countries in different periods.

The existing literature on drivers of inflation divides into two categories; the traditional view that emphasizes internal drivers' role, especially the excess monetary growth, and another view that gains attention after the 1990s, focuses on external factors.

Examining the previous studies from both perspectives provide us to have some implications.

First, since inflation has a complex structure, there is no generally accepted "the main determinant" of inflation, but some drivers have been emphasized in the literature**.**

Second, since developing and developed countries have different inflation dynamics due to their economic structures, the research aims to determine the drivers of inflation for a specific country to consider its income group.

Third, as the globalization dominates the world economy, the focus of the literature on the drivers of inflation shifted from internal to external drivers, especially for developing countries. The increasing effect of the globalization made movements in foreign exchange more critical in developing countries.

Fourth, country characteristics are important even in the same income groups in the developing world. Although external factors are emphasized in recent studies,

what factors are more important depends on the country's subjective conditions, such as whether a country is relatively closed or oil exporter.

The outline of the chapter is as follows. In the first part, we discuss the main arguments of early literature, implying demand-side/internal factors play critical roles in determining inflation. According to this view, the fiscal deficits and the monetary aggregates were considered the main determinants of inflation, especially for developing countries. In the second part, the growing literature on external factors is discussed. According to this approach, unlike the traditional approach, external drivers have a remarkable effect on the inflation rates. The exchange rate movements, especially the depreciation of the domestic currency, global food prices, and oil prices, are the main external drivers of inflation. All these determinants have effects on inflation in different degrees. For example, exchange rate movements affect the economy through total debt and the industrial sector by affecting production costs [25] . Global food prices directly affect the CPI inflation since it has an important share in the representative consumer's production basket, especially in developing countries (Akçelik,2014). Lastly, the oil prices influence the whole economy since it is related to cost structure in almost all parts of the economy, such as fuel in transportation and industry, etc.[26].

Furthermore, in this part, the literature on the global inflation hypothesis is also discussed. This argument states that inflation is a global phenomenon, mainly triggered by global movements, rather than the domestic factors, especially after the 1980s, which refers to globalization. In the third part, the literature on institutionalist and political economy approaches focuses on the relationship between political/institutional dynamics and inflation. According to this literature, a country that avoids populist policies and has independent institutions can control inflation better than those who do not. The last section summarizes and concludes.

3.2 The Literature on Internal Factors

The early literature focuses on the demand side of domestic factors like public debt/ deficit and monetary growth. Other factors, such as the role of the exchange rate,

[25] Via imported intermediate goods.

[26] Actually, it was the main reason behind globally high inflation rates in 1970s.

food and oil prices, political and institutional determinants, and other supply-side factors, are not popular among the early studies. However, as the world economy globalizes, especially after the new millennium, the literature mainly focuses on external factors.

The level of public debt/budget deficit and monetary growth are considered the primary sources of inflation in the early studies since the countries with high inflation episodes also have high monetary growth rates. According to Mishkin (1984), there is a positive relationship between money growth and inflation. He uses the money supply growth and annual inflation rates of 52 countries between 1972 and a982. He finds a 0.96 percent correlation between these variables. The country that has the highest inflation, Argentina, is also the country that has the highest rate of money supply growth. Similarly, the country that has the lowest inflation, Switzerland, is also the country with the lowest Money supply growth rate. According to Friedman (1994), the expansionary fiscal policy is one of the main determinants of inflation since it causes expansionary fiscal policy. However, there are some drawbacks to these analyses. First of all, statistically, correlation does not indicate causality; that is, a high correlation between inflation and monetary growth may not indicate that high monetary growth causes inflation. Second, the investigation has two major oil shocks, which led to a global scaled economic crisis in this period.

As another internal/demand-side factor, the role of budget deficits and government debs are another subjects in the literature on drivers of inflation in the traditional view. The expansionary fiscal policy causes a budget deficit financed by the central bank, leading to inflation by triggering high monetary growth. Leviatan and Pitterman (1986) associate this imbalance with the balance of payment crisis and exchange rate depreciation. For the empirical results, Fischer et al. (2002) state that the relationship between fiscal deficit and inflation is significant only in countries with high inflation rates or inflationary periods. In contrast, for countries with low inflation, there is no clear relationship between these variables.

3.3 Literature on External Factors

As explained before, the literature on external factors has been growing. The existing literature on different external factors such as exchange rate movements, food prices, oil shock, and the global inflation hypothesis are investigated in this part.

3.3.1 Literature on Exchange Rate, Food and Oil Prices

It is not a surprise that the countries' inflation rates declined while their domestic currencies appreciate. The literature about the exchange rate- inflation relation starts with a comparison between different exchange rate regimes' performances in controlling inflation. Thus, these studies focus on whether the exchange rate is fixed or floating. In his study, Edwards (1992) examines nominal exchange rates of 56 countries in the period covering 1980-1989. According to the study, fixed exchange rate regimes are more successful than floating in reducing inflation. There are some drawbacks to this argument. First, the period that is under the investigation in the study (80-89) is not appropriate to compare two regimes because, in general, pegged regimes were functional to control the inflation rate at the beginning; however, since this regime is vulnerable to the speculative attacks and it is hard to maintain the given foreign fixed exchange rate for developing country because of the insufficient reserves; eventually they all failed (Mishkin,1999). The fixed exchange rate regime also requires credibility to provide disinflationary impacts, especially eliminating financial market imperfections and strengthening the banking systems (Kamisnky and Reinhart,1999). Siklos (1996) concludes that since most developing countries that implement a fixed exchange rate regime experienced high inflation in their histories, they are not credible. Indeed, regardless of the exchange rate regime implemented, the exchange rate is an important factor in inflation for developing countries.

Another argument regarding the exchange rate - inflation relation in the literature is how the exchange rate movements – especially depreciation- trigger inflation. At this point, it is important to emphasize the importance of the exchange rate shock as a supply-side factor in the determination of inflation in developing countries. A change in the exchange rate has two main effects on inflation. When the domestic currency depreciates, this primarily affects the price of imported goods directly in the domestic economy. In the second step, the effects of depreciation are transmitted into sectors by changing costs and inflation expectations of economic agents (Vansteenkiste, 2009). The main reason for this is that many developing

countries are prone to use imported intermediate goods in their industries. Some of them are energy importer; any exchange rate shock has severe impacts on their economies' aggregate supply.

Furthermore, currency depreciation does not cause only a supply shock; it might trigger a financial crisis as well. In his study, Mishkin (2004) emphasizes the dollarization problem that developing countries suffer. According to him, while their assets are mostly domestic currency denominated and the liabilities are foreign currency denominated[27], a currency depreciation worsens economic agents' debt burden, increases inflation, and prevents financial stability. Thus, developing countries should focus on preventing large currency depreciation from controlling inflation.

Some empirical results support this argument. For instance, Laungani and Swagel (2001) investigate 53 countries to examine the determinants of inflation. According to the results, the exchange rate regime explains almost 66 percent of inflation changes in these countries. They present four drivers to investigate their relationship between inflation: budget deficit, the domestic output gap, supply (cost) shocks, and lastly, the inflation inertia. In addition, the main drivers of inflation vary across geography. For example, while the exchange rate and budget deficits are the main drivers in Latin America, they observe the dominant role of inflation inertia in Africa and Asia.

Before the 2000s, many developing country central banks implemented exchange rate-based anti-inflationary policies. These policies were unsuccessful since they caused the overvaluation of the domestic currency and made vulnerable the domestic currencies against speculative attacks. After these unsatisfactory experiences, developing countries started implementing an inflation-targeting regime (Benlialper and Cömert, 2016**).** However, Inflation Targeting has some important drawbacks as well. Theoretically, in this regime, the central bank announces a targeted annual inflation rate and uses monetary policy to reach this target. Short term interest rates are the main and the only policy tools to control inflation. The main idea behind this is that inflation is driven by internal/demand-side factors, the excess demand, and the central bank can control these factors by conducting appropriate monetary policy. According to Benlialper and Cömert (2016), although most developing countries curbed their inflation rates in this period, this is not because of the success of inflation

[27] Mostly USD.

targeting, but mainly because of the exchange rate appreciation currencies. In this vein, according to Epstein and Yeldan (2009), the same disinflation performance experienced by many other developing countries did not use inflation targeting as a monetary policy regime.

According to Figure 2.7, in general, developing countries experienced different degrees of appreciation in their currencies after the new millennium. Moreover, according to the WB Report (2019), only 20 percent of them have experienced depreciation, and the majority of them experienced only 5 to 10 percent. However, since inflation targeting assumes that inflation is assumed as a demand-side phenomenon, and CB can control inflation just by using short term interest rates, it does not react to the exchange rate movements. Thus, in that period, either central banks violated the orthodox inflation targeting policy by preventing the currency depreciation, which implies an implicit asymmetric stance of central banks in the developing world. This positive movement of exchange rates might not be considered the success of domestic central banks (Benlialper and Cömert,2016) completely.

Another important determinant of inflation in developing countries is food prices[28]. Food items have a significant share in the consumer baskets of households in developing countries. That is why developing countries' CPI indexes will be more sensitive to food price changes than developed economies. According to Akçelik (2013), in developing countries, households' income elasticity regarding food is higher. Furthermore, since most of the food items are necessities, the price elasticity of demand for these goods is low in absolute terms; this states that any rise in the food price will cause an increase in the consumption expenditure in households' budget since there is no significant decline in the demand, that will eventually cause the consumer price inflation.

[28] Although it can be considered as an external factor, since the existing literature focuses on the oil price movements and the global recessions in the global inflation trend, I prefer to touch on this concept in the traditional literature.

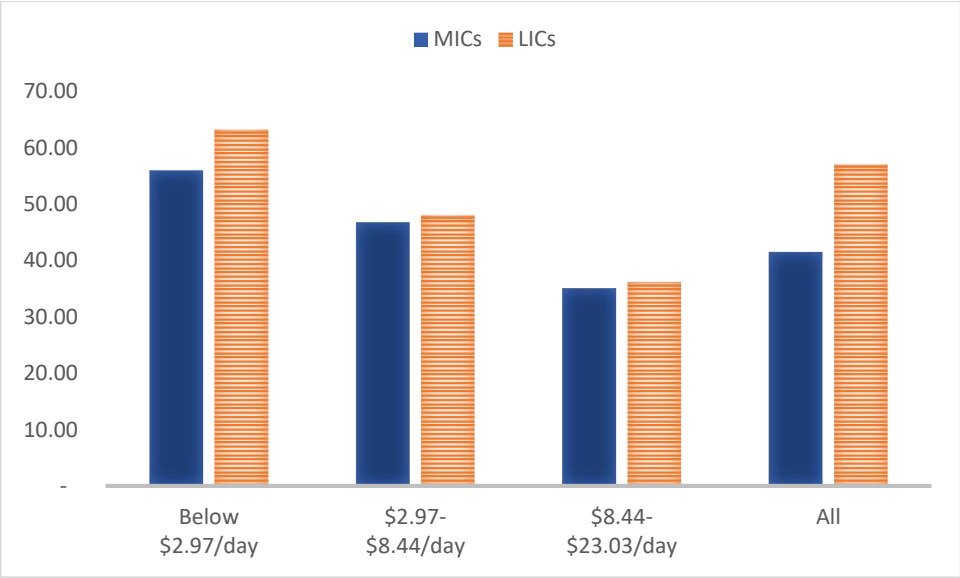


Figure 3.1 Share of Food in Total Consumption Expenditure In Low and Middle-Income Countries

Source: WB

Note: The left ones constitute the Middle-Income countries, and the right ones are Low-Income Countries.

According to table 3.1, food consumption constitutes a significant part of households in all parts of developing countries. Any price shock affects consumer price inflation due to the inelastic price elasticity of demand for food. The inelastic price elasticity of demand implies that food is necessary for households in all income groups in developing countries. It is also possible to say that this increases producers pricing power so that they ignore market demand for food when they set prices (Akçelik,2013).

In addition, at the macro level, global food prices are discussed in the second chapter. As shown in Figure 2.6, there is a coincidence between global food prices and inflation rates in many periods. For example, while in the mid-1990s, global food prices are relatively stable when developing countries began to experience disinflation. These stable prices were replaced by an increasing trend in the 2000s, where this disinflationary period slowed. Due to the reasons we mention at the micro-level, food prices constitute an important part of inflation in developing countries.

Some empirical studies emphasize the role of food prices in inflation. For example, Mohanty and Klau (2001) examine the drivers of inflation of 14 selected countries in the 1980s and 1990s. Their main findings are that although both demand and supply-side factors impact overall inflation, food prices movements have the leading role among all other factors like excess money growth, output gap, or wages.

Another empirical study by Vansteekiste, 2009, investigates the reasons behind the prolonged inflationary periods of 91 selected countries using the panel probit method (63 developing, 28 developed). The study results are that the causes of inflation periods of selected countries are a combination of policy mistakes, global shocks, and structural factors. Too loose monetary policy, fixed exchange rate, and the increase in food prices are the main reasons for these counties' prolonged inflationary periods.

Eickmeier and Moll (2009) examine the external factors of inflation for 24 selected OECD countries in the time period 1980-2007. They use the traditional Phillips Curve. They conduct a factor model and use output gaps, unit cost changes to some country-specific. According to the study, the change in unit labor cost is the most important and common component of the domestic inflation rates in a given period. In addition, changes in import prices also have an important impact on consumer price inflation. Although this is an essential study for the inflation dynamics of developed countries since the overwhelming majority of the study countries are developed countries (the only developing country is Mexico), it does not provide much insight into developing countries' inflation dynamics.

3.3.2 The Literature on "Global Inflation" and It's Synchronization

The existing literature on global inflation and global inflation synchronization has been increasingly popular, especially since the new millennium. In this sense, to understand the global inflation dynamics, first, it is needed to be examined whether there is synchronization in the global inflation that causes the disinflation trend starting from developed countries and spread to all other countries.

As the world economy globalized, the trade barriers have been lifted, financial integration has increased, and the monetary policy frameworks have constituted similar responses. Countries' domestic inflation rates are more synchronized today than before (Ha et al. , 2019).

Globalization has changed the economic structures of domestic economies. Since inflation is not independent of economies' structural forces, it might be affected by globalization. For instance, at the beginning of the 1990s, when the socialist bloc collapsed, all former socialist countries were started to integrate into the world economy. This caused an increase in the global labor force and decreased labor costs. This downward pressure on labor costs had a mitigating effect on the domestic inflation rates in these countries. Also, the authorities had less control over their domestic economies than before because of the increasing interdependency of economies (Borio and Filardo,2007). Not surprisingly, the globalization of economies resulted in the globalization of inflation rates, which refers to the convergence among countries' inflation rates (Figure 2.7).

The existing literature agrees that there is a synchronization of inflation among countries, and it has been evolving for years. A global inflation factor is a useful tool to explain inflation changes in many countries for both developed and developing countries (Borio and Filardo, 2007;2017; Mumtaz and Surico,2006). Also, since the developed countries are the main drivers of the world economy, their inflation factors are different from the developing countries. Lastly, synchronization among developing countries differs from each other because of the differences in country characteristics.

As an empirical work, Borio and Filardo (2007) examine the common factor for the domestic inflation rates of 29 countries (17 developed and 12 developing) between 1985 and 2005[29]. They come up with a new hypothesis that globalization has changed the inflation dynamics, and there is an increasing share of a global factor explaining the domestic inflation rates. According to them, the main reason why previous studies fail to explain this reality is that they are so country-specific. They use a term called a global centric approach for their method includes some revisions for the previous studies explaining the dynamics of globalization. In this context, they use the extended Phillips Curve Approach by revising it. They find some evidence that proxies for global economic slack add significant explanatory power to traditional equations. Also, the role of external factors has been growing for years, especially since the 1990s. The role of external factors overshaded the domestic factors in determining inflation rates in many countries.

[29] These are US, Euro Area, Japan,Germany, France, UK, Italy, Canada, Netherlands, Belgium, Sweeden, Switzerland, Spain, Australia, Norway,New Zelland.

As a methodology, to examine the external factors, firstly, they revised the mainstream model for inflation by adding the same variables regarding the global output gap. The term "Global Slack" is defined as a weighted average of international output gaps.

$$Gap_j^{Gi} = \sum_{k \in K} w_{j,k}^{i} \ , Gap_k^{D}, G_{\text{i}} \in \{W1, W2, W3, W4, WG\}$$

where W1 and W2 refer to the trade-weighted global output gap, W3 refers to the exchange rate weighted global output gap, W4 refers to the exchange rate adjusted trade-weighted global output gap, and WG refers to the GDP weighted global output gap.

The results are as follows:

- The domestic measures on the domestic economy have been losing significance in a time-varying process.
- The role of global measures on economic activity has increased.
- The global control variables are robust.

Ihrig et al. (2010) work on a similar topic for developed countries. The study uses the sample of 11 advanced countries and estimates Phillips Curve equations by adding the output gap of foreign countries to the equations. The study finds limited support for the argument in terms of developed countries, as opposed to Borio and Filardo.

For the developing world case, Bems et al. (2018) examine the disinflationary period starting from the late 90s. According to the study, the rate and the volatility of inflation have declined in this period. There are two main approaches to explain this disinflationary period**.** According to the first approach, which the writers call the optimists, this development is caused by an institutional change in developing countries. Second, the pessimists argue that opposing international forces might contribute to this result, like China's increasing role in world markets (Carney,2017).

When China opened its economy to the world, the global labor supply considerably increased and negatively affected wage growth. Since the unit labor costs are an important part of the total cost of goods, it had downward pressure on the prices (Hirst, 2015)

In line with these studies, a report published by WB states that the global common factor accounts for a remarkable portion of national inflation rates by referring to Ciccarelli and Mojon (2010). They state that the common global factor constitutes almost 70 percent of the 22 OECD member countries' national inflation rates[30].

For another empirical work, Bianchi and Civelli (2015) investigate the relationship between globalization and inflation by the time-varying VAR model. Their study assesses the globalization hypothesis's implications that states the global slack has been more critical in countries' domestic inflation. To evaluate this hypothesis, they conduct a time-varying vector autoregressive model for 50 countries; both developed and developing, from 1970 to 2006. Their findings are as follows. First, global movements have a considerable impact on countries' domestic inflation rates. Second, despite the importance of external movements, their effects on inflation do not indicate a clear time-varying structure in line with globalization. That is to say, although the effect of the foreign output gap is significant, it is not its effect does not dominate the effect of the domestic output gap for the selected countries. Last, while the time-series part of the model is not successful in showing globalization's impacts on inflation, increasing the number of countries, which refers to the panel data methods, indicates a positive relationship between trade openness and the role of global factors on inflation.

In their study, Bobeica and Jarocinski (2017) examine the inflation dynamics of selected developed countries after the global financial crisis. In that study, they focus on the two different directions of inflation as opposed to the standard models' estimations. According to their claim, inflation in developed countries fell more than standard models expected in the post-crisis period, called the missing disinflation. However, inflation moved in the opposite direction, after 2012, especially in the Euro Area, and the authors claim that it was unexpectedly low, and they call it as missing inflation. They employ a Bayesian VAR model to understand these movements' dynamics in internal and external factors. According to the model, there is no missing disinflation and inflation. The relative importance of internal and external factors have

[30] To calculate global factor, they use three different measure and compare them. The first one is the simple average inflation rate of 22 countries. Second is static and the last is dynamic factor models.

varied in that period. While in the first period (2008-2011), global factors were more effective, in the second period (2011-2014), domestic factors became dominant in the Euro Area.

The relationship between inflation and crisis is also an important subject to examine. Depending on the origin, a crisis might have different effects on the country's inflation. In the global crises, for example, in the 1970s, the oil crisis led to the rise of inflation in almost all countries because of the supply shocks. In another case, in the 1990s, when the developing world has experienced many regional crises in South Asia, Latin America, Russia, and Turkey, the inflation rates in these regions increased. At the same time, the developed world did not experience such an increase. During the last global financial crisis, almost 80 % of countries around the world witnessed disinflation. Besides, 75 % of developing countries witnessed another decline in inflation in the post-crisis period because of the low global demand (Ha et al. , 2019). In that period, the developing countries did not experience the danger of deflation since they did not experience big financial collapses as the developed countries did. Although they lost their rapid growth rates during the pre-crisis period, the economic activities did not stop. In conclusion, it can be said that the effect of the crisis on the inflation rate depends on whether it is global or regional and whether it is caused by supply and demand-side shock.

In the literature, the Harding and Pagan create an algorithm that examines the global inflation movements during some years of global recessions (Harding and Pagan,2002). These recessions are subject to many adverse developments in the global economy involving economic crisis in developed countries (Köse and Terrones,2015)[31].

[31] The writers determine these years by examining the global effects of recessions. Thus, they did not use the 1998 which the Asian Financial Crisis occurred.

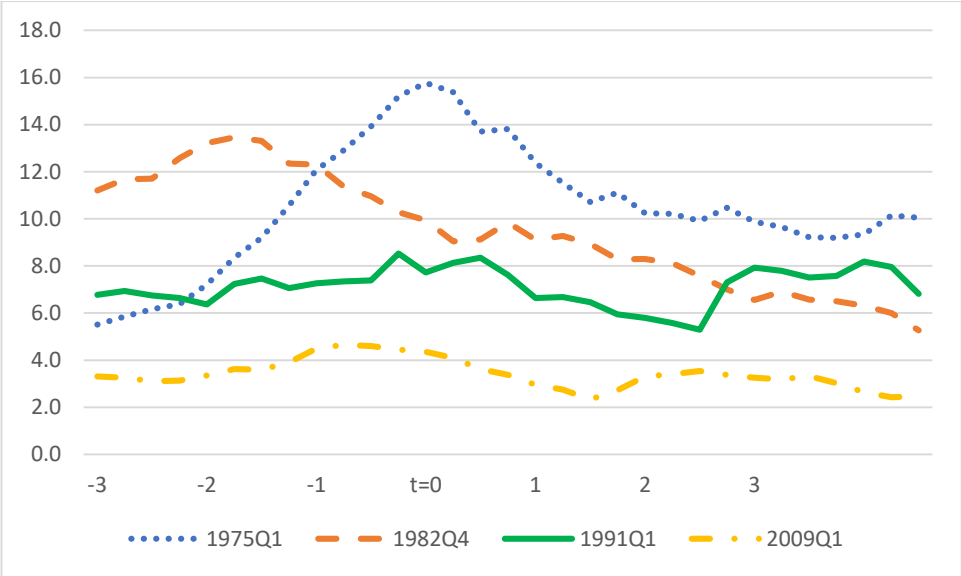


Figure 3.2 Global Inflation During Recessions[32]

Source: WB

Note: In this figure, quarterly data is used rather than annual. The term "t=0" refers to the period that crisis occurs, "t=1" is one quarter later, and "t= -1" is one year before, respectively.

In these periods, as can be seen from the graph, the global inflation fell with the recession's beginning, with a lag of 1 to 3 years. During past recessions, inflation decreased by about 1.5 percent on average between the year before and after the recession. In the last recession, inflation dropped sharply on the global side because of a fall in the global demand and the increasing effect of external developments (Ha et al., 2019). In the 2010s, inflation remained relatively low, 5 percent for developing countries and 2 percent for developed countries. One interesting fact about the inflation dynamics during the last financial crisis is that both developing and developed countries declined their inflation rates at the same percent (50%, from median inflation of 8 to 4 and from 2 to 1), and the movements are almost the same (Figure 3.3).

[32] In the graph, t=0 refers to the time that recession begin.

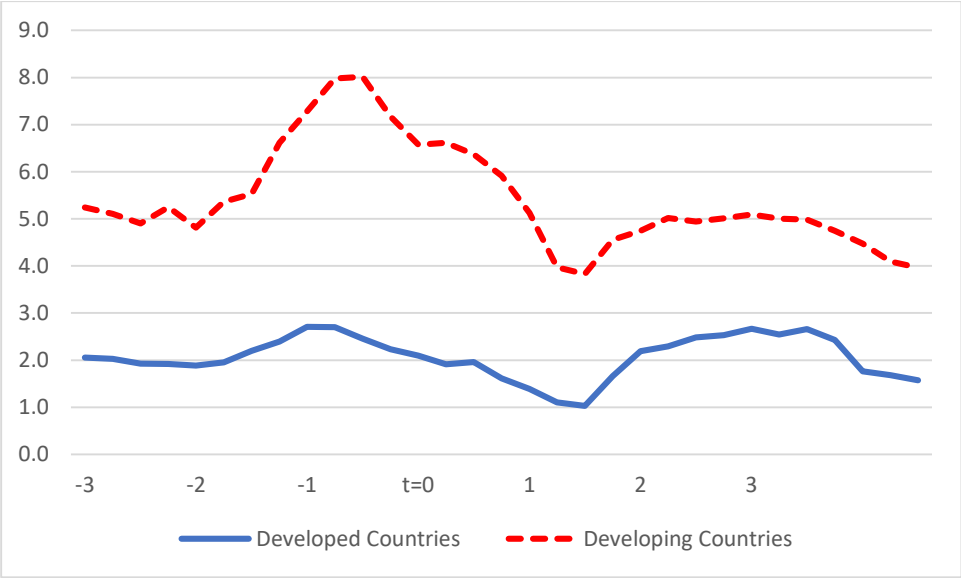


Figure 3.3 Inflation Rates of Developed and Developing Countries During the 2009 Recession

Source: WB/WDI

3.4 The Institutionalist and Political Economy View

Some researchers focus on political and institutional developments to understand inflation dynamics in different countries**.** The political drivers of inflation are attached to two competing schools of thought: populist and state capture approach (Vansteenkiste, 2009).

According to the populist view, whenever there is a social conflict regarding wealth distribution, politicians react by increasing government expenditure, which triggers inflation. In this view, inflation is less likely to occur if the government is powerful to control these social issues without making a compromise (Nelson 1993; Haggard and Kaufman 1992). Otherwise, the state capture approach argues that inflation's main reason is related to politicians' benefits and the people around them. Central banks or governments finance the firms or sectors that have close relations with governments, which cause inflation (Hellman et al., 2000). Desai et al. (2003) tested these arguments for 100 countries over the period between 1960 and 1999. They argue that democracy is associated with lower inflation in lower-inequality countries but higher inflation in higher-inequality countries.

Some studies in the literature give attention to the institutional changes that developing countries experienced, especially after the new millennium. The transition

to the independent central bank, open financial markets, and implementing inflation targeting as a monetary policy regime are the leading developments regarding the literature's institutional changes (Domaç and Yücel, 2004; Haet al. ,2019).

3.1 Conclusion

It is generally said that inflation – economy relation is like oil and machine. If we do not use any oil in the machine, it cannot operate properly; however, too much oil might ruin the machine. Thus it is perceived that low and stable inflation is appropriate for an economy. That is why policymakers should determine the factors triggering inflation episodes to implement correct policies against it. Since the developing and developed countries have many differences in terms of their economic structures, the sources of inflation in these groups may differ from each other. Thus, to understand the dynamics of inflation in developing countries, it is essential to emphasize its characteristics. Otherwise, an approach that treats a developing country as a developed one fails to explain the general situation

The literature is divided into two approaches; the traditional view emphasizes the role of internal/demand-side factors and the and the second view, which gains attention after the 1980s, focuses on the importance of external variables. The critical literature review regarding the existing studies makes us have some implications and ideas.

First, although early studies focus on internal factors, especially excess money supply growth, recent studies started to focus on the role of external/supply-side factors, especially after the 1980s, when globalization began. Also, the second view attracted more attention towards the new millennium when the developing countries started to decline their inflation rates**.**

Second, in the literature, there is no generally accepted common driver of inflation for all countries. Although external factors are more emphasized, the leading factor changes in different periods and countries. That is why, in the next chapter, we decide on the inflation equation carefully by considering the time period and the characteristics of the countries under the investigation.

CHAPTER 4

ECONOMETRIC INVESTIGATION FOR DRIVERS OF INFLATION

4.1 Introduction

The global economy has experienced many inflationary periods. Especially the developing countries have suffered from high and volatile inflation rates. They implemented many IMF/WB supported stabilization programs that aimed to solve inflation problems. Although these programs caused temporary relief in some periods, inflation continued to stand as one of the most serious developing world issues until the new millennium. After the mid-1990s, developing countries experienced a remarkable decrease in inflation rates. In this sense, after the mid-1990s, most developing countries reduced their inflation rates to single-digit levels. This disinflationary period is realized in almost all parts of the developing world, including Latin America and Sub-Saharan Africa, which have witnessed many hyperinflation episodes throughout history.

Even though the declining trend paused in the aftermath of the Global Financial Crisis, developing countries did not experience such high inflation rates as the pre-2000s period. Besides, some developing countries continued to curb their inflation rates in the post-crisis period as well.

As mentioned in the previous chapters, inflation is a complex phenomenon, and it is connected to many macroeconomic variables. Thus, in the second chapter, we utilize many descriptive statistics regarding inflation to see what trend inflation has followed throughput time, whether there is a difference in inflation structures between developing and developed countries, and how inflation might be associated with different internal/external factors. The second chapter helps us understand the inflation dynamics and has important implications regarding the sources of inflation. First, inflation followed different trends in different periods, and historically developing countries have higher and more volatile inflation than developed countries. Second,

developing and developed countries have different inflation structures; the most visible one is that while the movements in foreign exchange is one of the most important determinants of inflation in developing countries, we did not see such importance for developed countries. Third, despite all differences, there are some global factors such as oil and food prices affecting inflation in both developing and developed countries[33].

As stated in the third chapter, the literature on sources of inflation can be divided into two views; one is the "traditional approach," which asserts that the demand side/internal factors are important in the inflation dynamics such as domestic output gap, fiscal deficit, and money growth rate. The other view that gained popularity in the literature after the new millennium states that as the world economy integrated, which refers to the rise of globalization in the world economy, inflation has become a global phenomenon. The role of external factors has grown[34]. This growing role helped both developed and developing countries curb their inflation rates starting from the mid-1980s for developed countries and one decade later for developing countries. Thus, a traditional understanding of inflation that gives attention to the domestic variables should be reconsidered and revised (Borio and Filardo, 2007).

According to the second view, globalization has affected inflation dynamics as follows. First, liberalization in world trade and financial flows caused a shift in production from relatively high-cost countries to lower-cost countries that lead to a decrease in the production costs and thereby the prices of imported final and imported goods. Besides, since most developing countries have been using imported intermediate goods in their manufacturing industries, this decline led to a fall in the domestically produced goods. Moreover, since this liberalization caused a decline in the tariffs and any other restrictions, it increased domestic market competition. It led the domestic producer to lower its markup. Besides, due to the labor's mobilization, the share of wage earners in total income decreased considerably (Halka and Kotlowski, 2016).

In this study, we examine the drivers of inflation for selected developing countries, Brazil, Chile, Colombia, Czech Republic, Hungary, Mexico, Poland, South Africa,

[33] The oil prices is considered the main reason behind the high inflation rates in 1970s.
[34] Such as exchange rate, commodity and food prices, and global demand

Turkey, in the period 1995-2019 by using the Panel Vector Autoregressive (PVAR) model. Furthermore, since the PVAR model is not a useful tool for examining the country-specific effects; therefore, we also construct three Vector Autoregressive Models (VAR) for Brazil, Hungary, Turkey, for three periods. In addition, in order to understand whether or not there is a difference in inflation dynamics between developed and developing countries, we construct the same regression for three major developed countries; Japan, UK, and the US. The study's main objectives are to understand whether inflation is a global phenomenon or not and how the relative roles of internal/ external factors have been changed over time and whether there is a difference in the drivers of inflation between developing and developed countries.

Descriptive statistics and critical literature reviews have contributed to constructing the true model. As explained in the last two parts, a useful model covering the true inflation equation that explains the inflation dynamics of selected countries has two main parts: country-specific variables and global variables. The most common country specific-internal- factors are domestic output gap, monetary growth, and fiscal deficit. In contrast, the external ones are exchange rate, food, and commodity prices, and the change in imports.

Besides, after constructing the inflation equation, the choice of methodology is another important decision. In the literature, three different approaches come into prominence in determining the inflation dynamics of countries, the Factor Augmenting Vector Autoregressive Models (FAVAR), the Structural Vector Autoregressive Models (SVAR), and the Time-varying vector autoregressive models (Time-varying VAR). Our study uses the Panel Vector Autoregressive Model (PVAR), which is a relatively new tool in econometrics and the standard Vector Autoregressive Model VAR. We choose these two methods because first, since we are looking for both the common factor that is useful for all countries under different circumstances, we employ the PVAR model. In addition, to see how country characteristics affect inflation dynamics', we employ a classical VAR model. For both models, Variance Decomposition (VDC) is the main tool to see the composition of the explained part of the variation in inflation by other variables in selected countries. In addition, for the classical VAR model, we also benefit from the Impulse Response Functions (IRF) to see if the shocks coming from the endogenous variables cause significant responses by the inflation.

The outline of the chapter is as follows. Next part, the review of related studies in the literature is discussed by focusing on their inflation equations and methodologies. In the second part, the model and the data are introduced to justify the model's variables. In this part, some extra descriptive statistics will help see the relation of variables with inflation rates in selected countries. In the third part, the estimation results will be discussed. The last part summarizes and concludes the findings.

4.2 The Review on Related Literature

The determinants of inflation are a contentious issue in the literature. All study elements, such as variables chosen for the inflation equation, time period, econometric methodology, and the country group subject to the investigation, have an important effect on the results. In this study, since we choose nine inflation targeting developing countries, we examine the studies that focus on similar country groups.

Many studies support the dominant role of external factors on the inflation of developing countries. For example, Anwar and Islam (2011) state that the main source of inflation in developing countries is unexpected supply shocks such as oil and food prices. Since most of the developing countries are energy importer, the shocks in oil prices have an important impact on the inflation rates. Besides, for the least developed countries, the correlation between food prices and inflation has very high (0.8). It is possible to give other examples in this vein. For example, Borio et al. (2017) state that the role of global factors in inflation is underestimated in the literature on the drivers of inflation. Although the mainstream literature focuses on the role of internal drivers, due to the integration of product capital and labor markets, global value chains made countries more sensitive to each other. The role of domestic slack in inflation became elusive. For a developed country case, Mumtaz and Saurico (2008) show the common factor is very important in today's inflation dynamics. Cicarelli and Mojon’s (2010) work on 22 countries indicates that inflation is a globally determined concept in today's economic atmosphere. According to their study, based on the data covering the period between 1960 Q1 and 2008 Q2, the global inflation, which refers to the inflation of 22 OECD countries, explains almost 70 percent of the countries' variance under the investigation.

For another study, Loungani and Swagel (2001) examine the source of inflation in 53 developing countries using annual data from 1964 to 1998. They estimate the

vector autoregressive model with six variables: oil price growth, non-oil commodity price growth, the output gap, exchange rate monetary growth, and inflation. According to their estimation results, the leading factors are different for different country groups. For example, while in Latin America, the exchange rate and past inflation experiences become the main driver of inflation. They conclude that fiscal conditions and exchange rate movements mainly drive inflation**.** The cost shocks and output gap play a relatively minor role in these countries.

Halka and Kotlowski (2016) examine which shock determines inflation in small European countries. This study examines the Czech Republic, Poland, and Sweeden's inflation dynamics by using a structural vector autoregressive model. According to the study, as the international trade and capital flows are liberalized, external factors in determining inflation increased in open economies. This growing role of external factors caused disinflation in the world economy in the 1990s, called global disinflation (Rogoff, 2003). Their model set some global variables such as the percentage changes in world import, commodity price index, and world CPI inflation. They introduced three kinds of shocks, such as global demand shock (GD), commodity-specific shock, which refers to the change in the world commodity prices (energy and non-energy) (GC), and global non-commodity supply shock. This study's main difference from others is that this study uses disaggregated data in commodity prices, while many studies use one aggregated commodity price index[35]. According to the estimation results for the period, 2000Q1 to 2014Q2, the movements in the domestic output gap and commodity prices are major determinants [36], while the commodity prices itself a dominant factor for other countries.

In the Hungarian case, Nagy and Tengely (2017) use principal component analysis (PCA) of the SVAR model to examine the developments in Hungarian inflation after 2012. According to this study, the traditional Phillips Curve fails to capture the new inflation dynamics. Therefore, it must be revised. They revised the traditional Phillips Curve by augmenting global slack variables. According to the estimations of this new version of the Phillips Curve, the global factors reduce inflation

[35] For Czechia and Poland they indicated 39 series. For Sweeden, since the data of communication servies are not available , they use 37 series for it.
[36] Almost 66 percent (two-thirds)

rates by increasing the correlation between countries[37]. One distinction of this study is that it defines two different shocks for external factors, the global and regional. In addition, they define the country-specific shock, which refers to the internal drivers. Global shocks refer to EU countries' impact, which constitutes 80 percent of Hungary's foreign trade; regional shocks refer to Visegrad countries' inflationary effects (Czech Republic, Poland, and Slovakia); all other factors are explained under country-specific factors. To determine the drivers using PCA, they followed these steps below: The external and country-specific factors are constructed with a two-step procedure. The common factor is estimated from the all inflation series. After that, the common factor is regressed on inflation, get the residuals. The regional factor is calculated by using another PCA. Lastly, all factors (common and regional) are regressed on the inflation series. To identify the external drivers of inflation using the SVAR model, the first estimate is a model that acquires the time series of selected shocks. They regress the disaggregated price indices of the main inflation groups on some domestic variables' identified shocks. Finally, they construct overall effects by excluding regulated prices and the effect of indirect taxes—by using quarterly data, covers the period between 2003Q1 and 2017Q3.

According to the estimation results, the changes in inflation in Hungary after 2012 have driven mostly by global factors. The output gap in the European Union, which refers to the global factor in the models, is stronger than Hungary's domestic output gap. Inflation is more sensitive to global shocks**.**

Benlialper and Cömert argue that the supply side factors are more important in the determination of inflation in developing countries. According to their study, the developing countries abandoned their monetary policy regimes and began to implement inflation targeting (IT) as a new monetary policy regime after the new millennium. Since IT assumes that inflation is a demand-side phenomenon, it is a guess that inflation can be controlled using short-term interest rates. In the IT regime, central banks conduct a floating exchange rate policy and do not intervene in the foreign exchange market. However, according to the authors, this argument is not valid for developing countries where the supply side factors have an important role in the determination of inflation, especially the exchange rate. Since many developing

[37] In that sense, it is argued that the correlation between developing and developed countries increased.

countries' industries depend on the imported intermediate goods, any depreciation has an increasing effect on production costs, thereby causing higher inflation rates. Therefore, Benlialper and Cömert argue that although the central banks in the developing countries officially follow inflation targeting (IT) as a monetary policy regime, they asymmetrically intervene in the exchange rate movements against depreciation as opposed to the orthodox inflation targeting policy. As a case study, they examine the role of supply-side factors in Turkish inflation. To measure the effects, they develop a VAR model.

Their regression includes monthly inflation measured by Consumer Price Index (CPI), monthly inflation measured by World Commodity Price Index (WPI), domestic output gap, nominal exchange rate[38], and interest rate[39]. After doing the unit root tests based on the Augmented Dickey-Fuller Test (ADF), choosing the optimal lag by referring to the Akaike Information Criteria (AIC), they run the regression. This study covers the period from 2002 to the end of 2008 in which the Turkish Central Bank implement the inflation targeting regime[40].

According to their estimation results, inflation in commodity prices explains 20% of the inflation, and the movement in exchange rate explains 13% of it. Other variables explain less than these two ones. Their findings show that external and supply-side factors have a significant role in determining inflation in Turkey.

4.3 Data, Model, and Methodology

We first present the data, model, and methodology to investigate inflation sources and how their roles changed relatively throughout time. By doing this, first, we construct a Panel Vector Autoregressive Model (PVAR) to selected countries to identify the common determinants of the same group of countries. After that, we conduct Vector Autoregressive Models (VAR) for countries chosen from our panel data to investigate the countries' country-specific effects under different circumstances.

[38] End of month values are used.
[39] The interest rate is used instead of monetary growth, since it is main policy tool of CBRT to control monetary mechanism. Overnight borrowing and lending rates are used.
[40] To calculate some monthly changes, they use X-12 method for annual data.

4.3.1 The PVAR Model

The increasing attention to long-run economic issues, data availability in macroeconomics, and the developments in applied econometrics triggered the intention to work on Vector Autoregressive Models (VAR) on panel data.

Currently, Vector Autoregressive Models are important tools of applied econometrics. Although there are some question marks regarding their contribution to explaining the causal relationships, many researchers agree that vector autoregressive models are useful in summarizing some time-series facts. In this vein, it might be useful to apply this technique to panel data to see the dynamic relationship between variables with a greater cross-sectional dimension.

The first theoretical framework for PVAR models was presented by Holtz et al. (1988). According to that study, since panel vector autoregressive models can show both the dynamic relationship and individual heterogeneity due to its combined nature, it can be useful to apply standard vector autoregression methods to panel data (Holtz et al., 1988). Macroeconomists and macroeconomists have used the panel vector autoregressive models (PVAR) in the literature. The main difference between them is that while the micro PVAR models have a smaller time and greater cross-section dimension, macro PVAR models have longer time and smaller cross-section dimensions (Judson and Owen, 1999).

PVAR models have some advantages in their combined features. Firstly, the most important assumption to work on time series, the stationarity condition can be relaxed in PVAR models. The existence of more than one cross-sectional part in the dataset enables us to allow for lag coefficient that varies over time (Holtz et al., 1988). Also, Chamberlain's (1983) model with individual effects that relax the unit root problem. Secondly, thanks to the PVAR models, we can examine the common drivers of some macroeconomic variables for a group of countries.

In the PVAR models, we need to emphasize that the underlying structure is the same for all countries under the investigation; that is, we need to impose some constraints that make individual effects available for all countries that procure the heterogeneity. We can impose these restrictions by using fixed effects, denoted by "u_i" in the representative equation (Casni et al., 2016).

In our study, we use the Generalized Method of Moments (GMM) to acquire consistent estimates for our panel vector autoregressive model estimation.

GMM is firstly presented by Hansen's (1982) article. In that article, Hansen investigates the GMM as an estimator that works on a large sample with orthogonality conditions. It is a modified version of the method of moments estimator, which also needs moment conditions for the estimation process. The main difference of GMM from the classical MM estimators is that MM estimators are not applicable to the cases where the parameters are less than the moment conditions (Hansen,1982).

The use of GMM for PVAR models is based on some empirical studies. For example, According to Sigmund (2017), although the vector autoregressive models are important tools to work on multiple endogenous variables, the standard ordinary least squares (OLS) methods fail to estimate an unbiased estimator for panel vector autoregressive models. Besides, Aslanoğlu and Deniz (2016) state that the existence of the lagged variable of the dependent variable at the right-hand side, among the explanatory variables, might cause biasedness in the model, even with many countries. In this case, GMM will be the estimator to eliminate this problem. In addition, according to the literature on dynamic panel models, GMM estimation is one of the most suggested methods, as Ullah et al. (2017) and Aandreas (2014) stated. Our methodology follows the theoretical framework of Arrelano and Bond (1991), which proposes the GMM estimator for dynamic panel models.

We also use the forecast error variance decomposition function and the Windmeijer's Corrected Standard Errors (Windmeijer, 2005) to make structural analyses for our endogenous variables after choosing our model's estimator. Also, we benefit from some tools to check our model's robustness, such as Hansen's overidentification test (Hansen,1982), the stability test (Lükepohl (2007); Hamilton (1994)), and the model selection function created by Andrews and Lu (2001)[41].

We use the PVAR model with p lags and n endogenous variables. Our PVAR model is stationary with fixed effects. Although the PVAR model with random effects is also theoretically possible, the existing literature uses the estimation based on the

[41] For these tests, Hansen overidentification test states that a if the instruments used in the system are exogeneous, the model is overidentified and and valid. Andrews-Lu criteria calculates the AIC and BIC values of estimated models. Lastly, if all roots of the companion matrix of a model is in the unit circle, which refers to less than one, the model is stabil.

fixed effects. The model with random variables needs strong assumptions regarding individual effects (Sigmund,2017).

Since the fixed effect is correlated with the regressors, and we have lagged dependent variables in the model, we need a transformation. For this purpose, we chose forward orthogonal deviations (fod), which is also known as the Helmert Transformation to the first difference (fd) to control the heterogeneity among countries, which is also suggested by Arrelano and Bover (1995), Hsiao and Zhou (2017), and Hayakawa (2009). All of these and many other researchers agree that the forward orthogonal deviations are more useful than the first differences since the first difference (fd) transformation asymptotically biased and fod transformation works better.

The representative version of Panel Vectorautoregressive models with fixed effects are as follows:

$$\boldsymbol{Y_{i,t}} = \sum \boldsymbol{Y_{i,t-j}} + \boldsymbol{X_{i,t}\beta_1} + \boldsymbol{S_{i,t}\beta_2} + \boldsymbol{u_i} + \boldsymbol{e_{i,t}}$$

Where

$\mathbf{Y_{i,t}}$= Vector of endogeneous variables

$\mathbf{X_{i,t}}$= Vector of exogeneous variables

$\boldsymbol{S_{i,t}}$= Vector of Predetermined variables

$\mathbf{u_i}$= Vector of Panel fixed effects

$\mathbf{e_{i,t=}}$ Idiosyncratic error

This study uses the Panel Vector Autoregressive Model (PVAR), as we explained above. We will benefit from Variance Decomposition (VDC) to understand how much our variables explain the variation in inflation, in general. By doing this, we use "plm" (Croissant,2008) and "panelvar" (Sigmund and Ferstl, (2017)) packages of R Studio[42].

The choice of variables in our study is influenced mainly by Benlialper and Cömert (2013), Benalialper, Cömert, and Öcal (2017), Sohrabji (2011), and Borio and Filardo (2007). In our model, inflation is measured by a percentage change of the monthly Consumer Price Index released by OECD ($inf_{i,t}$)[43]. We combine the two

[42] Especially, we use the "p.data frame", "pvargmm" and "fevd_orthogonal" functions.

[43] Growth rate from same period previous year is used. All available CPI data is and retrieved from OECD and FRED, Federal Reserve Bank of St. Louis; and can be reached from the URL : https://fred.stlouisfed.org/categories/32266

external drivers mentioned in the previous parts (Chapter 2 and 3); the oil and food prices are represented under the World Commodity Price Index[44] released by International Monetary Fund (Fuel and Non-Fuel) ($wcpi_{i,t}$)[45]. We use the monthly total industrial production index (2015=100) (resealed by OECD) as a proxy to GDP for the domestic output gap ($gap_{i,t}$)[46]. We apply the Hodrick-Prescott Filter to calculate the domestic output gap by setting the smoothing parameter (14400 for monthly data). For the effect of monetary policy, we use countries' policy rates ($int_{i,t}$) [47]. In addition, the percentage change in imports [48] is used as an indicator of globalization ($import_{i,t}$)[49]. The percentage change in nominal effective exchange rate index (2010=100) represents the exchange rate ($fx_{i,t}$).

After introducing the variables, the representation of our model is that :

$$\boldsymbol{Inf_{i,t}} = \sum_{\boldsymbol{j=1}}^{\boldsymbol{p}} (\boldsymbol{inf_{i,t-j}\beta 1 + WCPI_{i,t-j}\beta 2 + import_{i,t-j}\beta 3 + fx_{i,t-j}\beta 4} \\ \boldsymbol{+ gap_{i,t-j}\beta 5 + int_{i,t-j}\beta 6}) + \boldsymbol{u_i + e_{i,t}}$$

Where "i" represents the cross-sectional dimension, and "t" represents the period.

Also, the matrix representation of our model is that

[44] Growth rate from same period previous year is used. You can reach the available data from the URL: https://www.imf.org/en/Research/commodity-prices

[45] In their study, Benlialper and Cömert assert that they also estimate another model with fuel and food prices are seperated. However, since the results are similar with separate indices, they choose the model with general commodity price inflation in order not to consume unnecessary degrees of freedom for Turkish case.

[46] The data is retrieved from FRED, Federal Reserve Bank of St. Louis; and can be reached from the URL :
https://fred.stlouisfed.org/categories/32294

[47] We got the related data from BIS database and IMF-IFS. For the policy rate, we do not follow one type of interest rate in our regression. Since some central banks use different interest rates as policy rate, we examine these patters and changed the interest rates in line with this. For example ,for Turkey, while we use CBRT overnight borrowing rate and one week repo for different periods.

[48] For this variable, The Total value of imports (in USD) is used. The data for imports are retrieved from
https://fred.stlouisfed.org/tags/series?t=imports%3Bunited%20kingdom&rt=united%20kingdom&ob=t&od=asc

[49] Borio and Filardo (2007) emphasize the importance of global slack for the inflation especially after the 1980s. The main reason why we need to add this variables as an indicator for global demand is that since we argue that as the world economy integrated, the role of global factors have changed. In this new setting, trade is the main channel of developing world to connect with the world economy. In addition, as stated in the previous chapters, most of the developing countries dependent on imported intermediate goods in their industries. Any decline in the global demand cause decline in the import and production as well.

$$\begin{bmatrix} WCPI_{i,t-1} \\ import_{i,t-1} \\ fx_{i,t-1} \\ gap_{i,t-1} \\ int_{i,t-1} \\ int_{i,t-1} \\ inf_{i,t-1} \end{bmatrix} = \begin{bmatrix} \beta_{1,1} \\ \beta_{2,1} \\ \beta_{3,1} \\ \beta_{4,1} \\ \beta_{5,1} \\ \beta_{6,1} \end{bmatrix} \begin{bmatrix} WCPI_{i,t-1} \\ import_{i,t-1} \\ fx_{i,t-1} \\ gap_{i,t-1} \\ int_{i,t-1} \\ int_{i,t-1} \\ inf_{i,t-1} \end{bmatrix} + \ldots\ldots + \begin{bmatrix} \beta_{1,j} \\ \beta_{2,j} \\ \beta_{3,j} \\ \beta_{4,j} \\ \beta_{5,j} \\ \beta_{6,j} \end{bmatrix} \begin{bmatrix} WCPI_{i,t-j} \\ import_{i,t-j} \\ fx_{i,t-j} \\ gap_{i,t-j} \\ int_{i,t-j} \\ int_{i,t-j} \\ inf_{i,t-j} \end{bmatrix} + \begin{bmatrix} u_1 \\ u_2 \\ u_3 \\ \ldots \\ \ldots \\ u_i \end{bmatrix} +$$

$$\begin{bmatrix} e_{1,1} \ldots & e_{1,p} \\ e_{2,1} \ldots & e_{2,p} \\ e_{3,1} \ldots & e_{3,p} \\ e_{4,1} \ldots & e_{4,p} \\ e_{5,1} \ldots & e_{5,p} \\ e_{i,1} \ldots & e_{i,p} \end{bmatrix}$$

The theoretical PVAR model also has exogenous variables that are not correlated with any disturbance terms and predetermined variables that are potentially correlated with the lagged disturbances. We define all the variables as endogenous since we need to use variance decomposition (VDC) for our analysis. Since exogenous and predetermined variables are not included in the variance decomposition of the endogenous variable, we do not use them. For the number of instrumental variables, we use the suggested methodology by Sigmund(2017). We define the maximum and the minimum number of instrumental variables, and the code uses the optimal number within the interval[50]**.**

As explained above, we follow the structure that Arellano and Bover suggested. We choose two-step GMM estimation since, in the one-step estimation, the Hansen J test cannot be computed. Hansen J Test is one of the most important tests for GMM estimation, gives inference to evaluate the model's overidentification. It is used for testing the over-identifying restrictions on the model[51]. Moreover, According to Hwand and Sun (2015), although both one-step and two-step estimations are asymptotically normal, a two-step estimation should be chosen since it has a lower variance.

In our PVAR model, we use the data of Brazil, Chile, Colombia, Czech Republic, Hungary, Mexico, Poland, South Africa, and Turkey. We choose these

[50] For minimum and maximum number of instrumental variables, we choose 1L and 99 respectively which is used in almost all empirical works in pvargmm function of R Studio.

[51] When we run the one step estimation, the R code gives warning of : " Although it is mathematically possible, the Hanjen J Test makes no sense under first step". In addition, it gives inconsistent results.

countries because of the following reasons. First, all of these countries have the same monetary policy regime, inflation targeting. The traditional literature states that inflation is mainly driven by demand-side/internal factors. This approach towards inflation shaped the policy structure of the inflation targeting regime. Countries that implement IT as a monetary policy regime use the short-term interest rate as the main and the only policy tool since it assumes that inflation is mainly driven by demand-side factors, and interest rate policy has a significant impact on inflation. However, in this study, we argue that although this claim might be true for developed countries, developing countries have different inflation dynamics. That is why we argue that there is a need for different policies for solving developing countries' inflation problems. Thus, we select especially the developing countries that conduct IT as a monetary policy regime[52] in order to test this argument. Second**,** these countries are mainly upper-middle-income countries. Since the integration of low income and the lower-middle-income countries to the world economy is relatively weak, it may not be a good way to using countries from these groups to investigate the impact of globalization on inflation dynamics. Third, these countries' economies do not fully depend on some natural resources; in other words, the world commodity prices' role is not overrated in these countries. Fourth, we want to collect the data from different parts of the developing world to find whether or not there is a common driver of inflation for developing countries in different regions[53].

In our subsample, we have three groups of countries. We have some Latin American countries that experienced hyperinflation episodes and relatively low trade to GDP ratio. Also, we have East European countries that are members of the European Union (Not in the Eurozone), have relatively low inflation, and high trade to GDP ratio. Last, countries like Turkey and South Africa can be considered as the middle of these country groups in terms of inflation experiences and globalization**.** Also, it is possible to make other categorizations. For Turkey and Brazil, they are relatively large economies, both members of G20. While Brazil is relatively closed,[54]

[52] Since some countries' data are bot available, we just use these countries.

[53] In addition, we shouldn't ignore that we are also looking for drivers that are effective in all periods under investigation. In our time span, countries encountered different conditions .For example, while in 1990s, they all implemented fixed exchange rate regime and relatively low trade to gdp ratios, starting from new millennium they altered their monetary policy regimes, implemented floating exchange rate regime and increased their trade volumes.

[54] The trade volume to GDP ratio is around 20 percent and there are still price controls carried by government (Volpon, 2016).

Turkey has a relatively more open economy; on the other hand, we also have relatively small subsample economies.

Table 4.1: Data Description

Country	Starting Date	Ending Date
Brazil	1995 M01	2019 M12
Chile	1997 M01	2019 M12
Colombia	1995 M01	2018 M12
Czech Republic	1995 M12	2019 M12
Hungary	1995 M01	2019 M12
Mexico	1995 M01	2019 M12
Poland	1995 M01	2019 M12
South Africa	1995 M01	2019 M12
Turkey	1995 M01	2019 M12

4.3.2 Estimation Results of PVAR Model

The regression of unbalanced panel is run for nine countries, Brazil, Chile, Colombia, Czech Republic, Hungary, Mexico, Poland, South Africa, and Turkey. We conduct all the tests that we mention in the methodology part. For testing the overidentification, the Hansen J test is used. According to the test, the model is not overidentified and robust. In addition, the model satisfies the stability conditions, which means that all the eigenvalues are in the unit cycle[55]. Although the Chamberlain (1983) relaxes the stationary condition for dynamic panel models for the unit root test, we conduct some unit root tests. According to PP and Im, Pesaran, and Shin W-stats (IPS), all variables are stationary[56].

[55] In fact, although we have presented the theoretical support for forward orthogonal transformation instead of first differences, we also run a regression with first difference transformation. Although the variance decomposition results are similar, one eigenvalue is out of the unit circle, which means that the model does not satisfy the stability conditions.

[56] In addition, ADF also supports these results. The Levin-Lin unit root test is not applicable for unbalanced panel data.

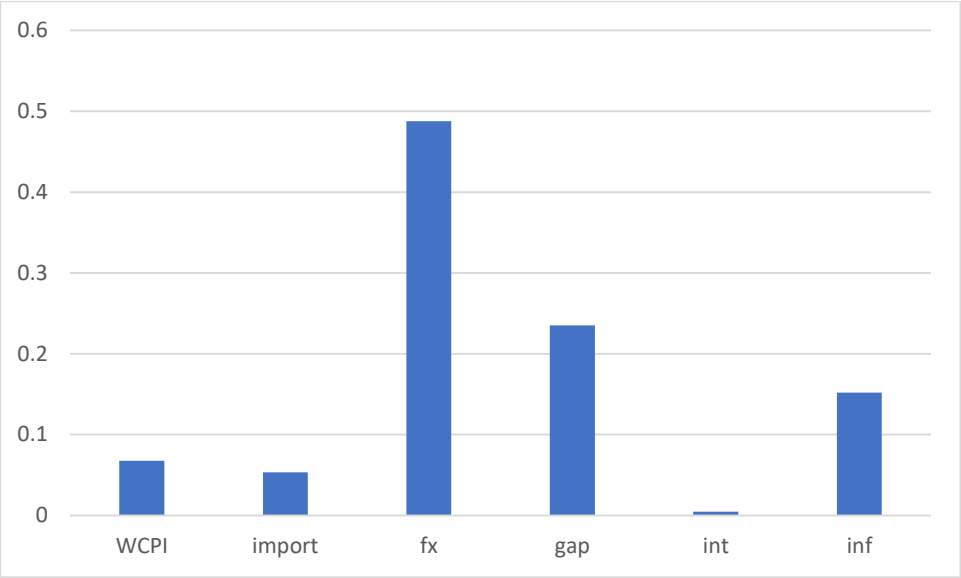


Figure 4.15 The VDC Results of PVAR Model[57]

According to the VDC results of the PVAR model (Figure 4.1), we have some implications. First, foreign exchange movements are the main and common driver of inflation for the countries in our subsample in this period (1995-2019). This result parallels what we observe in the descriptive statistics in the second chapter and some literature in the third chapter. Fx stands as the leading driver of inflation under all circumstances. When this regression is run fır three countries, fx and imports, with six countries fx and interest rate, and when it is finally run with nine countries, the fx and output gap become the leading factors. As understood from these results, as the number of countries included in the regression increases, while foreign exchange's role is not affected, the weight of the other drivers changes in line with the characteristics of new countries.

PVAR model helps us determine the common inflation driver for many developing countries since it is useful to see the dynamic relationship among variables. However, due to its pooled nature, it also has some drawbacks. In this sense, since there is heterogeneity in our subsample, we are not able to detect the country-specific dynamics of inflation, which is also an important issue in this subject. Thus, although we can say that foreign exchange is the common driver, we cannot make a conclusion

[57] The 10th period's values are used. For previous periods, there is no important change in the vdc values. You can find the estimation results and variance decomposition table at Appendix part.

regarding the role of other drivers. It is important to understand that the panel vector autoregressive models are not suitable for detecting all determinants of inflation for many countries. However, it might be useful to determine the common factor(s) of inflation for a group of countries.

To investigate the role of country characteristics in determining inflation, we construct a classical vector autoregressive (VAR) model, which enables us to overcome some of the limitations of PVAR.

4.4. The VAR Model

Vector Autoregressive Models (VAR) has been one of the useful, applicable econometric techniques to work on multivariate time series. Since it uses lagged versions of all variables, it is used in forecasting and causality between variables. In addition, since it treats all variables in the equation as endogeneous, the multicollinearity problem is relaxed.

The simple representation of the VAR model is as follows:

$$\boldsymbol{y_t = c + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \beta_3 y_{t-3} + \cdots + B_z y_{t-z} + u_t}$$

Where

$\mathbf{y_t}$ = vector of endogeneous variables

c= constant

$\mathbf{u_t}$= error term with white noise assumptions [58]

The matrix representation of our endogeneous variables in the VAR model is as follows:

$$Y_t = \begin{bmatrix} wcpi \\ import \\ \text{fx} \\ gap \\ int \\ inf \end{bmatrix}$$

[58] ($E[u_t]=0$, $E[u_t\, u_t'] =\sigma^2$, $E[u_t\, u_{t-k}'] =0$)

Vector Autoregressive Models (VAR) were firstly developed by Sims (1980). In that study, Sims states that there is a need for some models that show the interrelation of different macroeconomic variables in the economy. He constructs a dynamic model that investigates the effects of shocks coming from the monetary policy on the real variables in the economy. Starting from that article, the literature on VAR models has grown and become one of the most important tools in macroeconometrics. In the VAR(p) demonstration, p refers to the number of lags that endogenous variables include.

The main reason why we construct a time series model in addition to panel one, we want to estimate the country-specific effects in different periods as well. Although the PVAR model has advantages to determine the common driver, it has some drawbacks. For instance, because of its pooled nature, the individual differences are not represented very well. In this stage, the importance of the time-series dimension arises.

In our study, we use additional tools of classical VAR models. The Impulse Response Function (IRF), by definition, examines how an endogenous variable responds a one standard deviation shock from another variable. The main concern to examine the impulse responses is that the response function shouldn't intercept the x-axis with its confidence intervals. The matrix representation of IRF is as follows:

$$\begin{bmatrix} u_t^{wcpi} \\ u_t^{import} \\ u_t^{fx} \\ u_t^{gap} \\ u_t^{int} \\ u_t^{inf} \end{bmatrix} = \begin{bmatrix} A_{11} & 0 & 0 & 0 & 0 & 0 \\ A_{21} & A_{22} & 0 & 0 & 0 & 0 \\ A_{31} & A_{32} & A_{33} & 0 & 0 & 0 \\ A_{41} & A_{42} & A_{43} & A_{44} & 0 & 0 \\ A_{51} & A_{52} & A_{53} & A_{54} & A_{55} & 0 \\ A_{61} & A_{62} & A_{63} & A_{64} & A_{65} & A_{66} \end{bmatrix} \begin{bmatrix} \epsilon_t^{wcpi} \\ \epsilon_t^{import} \\ \epsilon_t^{fx} \\ \epsilon_t^{gap} \\ \epsilon_t^{int} \\ \epsilon_t^{inf} \end{bmatrix}$$

In addition to the IRF, the Forecast Error Variance Decomposition or just Variance Decomposition (VDC) is used to investigate what percent of the variation in one endogenous variable can be explained by other variables.

Since it has two useful tools to analyze the composition of different inflation factors, Variance Decomposition (VDC) and Impulse Response Function (IRF), variance Decomposition makes us examine how much of the variance in one endogenous variable is explained by others. In addition, the Impulse Response

Function (IRF) helps us to observe the response of one endogeneous variable to a unit shock in another one.

In this VAR model, we analyze the determinants of inflation for both selecting developing and developed countries. To do this, we use data of three inflation targeting developing countries, Brazil, Hungary, and Turkey, and three developed countries, the United Kingdom. The United States and Japan in the period between 1995:1-2019:12.

The main reason why we chose these three countries within the subsample is that they are representatives of their groups. Brazil experienced hyperinflation and is a relatively closed Latin American country. On the other hand, Hungary is an EU member open economy, and Turkey in the middle of these two "extreme examples." In addition, for the time dimension, it is beneficial to examine the countries under different periods since they encountered different conditions.

After analyzing developing countries, we are going to follow the same process for some developed countries: the United Kingdom, the United States, and Japan. Although the determinants of inflation in developed countries are not the main objective of this study, these countries will help us understand whether there is a difference in inflation dynamics between the developing and developed world.

While forming our inflation equation, we select the variables that characterize our main objective[59]. Since monthly data is more appropriate to observe the effects of endogenous variables on inflation, we use the monthly data. Also, since many variables in our equation are not available in the pre-1995, we start the time period from the beginning of 1995[60] to the end of 2019 **[61].**

Hence our inflation equation is of the form :

$$\boldsymbol{inf = \beta_0 + \beta_1 wcpi + \beta_2 gap + \beta_3 import_t + \beta_4 fx_t + \beta_5 i_t + ui}$$

Thus, our VAR model is represented as follows:

[59] Variables are chosen by considering the inflation dynamics of developing countries.
[60] Since commodity price index and some other variables are not available before 1992 for both quarterly and monthly scale, we have to start the estimation from that year. Growth rate of same period from preious year is used.
[61] The reason why the monthly inflation is better is that, as the time passes, the adjustment process on prices accelerates. Thus, shorter periods are more suitable to capture the effects of shocks coming from endogeneous variables on inflation.

$$\boldsymbol{Inf_{,t} = \sum(inf_{t-j}\beta 1 + WCPI_{t-j}\beta 2 + import_{t-j}\beta 3 + fx_{t-j}\beta 4 + gap_{t-j}\beta 5 + int_{t-j}\beta 6) + u_i}$$

4.4.1 Estimation Results of VAR Model

Our model consists of $\pi_t, \pi_t^c, y_t^d, import, fx_t$ and i_t . To estimate the model, we check the stationary conditions. To examine the inflation dynamics clearly, we divide the whole period into three parts, the 1990s, 2000s, and 2010. Thus, we are able to observe the inflation dynamics in different conditions. In the 1990s, all the countries in our subsample follow fixed exchange and mainly exchange rate targeting monetary policy regimes. But with the new millennium, they began to implement inflation targeting and floating exchange rate regimes, and most of the developing countries curbed their inflation rates to single-digit levels. Lastly, after the global financial crisis, the 2010s have different global conditions than the previous decade with less stable conditions.

We use the Augmented Dicky Fuller (ADF) test to check the stationarity. The lags in the ADF tests are chosen automatically, according to Schwartz Criteria. According to the results, since we have yearly changes for variables, most variables in different periods are non-stationary. The output gap is the stationary variable in the equation.

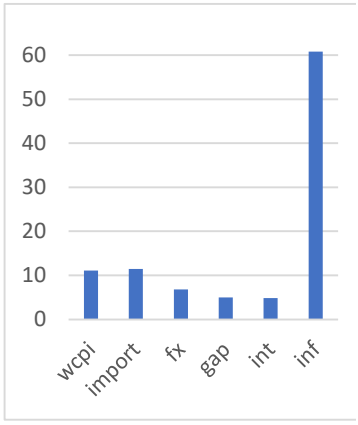
After solving the stationarity problem, we choose the appropriate lags for our model, which must be optimal in terms of economic and econometric conditions. To choose the optimal lag, we following the steps. First, we refer to the Akaike Information Criteria (AIC) to see the best operating lags. Second, we test these lags to see whether there is autocorrelation, heteroscedasticity, granger causality problem (the null hypothesis is there is not granger cause), and the system stability. If the optimal lag that is offered by AIC is free from these problems, we operate it, but if not, we examined other alternatives. All the results that we presented are free from these problems[62]. We use the Choletsky Order from the most exogenous one (wcpi) to most endogeneous (inflation) since it is a positive definite product of a lower triangular matrix. According to the literature and economic intuition, wcpi is the most exogenous

[62] You can see the results of diagnostic tests at appendix part. The only exception is 2010s Japan. Our model fails to acquire granger causality of inflation between other variables. Because of the granger causality problem, the VDC values are so low.

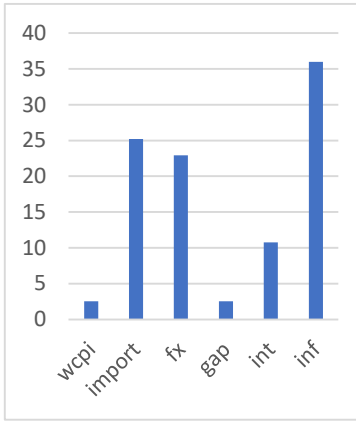
variable since the macroeconomic variables of Turkey have almost no effect on world commodity prices. Also, the fx and output gap are more exogeneous than inflation and interest rate. For other variables, changing order among themselves does not cause an important change in the variance decomposition results. We have nine regressions for each group of countries, three countries in 3 periods.

Table 4.16 Variance Decomposition Results of VAR Models[63]

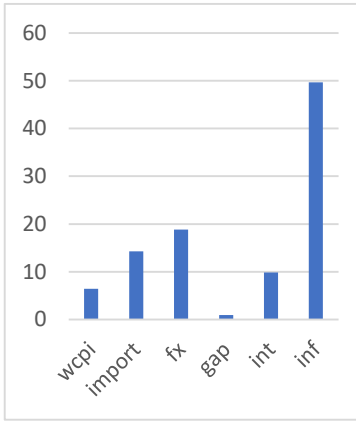
Turkey – 1990s



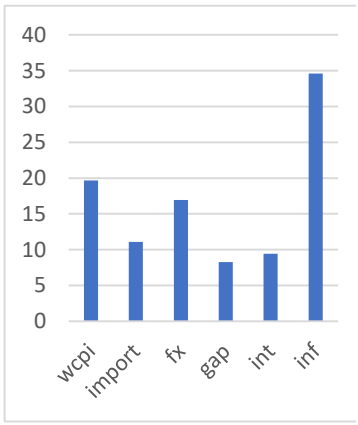
Turkey – 2000s



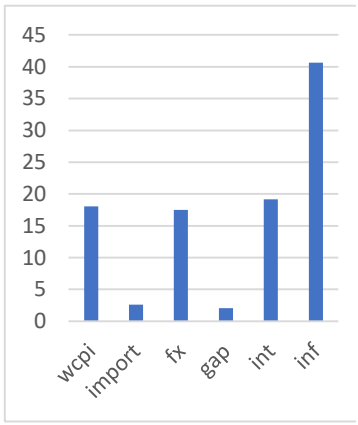
Turkey – 2010s



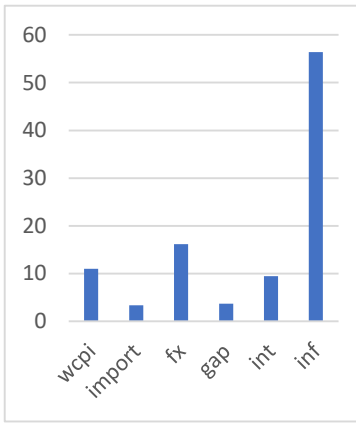
Brazil – 1990s



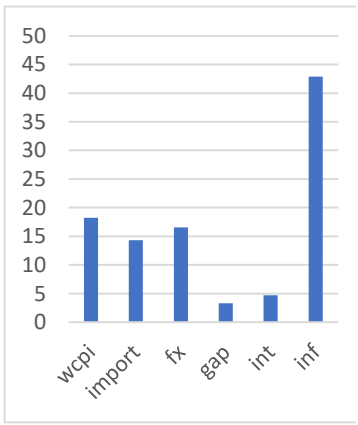
Brazil – 2000s



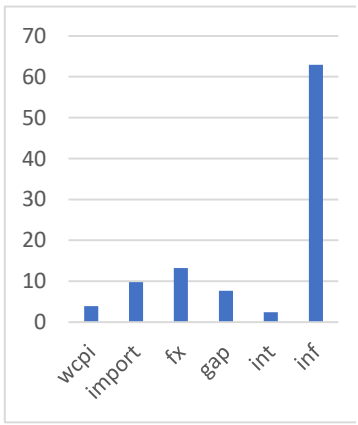
Brazil – 2010s



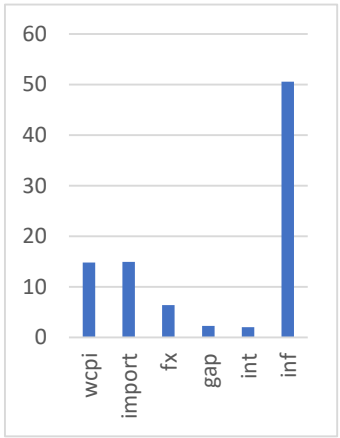
Hungary – 1990s



Hungary – 2000s



Hungary – 2010s



[63] These values represent the 10th period. For of all periods, all tables are also available at the Appendix part.

For developing countries, it can be said that the external variables dominate the inflation dynamics of these developing countries. Foreign exchange, imports, and world commodity price index have been leading drivers for countries in our subsample. The only exception is Brazil in the 2000s, in which the interest rate is the leading factor. In fact, throughout three regressions, we observe that the interest rate is more important in Brazil relative to other countries, which is not surprising.

According to the literature on drivers of inflation in Brazil, since the country has been exposed to many shocks and experienced unstable economic structure and hyperinflation episodes in its history, the natural risk Premium has become so high, and that increases the Brazilian interest rate, and that makes difficult to control the inflation (Volpon,2015). Also, even in that period, although the leading factor is the interest rate, the second and third important factors are external factors. The variance decomposition results of these three variables are so close[64]. Thus, eventually, the external factors consist of the majority of the variations in inflation in Brazil.

Among the external drivers, we see that although wcpi and imports' importance changes in different periods and countries, the exchange rate stands as an important factor for all periods in all countries. The only exception for this is the results of Hungary in the 2010s. It was reasonable since, after joining the EU in 2004, the economic structure of Hungary changed considerably. An increase in economic relations with EU member countries eliminated some fragilities of the Hungarian economy that a typical developing country owns. On the monetary side, although Hungary is not in the Eurozone, it has been using Euro as a reference currency, which prevents any exchange rate shock for Hungary. The Central bank of Hungary defines its exchange rate regime as the floating regime, which means the exchange rate is defined as the interaction of supply and the demand of Forint; they follow the Euro as the reference currency (MNB, 2008). Since there is an inflow of Euro towards the country, it is not hard to prevent the exchange rate shocks for monetary authorities in Hungary. Another implication of the regression results of developing countries is that the role of import on the inflation dynamics in Brazil is relatively low compared to Turkey and Hungary in the last two decades since Brazil is one of the most closed economies in the developing world[65]. The imports are the least important variable in

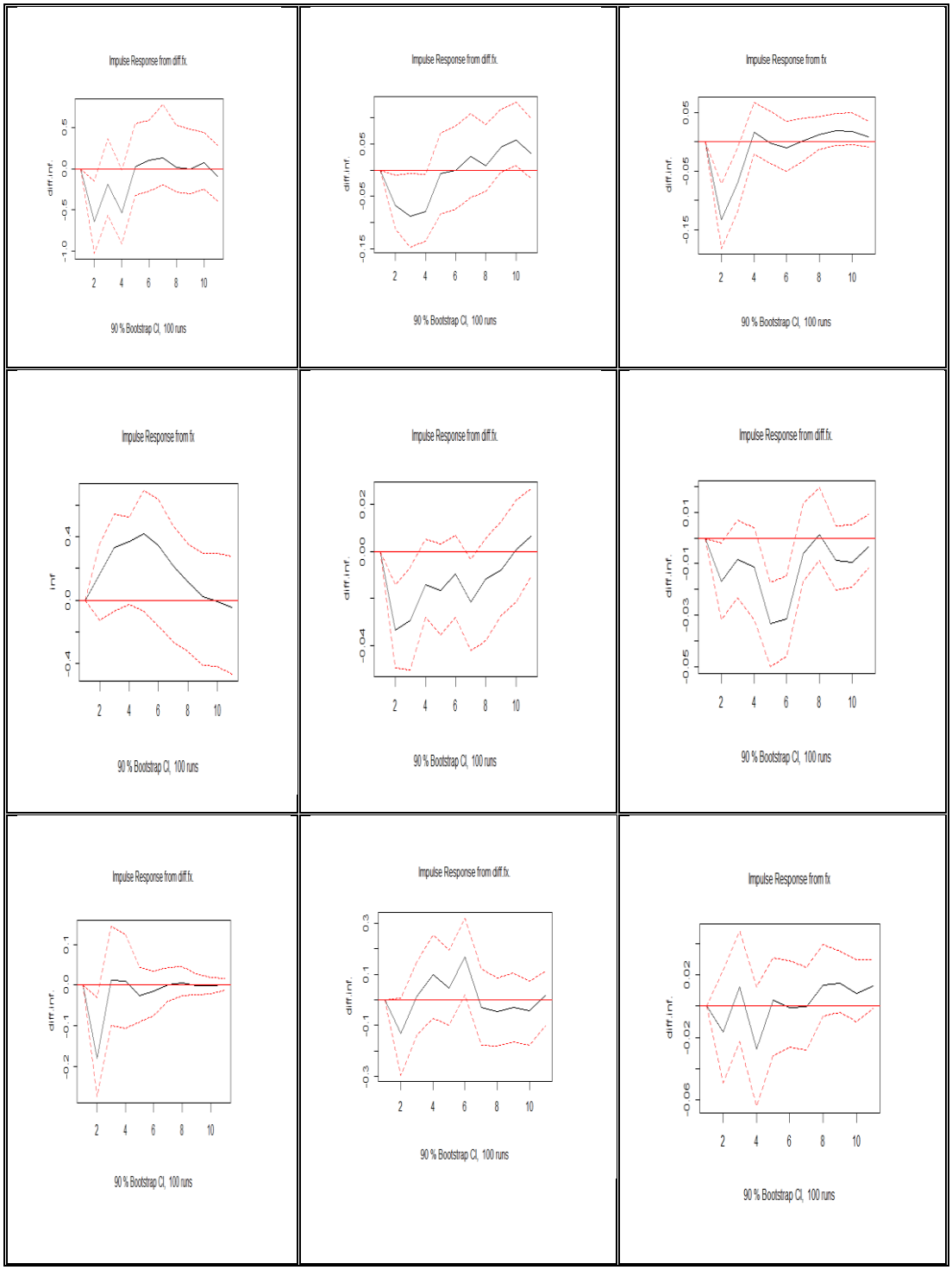
[64] The variance decomposition of interest rate is 19 , while wcpi and fx are 18 and 17 respectively.
[65] Trade to GDP ratio is around 20 percent. It is 50 and 110 percent for Turkey and Hungary.

Brazil in the last two periods, while in Turkey, Hungary, it is one of the leading factors in the same periods.[66]

In developed countries, the main result is that the exchange rate is not an important driver of inflation. This is rational since the developed countries, especially in our subsample, has much more powerful currencies that do not experience such devaluations and depreciation that developing countries experience. The only exception in the 1990s UK since the UK was affected by the 1993 European Currency Crisis and experienced huge devaluation in the history of Sterlin. In addition, the role of the output gap is relatively more visible in developed countries in some periods, as oppose that in developing countries' results.

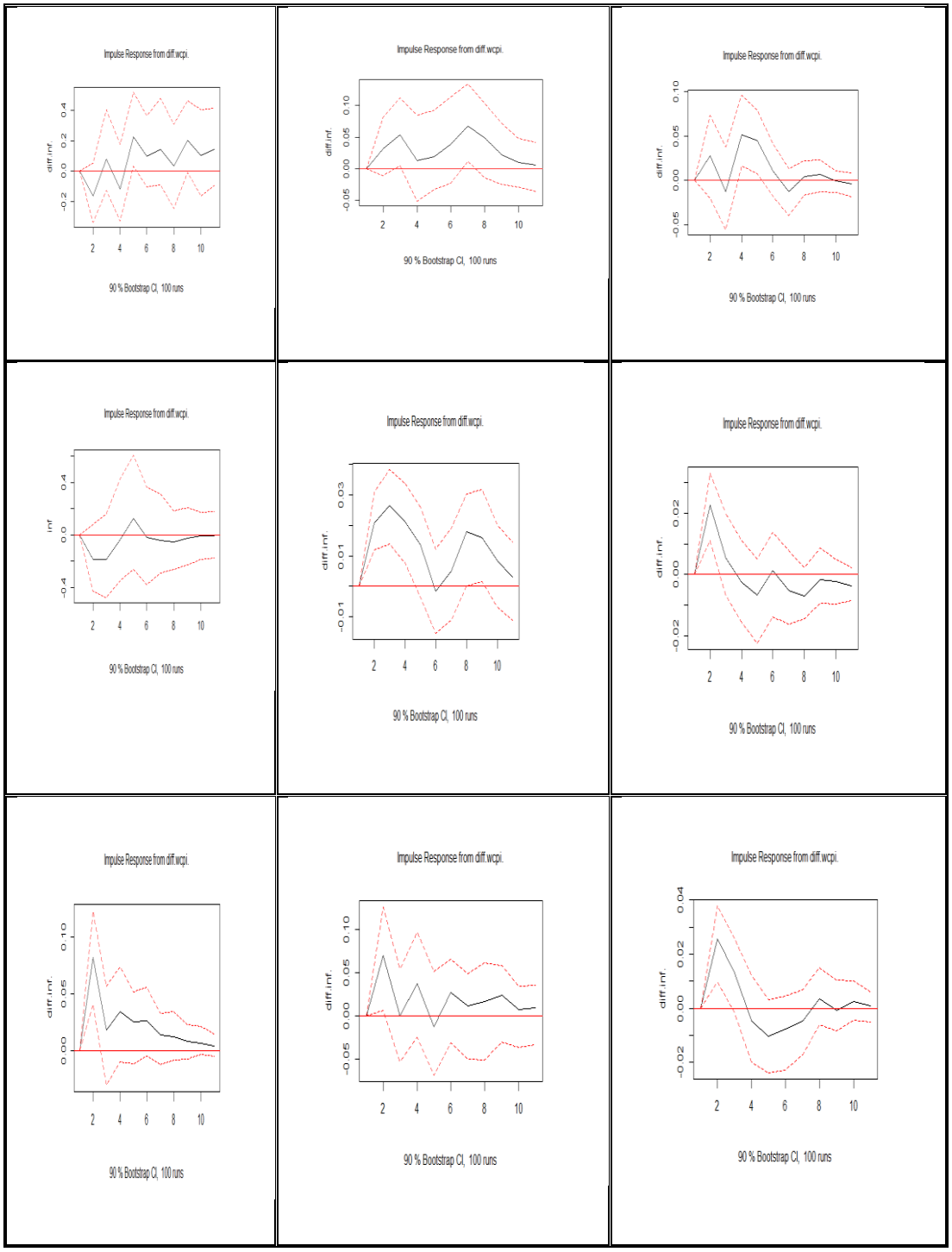
[66] The numerical values are also supporting this argument. While in the Brazil it explains only 2 and 3 percent, for Turkey 25 and 14, for Hungary, 9 and 6. For Hungary it is the second and third explanatory variable.

Table 4.3 Impulse Response Functions-Foreign Exchange[67]



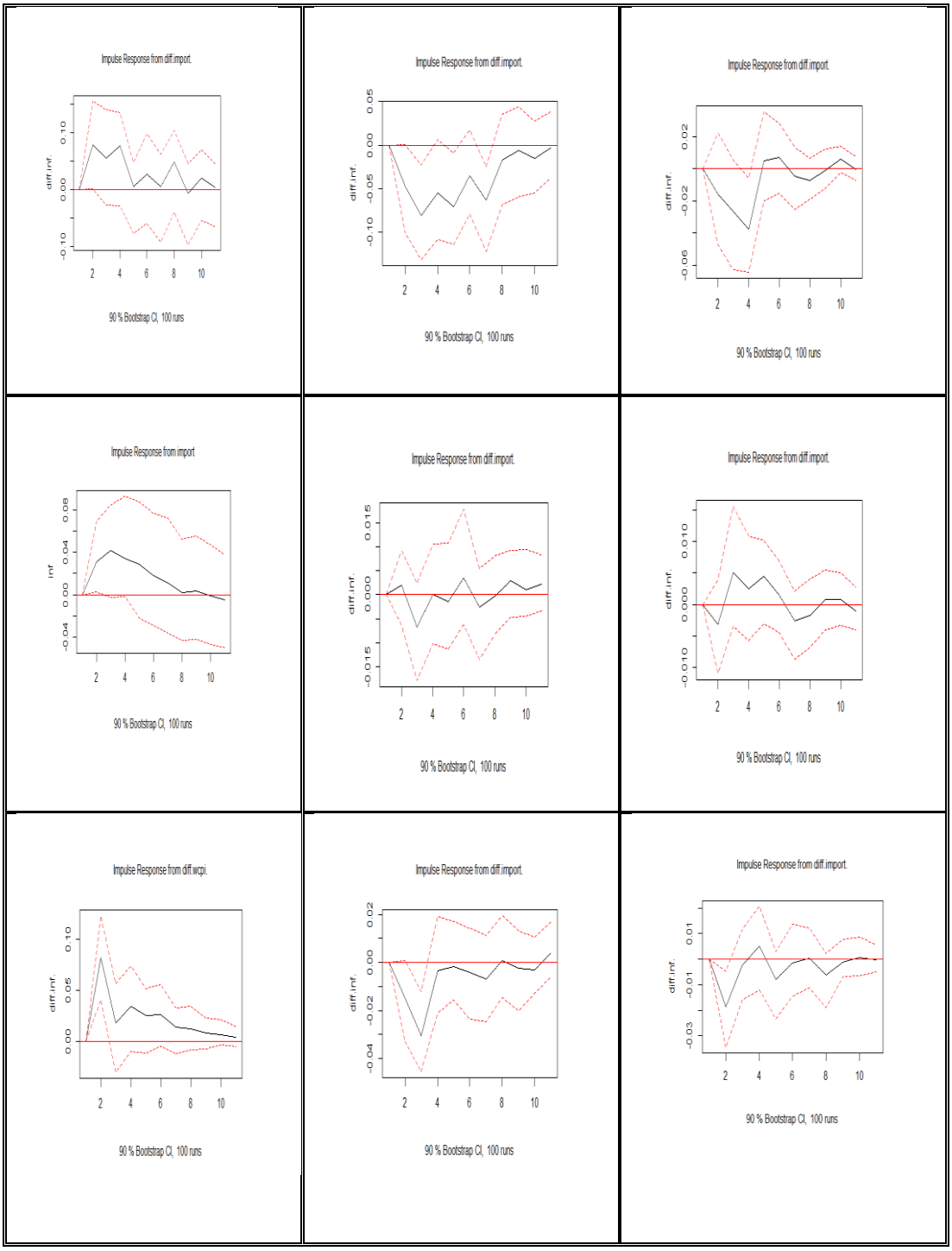
[67] The first row represents Turkey, second represents Brazil and third row represents Hungary respectively.

Table 4.4 Impulse Response Functions- World Commodity Price Inflation [68]



[68] The first row represents Turkey, second represents Brazil and third row represents Hungary respectively

Table 4.5 Impulse Response Functions-Imports[69]



The results of impulse response functions are parallel with our findings in variance decompositions. For example, the developing countries in our subsample

[69] The first row represents Turkey, second represents Brazil and third row represents Hungary respectively

mainly have significant responses to shocks coming from the external variables. But the speed of adjustment of this shock changes from country to country. The period that the shocks are the most volatile in the 2010s, where all of the countries react spontaneously positive to the innovations in wcpi.

For foreign exchange, we see that the shocks coming from the exchange rate have negative responses to inflation since there is a negative correlation between fx change and inflation. The period that we see the most significant and persistent responses to the innovation coming from fx is the 2000s, where the developing countries experienced appreciations. The responses are insignificant in Hungary in the 2010s, which is consistent with the variance decomposition results.

For imports, we have different implications. Hungary is the only country that the responses to the imports are significant at all periods. In addition, in Brazil, the shocks are insignificant in the last two periods, as we see in the variance decomposition results. For Turkey, it has a significant response only in the 2000s, when the country was declining inflation.

For world commodity price inflation, although it has significant responses in Brazil and Hungary, we don't see such reaction of Turkish inflation to the innovations coming from the world commodity prices.

4.5 Conclusion

After referring to some descriptive statistics and literature review, in this chapter, we conducted different econometric techniques to determine the drivers of inflation in selected countries.

At first, we construct a Panel Vector Autoregressive model (PVAR) to nine inflation targeting developing countries in 1995(1)-2019(12) period. In that regression, we aim to find a "common driver" of inflation for all countries in our subsample. According to the results, the exchange rate (fx) stands as the common driver of inflation.

After that, although panel vector autoregressive models are important tools, they are not good at determining the country-specific effects. Thus, we also conduct a vector autoregressive model for 3 of these countries; Brazil, Hungary, and Turkey. In addition, to see whether or not there is a difference between the inflation dynamics of

these countries, we also run another three regressions to 3 major developed countries, Japan, UK, and the US.

In our model, we choose the domestic output gap and policy rate to represent the domestic variables and change in foreign exchange, imports, and world commodity price inflation as global variables. According to the results, inflation is driven mainly by external variables for all countries in our subsample. For developing countries, world commodity price inflation, exchange rate movements, and change in imports stand as leading factors. In the developed countries' side, while world commodity price inflation and imports are also important, we don't see such importance of foreign exchange movements in inflation. This is consistent with the findings of the previous chapters. Since the developed countries do not experience considerable exchange, foreign exchange is not one of the most important sources of inflation for them. Moreover, the country characteristics cause some differences among the same group of countries. For example, while the change in imports is much more important in inflation in relatively open Turkey and Hungary, we don't see much impact in Brazil, which is one of the most closed countries in the developing world.

CHAPTER 5

CONCLUSION

Inflation is defined as a rise in overall prices over a period. Since it is one of the main determinants of the standard of living, it is considered one of the most important subjects in economics.

It is generally accepted that inflation should be stable and low since high/hyperinflation undermines the economic activity by shortening planning horizons and causing low economic growth[70]. Also, at the micro-level, the high inflation might affect the households disproportionally, the wage earner- poorer parts of the society might be damaged more, which may cause social problems. Due to all these reasons, governments and policymakers of countries focus on fighting against high inflation. All these facts make inflation an important subject to investigate. In this study, we examine the inflation dynamics of selected developing countries by utilizing some econometric techniques. The main objective of ours is to compare the relative roles of internal and external drivers. To do this, we need to refer to descriptive statistics and review the existing literature to construct the true model.

In chapter two, refer to descriptive statistics to understand the historical movements and dynamics behind inflation. We indicate that the developing world has historically high and more volatile inflation than developed countries. Developing countries had witnessed many high/hyperinflation episodes in their histories. After the high inflation rates in the 1970s when the median global inflation reached 16.76 percent, which is eight times of current global median inflation. Inflation rates in developed countries started to decline in the 80s. Developing countries followed this pattern a decade later. In the new millennium, most of the developing countries decreased their inflation rates to single-digit levels. In that period, the inflation spread between these two groups is decreased as well.

[70] This is also true for the case of deflation.

In calculating inflation, we show that there are different measures of inflation for different purposes. The core or headline inflation, Consumer Price Index (CPI), Producer Price Index (PPI), and GDP Deflator based inflation measures give different answers to different questions. Although the correlation among these indexes was quite high, the overall correlation has declined in the last two decades. Also, due to the differences in economic structures between the developing and developed world, the role of different factors in inflation vary from developed to developing countries. Among these differences, the most important difference between developing and developed countries is the role of the exchange rate in the determination of inflation. Since the developing world has depended on imported intermediate goods in the production sector and foreign currency-denominated liabilities, any depreciation of the domestic currency has an increasing effect on unit costs and thereby the inflation rates. On the other hand, since the developed world has relatively stable, powerful, and international currencies that can be used in international trade, they don't encounter such problems in their economies. Although the exchange rate plays different roles in developed and developing countries, oil and food prices are common factors in both groups

In the literature, there are two main views regarding the sources of inflation. According to the first and the traditional point of view, inflation is mainly determined by the monetary factors. This argument states that in order to control inflation, the monetary aggregates should be controlled. Milton Friedman (1984) and Frederic Mishkin's (1992) studies support this view.

According to the second view, due to the globalized character of today's world economy, the role of external factors in inflation has increased. According to this view, the globalization of economies caused the globalization of inflation rates. This view states that as the world economy globalized, countries have experienced some transformation in their economic structures. In the new period, the role of the state in economic activities has declined, and the liberalization in the financial account and global trade is accomplished by decline or totally abolishment of tariffs and other restrictions. The range of goods and services that can be the subject of international trade has increased starting from this period. Besides, due to the rising role of China in world trade, the competition increased, which led import prices to go down. As White asserted, as a result of these developments, since imported goods have a greater

portion in consumption baskets of households in countries, in other words, the inflation dynamics of countries have transformed in favor of external drivers. The relative role of external variables on inflation gained power among all other variables.

After gaining information from the existing literature, we run some regressions to examine the drivers of inflation in selected countries. In that part, first, we create an inflation regression equation that consists of consumer price inflation, nominal effective exchange rate, domestic output gap, policy rate, world commodity price inflation, and imports. With the help of this regression equation, we want to compare the effects of the traditional internal-demand side factors and external-mainly supply-side – factors in inflation.

We first construct a Panel Vector Autoregressive Model (PVAR) to identify whether there is a general driver of inflation in developing countries under different circumstances. In this model, we use the data of Brazil, Chile, Colombia, Czech Republic, Hungary, Mexico, Poland, South Africa, and Turkey. There are some reasons for choosing these countries. First, they all inflation targeting developing countries; we can test the validity of the traditional view. Second, these countries are upper-middle-income countries, and the other parts of the developing world have problems with integration to the world economy. Third, the availability of data made us choose these countries[71]. According to the results of the PVAR model, the exchange rate is the common driver of inflation for these countries in the period of 1995-2019.

Since PVAR models have some limitations to detect the country-specific effects, we also run another regression with the VAR model to 3 selected countries, namely Brazil, Hungary, and Turkey, for three periods (the 1990s, 2000s, 2010s)**.** In this group, Brazil is the Latin American, less globalized, and hyperinflation experienced country. As opposed to Brazil, Hungary is an EU member, East European, and highly globalized country. In addition, it has relatively stable inflation. Turkey represents the middle ground between these two extreme examples. Also, just to explore that if there is a difference between inflation dynamics of developed and developing countries, we run the regression for three major developed countries; Japan, UK, and the US.

[71] The availability of the data is also another important reason.

According to the results of VAR models, external drivers dominate the inflation dynamics of selected developing countries. Almost all of the nine regressions (three countries, three periods) world commodity price inflation, foreign exchange, and imports become the leading factors of inflation in all countries. In addition, the role of imports is more important in Hungary and Turkey than Brazil, which is one of the most closed economies in the developing world, which still imposes price and import controls. Although the effect of world commodity price inflation is important in some periods, the foreign exchange stands as the most stable driver that is important for all periods for all countries. While the foreign exchange stands as one of the leading factors in all these periods, the roles of wcpi and imports are changeable depending upon the country characteristics and global conditions.

In addition, for the developed countries in our subsample, we see that although world commodity price inflation is important in inflation dynamics, unlike the developing countries, foreign exchange is not an important driver of inflation for these countries.

In conclusion, in this study, we show that as globalization accelerates and changes the world economic structure, the inflation dynamics of countries have changed as well. In this new period, external drivers have been more effective in determining inflation in developing countries. In addition, although the foreign exchange is the most persistent driver of inflation in developing countries in all periods, we don't see such importance for developed countries.

There are some policy implications based on the result of this study. First, since the movements in the exchange rate are an important indicator in the determination of inflation in developing countries, the central banks in those should implement some policies regarding the exchange rate stability. The countries that implement inflation targeting should abandon the orthodox stance, which suggests only the use of short term interest rates.

There are some important limitations to this study, as well. The most important limitation of this study is that because of the lack of monthly and quarterly data regarding the pre-1980 period, especially for the developing countries, we couldn't compare the inflation dynamics before and after the 1980s. This prevents us from examining the time-varying characteristics of inflation as much as we want.

For further research, one can focus on the relationship between exchange rate and inflation in developing countries. As demonstrated in the study, the exchange rate is the common driver of inflation in different parts of the developing world. In the next step, one might examine if there is a nonlinear relationship between inflation and foreign exchange in developing countries. Besides, we do not focus on the drivers of inflation in developed countries much. However, it might be a useful exercise to investigate the inflation dynamics of advanced economies in detail.

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APPENDICES

APPENDIX A : Unit Root Tests

Table A.1: Unit Root Tests for Turkey[72]

Variable	ADF(1)	ADF(2)	ADF(3)
Fx	0.77-0.01-0.02	0.25-0.05-0.01	0.46-0.06-0.02
Gap	0-0-0	0-0-0	0-0-0
Import	0.01-0.08-0	0.09-0-0.05	0.34-0.02-0.21
Inf	0.58-0.02-0.48	0.14-0.25-0.21	0.26-0.28-0.07
Int	0.76-0.05-0.22	0-0.08-0.12	0.02-0-0.09
WCPI	0.33-0.01-0.01	0.92-0.02-0.12	0.99-0.1-0.43

Table A.2:Unit Root Test for Brazil

Variable	ADF(1)	ADF(2)	ADF(3)
Fx	0-0.01-0.01	0.01-0.11-0.06	0-0.11-0.23
Gap	0-0-0	0.01-0.01-0.02	0.04-0.04-0.08
Import	0-0.01-0.01	0.05-0.08-0.07	0.01-0.23-0.2
Inf	0-0.24-0.47	0-0.1-0.35	0-0.11-0.58
Int	0.19-0.31-0.19	0.36-0.1-0.26	0.38-0.03-0.44
WCPI	0.33-0.01-0.01	0.92-0.02-0.12	0.99-0.1-0.43

Table A.3: Unit Root Test for Hungary

Variable	ADF(1)	ADF(2)	ADF(3)
fx	0.31-0-0	0.62-0.05-0	0.01-0.13-0.79
gap	0-0-0.08	0-0-0.43	0-0-0.79
import	0.01-0.07-0.02	0-0-0.16	0-0-0.43
inf	0.25-0.21-0.18	0.75-0.23-0.39	0.75-0.58-0.87
int	0.03-0.14-0.16	0.99-0.25-0.81	0-0.470.73
wcpi	0.33-0.01-0.01	0.92-0.02-0.12	0.99-0.1-0.43

[72] ADF(1) refers to random walk; ADF(2) Random walk with intercept and ADF(3) refers to random walk with trend and intercept. The first value refers to 90s, second 2000s and third 2010s respectively.

Table A.4: Unit Root Tests for UK

Variable	ADF(1)	ADF(2)	ADF(3)
Fx	0.39-0.06-0.05	0.7-0.28-0.31	0.93-0.750.68
Gap	0-0.02-0	0.01-0.19-0	0.03-0.4-0
Import	0.06-0.06-0.03	0.13-0.25-0.24	0.33-0.59-0.31
Inf	0.18-0.49-0.39	0.28-0.21-0.75	0.36-0.21-0.91
Int	0.42-0.14-0.76	0.15-0.77-0.7	0.13-0.87-0.87
WCPI	0.33-0.01-0.01	0.92-0.02-0.12	0.99-0.1-0.43

Table A.5: Unit Root Tests for US

Variable	ADF(1)	ADF(2)	ADF(3)
Fx	0.1-0-0	0.14-0.01-0.02	0.38-0.03-0.12
Gap	0.01-0-0.01	0.07-0.01-0.07	0.12-0.03-0.18
Import	0.51-0.11-0.04	0.47-0-0.37	0.84-0-0.68
Inf	0.55-0.14-0.3	0.68-0.01-0.12	0.97-0.04-0.36
Int	0.37-0.06-0.42	0.13-0.25-0.64	0.69-0.550.46
WCPI	0.33-0.01-0.01	0.92-0.02-0.12	0.99-0.1-0.43

Table A.6: Unit Root Test for Japan

Variable	ADF(1)	ADF(2)	ADF(3)
Fx	0.08-0.01-0.04	0.4-0.11-0.29	0.48-0.27-0.6
Gap	0.06-0-0	0.36-0-0	0.65-0.01-0
Import	0.35-0-0.06	0.79-0.01-0.4	0.99-0.04-0.74
Inf	0.113-0.13-0.04	0.59-0.49-0.15	0.87-0.46-0.37
Int	0-0.23-0.26	0-0.44-0.76	0.02-0.77-0.57
WCPI	0.33-0.01-0.01	0.92-0.02-0.12	0.99-0.1-0.43

APPENDIX B: RESULTS OF PVAR MODEL

Table B.1 : Estimation Results of PVAR Model

Dynamic Panel VAR Estimation, two-step GMM						
Transformation: Forward Orthogonal Deviations						
Group variable : id						
Time variable: t						
Number of observations: 2629						
Number of groups: 9						
Obs per gorup min =273						
avg=291.7778						
max= 297						
Number of instruments =3570						
	WCPI	import	fx	gap	int	inf
lag1_WCPI	0.1653	0.3948	0.089	-0.0334	0.0005	-0.0444
	(0.0489)	**(0.0682)**	**(0.0489)**	**(0.0232)**	**(0.0221)**	**(0.035)**
lag1_import	0.1284	0.1849	0.1346	0.0636	-0.0272	-0.0333
	(0.0474)	**(0.0422)**	**(0.0551)**	**(0.0255)**	**(0.0317)**	**(0.0529)**
lag1_fx	0.0874	0.2063	0.0254	0.0047	-0.0938	-0.0172
	(0.0349)	**(0.0935)**	**(0.0195)**	**(0.0257)**	**(0.0296)**	**(0.0154)**
lag1_gap	-0.0096	-0.038	-0.0048	0.0354	-0.0248	-0.0001
	(0.0028)	**(0.0125)**	**(0.0043)**	**(0.0083)**	**(0.0085)**	**(0.0014)**
lag1_int	0.1039	0.2461	0.0905	-0.1984	0.2971	0.0003
	(0.0367)	**(0.0627)**	**(0.0664)**	**(0.0615)**	**(0.0624)**	**(0.0281)**
lag1_inf	0.0807	-0.1096	0.004	-0.1295	0.1845	0.0161
	(0.0207)	**(0.0406)**	**(0.0323)**	**(0.0513)**	**(0.0089)**	**(0.0259)**
lag2_WCPI	0.1003	0.1677	0.0824	-0.0041	-0.0314	-0.0415
	(0.0476)	**(0.0253)**	**(0.0484)**	**(0.0215)**	**(0.0294)**	**(0.0377)**
lag2_import	0.0709	-0.0275	0.1546	0.0918	-0.0442	-0.0265
	(0.0488)	**(0.1159)**	**(0.0647)**	**(0.0311)**	**(0.038)**	**(0.0569)**
lag2_fx	0.0822	0.1656	0.0186	0.0159	-0.1062	-0.0194
	(0.0353)	**(0.072)**	**(0.0162)**	**(0.0267)**	**(0.031)**	**(0.0149)**
lag2_gap	-0.0146	-0.0535	-0.0032	0.0334	-0.0257	0.0003
	(0.0037)	**(0.0174)**	**(0.0047)**	**(0.0079)**	**(0.0087)**	**(0.0015)**
lag2_int	0.1074	0.2564	0.0945	-0.2029	0.3163	0.0005
	(0.0369)	**(0.0607)**	**(0.0674)**	**(0.0623)**	**(0.0645)**	**(0.0284)**
lag2_inf	0.081	-0.1455	0.009	-0.1269	0.1807	0.0194
	(0.0215)	**(0.0461)**	**(0.0255)**	**(0.0537)**	**(0.018)**	**(0.0268)**
const	0	0	0	0	0	0
	0	**0**	**0**	**0**	**0**	**0**

Table B.2: Variance Decomposition Results of PVAR Model

inf						
	WCPI	import	fx	gap	int	inf
[1]	0.058877	0.052563	0.493793	0.239967	3.93E-05	0.154761
[2]	0.060341	0.052983	0.493043	0.239277	3.93E-05	0.154316
[3]	0.063842	0.053311	0.491676	0.237766	1.02E-04	0.153303
[4]	0.065573	0.053376	0.490649	0.236998	6.21E-04	0.152783
[5]	0.06682	0.053395	0.489522	0.236376	1.50E-03	0.152388
[6]	0.067355	0.053396	0.488656	0.235955	2.47E-03	0.15217
[7]	0.067532	0.053354	0.488097	0.235629	3.36E-03	0.15203
[8]	0.067517	0.0533	0.487852	0.235385	4.01E-03	0.151939
[9]	0.067459	0.053254	0.48781	0.235199	4.41E-03	0.151871
[10]	0.067438	0.053225	0.487863	0.235061	4.60E-03	0.151813

APPENDIX C: RESULTS OF COUNTRIES

C.1 Turkey

C.1.1 1990s

Table C.1.1.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	45.00454	36	0.1444	1.308922	(36, 86.2)	0.1562
2	34.56274	36	0.537	0.952545	(36, 86.2)	0.553
3	41.15231	36	0.2552	1.173231	(36, 86.2)	0.2705
4	37.05251	36	0.4202	1.034276	(36, 86.2)	0.4371

Table C.1.1.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity at lag h		
Joint test:		
Chi-sq	df	Prob.
1010.258	1008	0.474

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	4.167854	4	0.3838
D(IMPORT)	10.09629	4	0.0388
D(FX)	15.4833	4	0.0038
GAP	4.00927	4	0.4048
D(INT)	3.069622	4	0.5462
All	**31.80945**	**20**	**0.0454**

Table C.1.1.3: Variance Decomposition

Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	GAP	D(INT)	D(INF)
1	3.151406	13.70641	2.879261	0.009882	0.688885	5.136956	77.57861
2	3.305419	11.42486	5.085781	3.786802	4.174492	4.005987	71.52208
3	3.516486	10.71117	7.341101	3.280904	4.156387	3.679344	70.8311
4	3.698168	9.952729	10.28011	6.149409	3.867072	3.400255	66.35042
5	3.851416	11.48741	9.705142	5.936392	3.506613	4.100659	65.26378
6	3.975429	10.35116	10.17418	7.134111	3.923035	4.596119	63.82139
7	4.048887	10.24041	10.06478	7.109001	4.957922	5.041144	62.58674
8	4.123743	9.762605	11.64293	6.91202	4.688327	5.058388	61.93573
9	4.183723	11.22848	11.25006	6.675142	5.040384	4.980599	60.82534
10	**4.253676**	**11.07727**	**11.49109**	**6.801876**	**4.967663**	**4.848918**	**60.81318**

C.1.2 2000s

Table C.1.2.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	33.67452	36	0.5797	0.934103	(36, 318.9)	0.5811
2	35.49182	36	0.4926	0.987226	(36, 318.9)	0.4941
3	36.1628	36	0.461	1.006912	(36, 318.9)	0.4626
4	33.92653	36	0.5676	0.941453	(36, 318.9)	0.569
5	44.3718	36	0.1595	1.250976	(36, 318.9)	0.1607

Table C.1.2.2: Heteroscedasticity and Granger Causality

Null hypothesis: No serial correlation at lag h		
Joint test:		
Chi-sq	df	Prob.
1337.523	1260	0.0634

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	9.385832	5	0.0946
D(IMPORT)	11.40293	5	0.044
D(FX)	6.851916	5	0.2319
GAP	2.809023	5	0.7294
D(INT)	14.95557	5	0.0106
All	**59.12312**	**25**	**0.0001**

Table C.1.2.3: Variance Decomposition

Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	GAP	D(INT)	D(INF)
1	7.038101	0.514795	0.159076	17.39693	1.590485	7.972705	72.36601
2	7.83449	0.520691	5.541248	26.11372	2.01458	4.835697	60.97406
3	8.110983	0.467052	16.60252	26.90861	1.949765	6.675723	47.39633
4	8.470429	0.654886	20.43001	26.94518	1.82592	7.202662	42.94134
5	8.73447	0.801281	24.01888	24.21954	1.65564	10.84447	38.46018
6	8.871016	1.030517	24.23258	23.54355	2.231328	10.6666	38.29542
7	8.943082	1.770499	25.74196	22.54467	2.142752	10.65233	37.14778
8	9.016888	2.381462	25.68672	22.18248	2.224463	10.87456	36.65031
9	9.057252	2.506505	25.49874	22.26879	2.444959	10.88693	36.39407
10	9.089339	2.54475	25.21768	22.947	2.52823	10.76556	35.99678

C.1.3 2010s

Table C.1.3.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	42.71852	36	0.2047	1.199161	(36, 380.4)	0.2057
2	47.69986	36	0.0919	1.347572	(36, 380.4)	0.0925
3	38.45632	36	0.3589	1.073644	(36, 380.4)	0.36

Table C.1.3.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
810.965	756	0.0811

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	6.567395	3	0.087
D(IMPORT)	6.545843	3	0.0879
FX	19.05094	3	0.0003
GAP	0.328271	3	0.9546
D(INT)	4.921053	3	0.1777
All	53.74545	15	0

Table C.1.3.3: Variance Decomposition

Period	S.E.	D(WCPI)	D(IMPORT)	FX	GAP	D(INT)	D(INF)
1	4.571601	1.07267	11.10993	10.79204	0.058689	1.629439	75.33723
2	4.759032	2.902602	13.15636	23.77982	0.141914	1.360814	58.65849
3	4.945822	3.488493	13.31787	21.78167	0.595522	2.078846	58.7376
4	5.26908	3.425807	15.11538	19.46048	0.772086	9.083449	52.1428
5	5.342853	6.008107	14.61587	18.88418	0.801709	8.831241	50.85889
6	5.423317	6.23798	14.41565	18.85113	0.92001	9.056831	50.5184
7	5.468282	6.485633	14.33218	18.59114	0.928133	9.797508	49.8654
8	5.490865	6.458745	14.27946	18.67484	0.926283	9.922024	49.73865
9	5.498458	6.466759	14.25902	18.82419	0.925495	9.904796	49.61974
10	5.504674	6.448301	14.25753	18.82602	0.924101	9.879431	49.66462

C.2 Brazil

C.2.1 1990s

Table C.2.1.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	95.2245	36	0	3.630315	(36, 86.2)	0
2	56.85306	36	0.0149	1.759485	(36, 86.2)	0.0174
3	31.227	36	0.6949	0.846089	(36, 86.2)	0.7079
4	26.13584	36	0.8867	0.690103	(36, 86.2)	0.8929

Table C.2.1.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
991.8394	1008	0.6357

Dependent variable: INF			
Excluded	Chi-sq	df	Prob.
D(WCPI)	3.2972	4	0.5094
IMPORT	7.932207	4	0.0941
FX	5.76949	4	0.217
GAP	24.76841	4	0.0001
D(INT)	11.57757	4	0.0208
All	**113.832**	**20**	**0**

Table C.2.1.3: Variance Decomposition

Period	S.E.	D(WCPI)	IMPORT	FX	GAP	D(INT)	INF
1	2.623441	10.79084	2.52695	2.139138	4.943322	3.244936	76.35482
2	3.012799	15.98184	6.551686	3.976013	2.044208	13.10305	58.34321
3	3.132834	21.1614	10.77315	8.576711	1.730788	10.54463	47.21332
4	3.307453	21.34731	12.214	12.22023	2.662171	8.9915	42.56479
5	3.380621	19.53265	12.48984	15.83905	4.886922	8.256329	38.99521
6	3.475093	19.83225	12.24583	17.58105	5.483573	7.894859	36.96244
7	3.57216	19.97316	11.90085	17.84282	5.71303	8.282944	36.28719
8	3.704368	20.15126	11.55229	17.6846	6.176476	8.530692	35.90468
9	3.790937	20.02848	11.3003	17.33563	7.024468	8.931175	35.37995
10	3.841661	19.69849	11.06316	16.9218	8.283349	9.415373	34.61783

C.2.2 2000s

Table C.2.2.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	44.70214	36	0.1515	1.262783	(36, 288.2)	0.1528
2	38.45161	36	0.3591	1.074897	(36, 288.2)	0.361
3	29.07695	36	0.7867	0.800217	(36, 288.2)	0.7879
4	38.70624	36	0.3485	1.082476	(36, 288.2)	0.3503
5	24.50586	36	0.9268	0.669313	(36, 288.2)	0.9273
6	37.53877	36	0.3985	1.047778	(36, 288.2)	0.4004

Table C.2.2.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
1560.114	1512	0.19

Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	20.99871	6	0.0018
D(IMPORT)	8.111736	6	0.23
D(FX)	23.02837	6	0.0008
GAP	4.003824	6	0.6762
D(INT)	13.09107	6	0.0416
All	**75.80951**	**30**	**0**

Table C.2.2.3: Variance Decomposition

Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	GAP	D(INT)	D(INF)
1	6.631892	1.541851	1.456315	0.059214	1.42084	1.530574	93.9912
2	7.616327	8.718669	1.123762	10.27688	0.847168	2.074567	76.95896
3	7.953051	14.76752	2.212165	15.21156	1.703799	2.115839	63.98912
4	8.222596	16.8936	2.599517	15.36973	1.40132	10.77794	52.95789
5	8.385976	16.59193	2.588307	15.78854	1.945582	16.2997	46.78595
6	8.515673	15.45381	2.411237	15.86112	1.954407	20.38482	43.9346
7	8.646766	14.91864	2.654633	17.87613	1.915588	20.29404	42.34096
8	8.723219	16.38651	2.626004	17.92128	1.933921	19.5794	41.55289
9	8.855346	17.67158	2.611163	17.64958	2.036749	19.09062	40.94031
10	9.014434	18.03613	2.622586	17.49361	2.066934	19.15663	40.6241

C.2.3 2010s

Table C.2.3.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	42.02583	36	0.2261	1.179567	(36, 349.7)	0.2273
2	56.96795	36	0.0145	1.632619	(36, 349.7)	0.0147
3	48.25953	36	0.0832	1.366334	(36, 349.7)	0.0839
4	40.26596	36	0.287	1.127412	(36, 349.7)	0.2883

Table C.2.3.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
1039.947	1008	0.2361

Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	10.45698	4	0.0334
D(IMPORT)	3.352884	4	0.5006
D(FX)	18.33968	4	0.0011
D(GAP)	7.378967	4	0.1172
D(INT)	4.448865	4	0.3487
All	**48.79813**	**20**	**0.0003**

Table C.2.3.3: Variance Decomposition

Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	D(GAP)	D(INT)	D(INF)
1	4.536975	1.916795	0.158889	0.999126	0.12715	5.147726	91.65031
2	4.857332	8.469514	0.926858	3.597794	2.616032	8.828131	75.56167
3	5.117912	8.398016	1.844061	3.999093	2.578223	9.609392	73.57121
4	5.163247	8.412137	2.658966	4.912613	4.406137	9.260801	70.34935
5	5.253452	9.826113	3.105114	11.21945	3.987423	9.678181	62.18372
6	5.329417	9.79602	3.119211	15.88954	3.740784	9.286782	58.16766
7	5.361132	10.2434	3.231433	15.93938	3.713392	9.249351	57.62305
8	5.368408	10.60114	3.29599	15.78302	3.709936	9.579978	57.02994
9	5.377045	10.74591	3.313692	16.02169	3.705701	9.570392	56.64261
10	5.385633	10.97083	3.321016	16.17499	3.684299	9.434756	56.41411

C.3 Hungary

C.3.1 1990s

Table C.3.1.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	20.97789	36	0.9783	0.557307	(36, 147.7)	0.9789
2	31.21315	36	0.6956	0.856097	(36, 147.7)	0.7007

Table C.3.1.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
478.0852	504	0.7909

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	9.554973	2	0.0084
D(IMPORT)	12.73223	2	0.0017
D(FX)	9.024047	2	0.011
GAP	0.761598	2	0.6833
D(INT)	1.268953	2	0.5302
All	**25.3523**	**10**	**0.0047**

Table C.3.1.3: Variance Decomposition

Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	GAP	D(INT)	D(INF)
1	3.13847	0.009098	17.08778	9.758624	2.188381	2.982713	67.97341
2	3.247909	14.4678	11.24223	19.51588	1.440449	4.553581	48.78007
3	3.4694	13.97236	15.34139	17.49253	3.148682	4.528714	45.51632
4	3.505485	15.65233	14.97957	17.02519	3.115601	4.673766	44.55354
5	3.546282	16.51078	14.67711	16.89221	3.308611	4.776304	43.83498
6	3.55144	17.53321	14.42555	16.73645	3.297681	4.726228	43.28089
7	3.559429	17.8359	14.40957	16.65386	3.290154	4.713924	43.0966
8	3.561112	18.05215	14.37935	16.60841	3.283714	4.701183	42.97519
9	3.562844	18.14962	14.36141	16.58715	3.285174	4.695984	42.92066
10	3.563391	18.22072	14.34951	16.57127	3.287549	4.691459	42.8795

C.3.2 2000s

Table C.3.2.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	35.8076	36	0.4777	0.996401	(36, 349.7)	0.479
2	49.46929	36	0.0668	1.402949	(36, 349.7)	0.0673
3	43.87294	36	0.1723	1.234578	(36, 349.7)	0.1733
4	36.58036	36	0.4417	1.018995	(36, 349.7)	0.443

Table C.3.2.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
991.6311	1008	0.6375

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	9.904511	4	0.0421
D(IMPORT)	14.7504	4	0.0052
D(FX)	7.234475	4	0.124
GAP	1.820746	4	0.7687
D(INT)	1.505769	4	0.8256
All	37.3885	20	0.0105

Table C.3.2.3: Variance Decomposition

Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	GAP	D(INT)	D(INF)
1	6.679252	1.34866	0.999993	1.28677	0.114449	1.724532	94.5256
2	7.60629	2.55443	2.066653	2.152888	0.109567	1.593748	91.52271
3	7.733913	3.376478	3.822907	10.36671	1.213494	1.475041	79.74537
4	7.944684	3.883255	5.25349	12.0179	2.603407	1.716401	74.52555
5	8.256233	4.010349	10.5979	10.94469	2.671492	1.761468	70.01411
6	8.454032	4.092496	10.55591	10.86501	3.391229	1.737314	69.35804
7	8.508072	3.871993	10.10725	13.31038	4.881179	2.080719	65.74847
8	8.548644	3.77847	9.868923	13.35068	6.563299	2.325186	64.11344
9	8.61135	3.907659	9.762112	13.28996	7.365512	2.463728	63.21103
10	8.691806	3.918307	9.766667	13.22406	7.672684	2.4516	62.96668

C.3.3 2010s

Table C.3.3.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	51.11309	36	0.0489	1.452894	(36, 349.7)	0.0494
2	46.44479	36	0.114	1.311635	(36, 349.7)	0.1148
3	39.66148	36	0.31	1.109556	(36, 349.7)	0.3113
4	39.37461	36	0.3213	1.101092	(36, 349.7)	0.3226

Table C.3.3.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
1046.834	1008	0.1925

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	11.42043	4	0.0222
D(IMPORT)	4.221654	4	0.3768
FX	0.875178	4	0.9281
D(GAP)	1.62941	4	0.8035
D(INT)	18.37368	4	0.001
All	**38.18169**	**20**	**0.0084**

Table C.3.3.3: Variance Decomposition

Period	S.E.	D(WCPI)	D(IMPORT)	FX	D(GAP)	D(INT)	D(INF)
1	4.703971	7.36679	3.865033	0.268342	1.313233	1.127179	86.05942
2	5.025911	11.82965	8.21493	0.659035	2.132486	1.083314	76.08058
3	5.170321	13.00115	7.334719	0.844843	1.919665	8.474901	68.42472
4	5.215456	12.50651	7.04723	1.809301	1.960709	12.22679	64.44946
5	5.266742	14.29328	6.544374	1.726421	1.969918	13.44198	62.02403
6	5.307639	14.81616	6.38749	1.684841	1.92394	14.52621	60.66136
7	5.326776	14.99782	6.358996	1.674868	2.018069	14.57751	60.37274
8	5.33116	14.91904	6.412077	1.931679	2.003615	14.68695	60.04664
9	5.337585	14.82519	6.368796	2.179069	1.99276	14.82011	59.81408
10	5.342948	14.83276	6.38255	2.263724	2.009861	14.96171	59.54939

C.4 UK

C.4.1 1990S

Table C.4.1.1: Serial Correlation

Null hypothesis: No serial correlation at lags 1 to h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	21.69116	36	0.9713	0.571048	(36, 116.9)	0.9724
2	58.95551	72	0.8652	0.768831	(72, 114.6)	0.8855
3	131.6663	108	0.0605	1.257872	(108, 87.4)	0.1331

Table C.4.1.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
753.4054	756	0.5198

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	7.582152	3	0.0555
D(IMPORT)	10.51505	3	0.0147
D(FX)	7.656693	3	0.0537
D(GAP)	0.700043	3	0.8732
D(INT)	2.562849	3	0.464
All	**24.68914**	**15**	**0.0543**

Table C.4.1.2: Variance Decomposition

Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	D(GAP)	D(INT)	D(INF)
1	2.858387	3.321279	6.151667	3.003982	1.69953	0.127017	85.69652
2	3.052488	6.053379	9.581503	3.992291	2.05768	0.169973	78.14517
3	3.360965	6.490305	8.635676	9.556465	1.821724	2.736892	70.75894
4	3.685084	8.94899	10.10285	10.85739	2.195287	2.479263	65.41623
5	3.814772	9.183459	9.345696	9.963302	6.766316	4.799265	59.94196
6	3.842229	9.222186	8.870824	11.33918	7.319367	6.937333	56.31111
7	3.936552	9.563661	9.074124	11.37609	7.570623	6.867187	55.54831
8	3.953048	9.28877	8.836418	11.71969	7.386461	8.752222	54.01644
9	3.9704	9.270262	8.927596	11.71315	7.376194	8.768224	53.94457
10	3.973868	9.244738	8.902454	11.68055	7.366145	8.985193	53.82092

C.4.2 2000s

Table C.4.2.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	43.48848	36	0.1827	1.223105	(36, 349.7)	0.1837
2	49.77079	36	0.0631	1.412093	(36, 349.7)	0.0637
3	38.82894	36	0.3434	1.085011	(36, 349.7)	0.3447
4	33.89706	36	0.569	0.940744	(36, 349.7)	0.5702

Table C.4.2.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
1032.66	1008	0.2879

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	17.11909	4	0.0018
D(IMPORT)	5.523534	4	0.2377
D(FX)	5.635349	4	0.2281
D(GAP)	0.692834	4	0.9522
D(INT)	2.655267	4	0.6171
All	**38.19885**	**20**	**0.0084**

Table C.4.2.3: Variance Decomposition

Variance Decomposition of D(INF):							
Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	D(GAP)	D(INT)	D(INF)
1	0.231546	4.760114	0.026289	0.289303	0.16509	0.911083	93.84812
2	0.252512	15.36243	2.621685	1.138859	0.455945	1.500598	78.92048
3	0.258713	17.68601	2.512954	2.291629	0.485586	1.787409	75.23641
4	0.26393	17.04717	3.269257	4.288808	0.467118	1.730365	73.19728
5	0.26831	17.40165	3.326391	4.268902	1.39589	2.04216	71.56501
6	0.273343	16.768	3.279761	4.224684	2.631136	2.104553	70.99187
7	0.27516	16.5523	3.346942	4.246496	2.696808	2.249789	70.90767
8	0.276527	16.51115	3.390965	4.708973	2.672706	2.274587	70.44162
9	0.277903	16.69655	3.374199	4.993955	2.653286	2.502836	69.77917
10	0.278311	16.68359	3.457632	5.104292	2.650907	2.498251	69.60533

C.4.3 2010S

Table C.4.3.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	37.72213	36	0.3904	1.052815	(36, 318.9)	0.392
2	38.23338	36	0.3684	1.067912	(36, 318.9)	0.3699
3	42.43398	36	0.2134	1.192823	(36, 318.9)	0.2147
4	31.38545	36	0.6877	0.867597	(36, 318.9)	0.689
5	42.48872	36	0.2117	1.194461	(36, 318.9)	0.213

Table C.4.3.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
1243.742	1260	0.6225

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	4.653897	5	0.4596
D(IMPORT)	12.92255	5	0.0241
D(FX)	3.883691	5	0.5663
GAP	5.804886	5	0.3257
D(INT)	7.519750	5	0.1848
All	**37.65454**	**25**	**0.0500**

Table C.4.3.3: Heteroscedasticity and Granger Causality

Variance Decomposition of D(INF):							
Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	GAP	D(INT)	D(INF)
1	0.184809	10.76447	1.984108	0.037876	0.262544	0.402306	86.54869
2	0.187058	10.91519	1.936819	0.054724	0.263522	2.3467	84.48305
3	0.203752	19.45461	3.360349	2.445423	0.56776	2.06978	72.10207
4	0.21341	19.34519	3.064483	4.270259	4.229252	3.366982	65.72384
5	0.216475	20.63479	3.172829	4.181822	4.114413	4.011991	63.88416
6	0.224938	19.23632	6.306382	7.076921	4.08895	4.06006	59.23137
7	0.228044	18.93955	6.727311	7.687094	3.978559	4.486638	58.18085
8	0.230516	18.53702	7.373481	8.430724	4.10997	4.437392	57.11142
9	0.23159	18.41343	7.305451	8.70164	4.150995	4.527104	56.90138
10	0.232718	18.30071	7.344742	8.902642	4.320966	4.533352	56.59759

C.5 US

C.5.1 1990s

Table C.5.1.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	45.05839	36	0.1431	1.268642	(36, 380.4)	0.1439
2	30.48507	36	0.728	0.842484	(36, 380.4)	0.7288
3	36.07432	36	0.4652	1.004082	(36, 380.4)	0.4663

Table C.5.1.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
781.6726	756	0.2514

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	33.94066	3	0
D(IMPORT)	0.32324	3	0.9556
FX	0.817577	3	0.8453
GAP	6.704416	3	0.0819
D(INT)	5.75182	3	0.1243
All	**87.90983**	**15**	**0**

Table C.5.1.3: Heteroscedasticity and Granger Causality

Variance Decomposition of D(INF):							
Period	S.E.	D(WCPI)	D(IMPORT)	FX	GAP	D(INT)	D(INF)
1	0.385388	45.78192	0.055926	0.024417	2.002301	0.222027	51.91341
2	0.492596	63.30245	0.102854	0.096393	1.30453	3.345124	31.84865
3	0.55265	50.3129	3.952783	0.120413	13.61912	3.946295	28.04849
4	0.575558	46.38821	6.986861	0.16995	14.20981	3.999603	28.24556
5	0.580757	45.56696	7.300671	0.49601	14.06728	4.277869	28.29121
6	0.582928	45.55872	7.356202	0.64301	13.99271	4.321537	28.12782
7	0.586935	45.85529	7.399212	0.650753	13.87034	4.357256	27.86715
8	0.588361	46.02231	7.363488	0.649543	13.86093	4.342019	27.76171
9	0.588996	45.96524	7.376561	0.66112	13.92153	4.359089	27.71647
10	0.590278	45.76598	7.367541	0.666946	14.13239	4.452031	27.61511

C.5.2 2000s

Table C.5.2.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	29.83716	36	0.7557	0.814841	(36, 147.7)	0.7601
2	47.24432	36	0.0994	1.363055	(36, 147.7)	0.1031

Table C.5.2.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
557.7505	504	0.0487

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	21.5365	2	0
D(IMPORT)	4.503514	2	0.1052
D(FX)	0.161049	2	0.9226
D(GAP)	1.153666	2	0.5617
D(INT)	0.240513	2	0.8867
All	**27.11989**	**10**	**0.0025**

Table C.5.2.3: Heteroscedasticity and Granger Causality

Variance Decomposition of D(INF):							
Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	D(GAP)	D(INT)	D(INF)
1	0.150047	0.005892	0.780325	8.316387	7.860422	1.842785	81.19419
2	0.180233	27.37769	2.547001	5.891372	5.862828	1.27734	57.04377
3	0.191912	33.15521	3.48732	5.701532	5.340041	1.130775	51.18513
4	0.196568	35.02287	3.466785	5.434908	5.588518	1.589083	48.89784
5	0.197973	35.69825	3.488752	5.421783	5.593175	1.570382	48.22765
6	0.198828	35.78273	3.551362	5.523904	5.673547	1.650414	47.81805
7	0.199713	36.07298	3.55239	5.526903	5.640567	1.751704	47.45546
8	0.199986	36.20764	3.545451	5.520509	5.642895	1.757572	47.32593
9	0.200141	36.27523	3.544409	5.524508	5.639992	1.76266	47.2532
10	0.200268	36.32286	3.547136	5.524402	5.632896	1.774093	47.19861

C.5.3 2010s

Table C.5.3.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	63.13712	36	0.0034	1.831807	(36, 318.9)	0.0035
2	29.62152	36	0.7647	0.816657	(36, 318.9)	0.7657
3	34.88888	36	0.5213	0.969569	(36, 318.9)	0.5228
4	25.70904	36	0.8983	0.704619	(36, 318.9)	0.8988
5	37.69223	36	0.3918	1.051933	(36, 318.9)	0.3933

Table C.5.3.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
1307.918	1239	0.0849

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	15.21595	5	0.0095
D(IMPORT)	3.477828	5	0.6267
D(FX)	4.769902	5	0.4446
D(GAP)	4.709448	5	0.4524
D(INT)	1.735868	5	0.8844
All	**38.9184**	**25**	**0.0375**

Table C.5.3.2: Variance Decomposition

Variance Decomposition of D(INF):							
Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	D(GAP)	D(INT)	D(INF)
1	0.256306	29.93396	0.787245	0.312655	0.107876	0.934609	67.92365
2	0.301864	44.07444	0.879591	4.296977	0.656763	0.89848	49.19375
3	0.306674	44.39619	1.177453	5.03611	0.678603	1.041524	47.67012
4	0.311998	42.92163	1.458437	5.236308	1.31562	1.485642	47.58237
5	0.314273	42.37761	1.532103	5.177418	2.337284	1.475372	47.10022
6	0.317928	41.4103	1.526518	5.514187	2.691399	1.940173	46.91742
7	0.322726	40.21803	1.482463	6.633728	2.976671	2.327029	46.36208
8	0.32397	40.17918	1.514099	6.70253	3.010864	2.315297	46.27803
9	0.324592	40.24178	1.515008	6.699048	3.019784	2.314407	46.20998
10	0.325057	40.26633	1.520998	6.686494	3.023351	2.315556	46.18727

C.6 Japan

C.6.1 1990s

Table C.6.1.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	33.67993	36	0.5794	0.930929	(36, 147.7)	0.5855
2	25.89215	36	0.8934	0.698449	(36, 147.7)	0.8957

Table C.6.1.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
468.0212	504	0.8729

Null hypothesis: No Granger Causality			
Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	15.67374	2	0.0004
D(IMPORT)	0.892029	2	0.6402
D(FX)	1.024041	2	0.5993
D(GAP)	6.511286	2	0.0386
INT	0.729559	2	0.6943
All	**31.51132**	**10**	**0.0005**

Table C.6.1.3: Variance Decomposition

Variance Decomposition of D(INF):							
Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	D(GAP)	INT	D(INF)
1	0.368197	0.794039	3.635803	3.239481	1.265925	0.118781	90.94597
2	0.389277	1.132963	4.13603	5.305785	6.724589	0.114234	82.5864
3	0.467346	24.73684	6.219319	3.863423	7.530789	0.084297	57.56534
4	0.469082	24.87106	6.242372	3.86269	7.593524	0.259772	57.17058
5	0.48161	24.55534	8.254627	3.759835	8.741999	0.332006	54.35619
6	0.485389	24.22553	8.6347	4.097241	8.979088	0.433252	53.63019
7	0.486767	24.23721	8.752447	4.119964	9.130491	0.430868	53.32902
8	0.487497	24.29036	8.765317	4.119367	9.175192	0.479515	53.17025
9	0.488232	24.26759	8.850245	4.130384	9.197265	0.48892	53.0656
10	0.488687	24.25248	8.905278	4.146535	9.23714	0.48913	52.96944

C.6.2 2000s

Table C.6.2.1: Serial Correlation

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	50.16402	36	0.0586	1.42403	(36, 349.7)	0.0592
2	67.78478	36	0.0011	1.972304	(36, 349.7)	0.0011
3	46.24569	36	0.1179	1.30565	(36, 349.7)	0.1187
4	38.22123	36	0.3689	1.067129	(36, 349.7)	0.3702

Table C.6.2.2: Heteroscedasticity and Granger Causality

Null hypothesis: No Heteroscedasticity		
Joint test:		
Chi-sq	df	Prob.
974.4072	1008	0.7709

Dependent variable: D(INF)			
Excluded	Chi-sq	df	Prob.
D(WCPI)	21.4884	4	0.0003
D(IMPORT)	7.838884	4	0.0977
D(FX)	5.92326	4	0.205
GAP	9.585049	4	0.048
D(INT)	1.46213	4	0.8333
All	**83.52097**	**20**	**0**

Table C.6.2.3: Variance Decomposition

Variance Decomposition of D(INF):							
Period	S.E.	D(WCPI)	D(IMPORT)	D(FX)	GAP	D(INT)	D(INF)
1	0.239607	1.333069	8.79727	0.309083	0.174043	0.529077	88.85746
2	0.282389	17.649	14.88174	1.599871	0.352811	1.469804	64.04677
3	0.302542	20.15678	13.20081	1.649619	1.663261	1.600075	61.72946
4	0.312403	21.68166	12.77073	2.413945	1.663225	2.063282	59.40715
5	0.323783	21.26474	14.78736	3.987856	1.647309	2.995716	55.31703
6	0.326154	21.3865	14.86821	3.987805	2.221148	2.98356	54.55278
7	0.328232	21.31919	14.68174	3.951411	2.759892	3.097218	54.19055
8	0.331137	21.76348	14.47535	4.122956	2.870618	3.428773	53.33883
9	0.33399	22.93169	14.22931	4.184902	2.834602	3.377503	52.442
10	0.335866	23.59679	14.18061	4.196487	2.818035	3.342379	51.86569

C. TURKISH SUMMARY / TÜRKÇE ÖZET

Enflasyon, ortalama fiyat seviyesindeki sürekli artışı ifade eden bir kavramdır. Enflasyonun ekonomi içerisindeki rolü özellikle hanehalkının yaşam standardı ve alım gücünü etkilemesi açısından son derece önemlidir, zira asgari ücretin belirlenmesi, yıllık faiz oranları, toplu sözleşmelerdeki zam oranları gibi birçok düzenleyici aktivitenin temelinde söz konusu yılın enflasyon oranı ciddi önem arz eder.

Enflasyonun düşük ve görece stabil olduğu durumların ülke ekonomileri açısından faydalı olduğu kabul edilir. Çünkü, yüksek/hiperenflasyon dönemleri kadar enflasyonun sıfır olduğu veya sıfırın altına indiği (deflasyon) durumların da ekonomik faaliyetler üzerinde zararlı etkileri vardır. Bu iki "aşırı uç"tan hiperenflasyon dönemlerinde ekonomide belirsizlikler artar, uzun ve orta vadeli planlar yapmak zorlaştığı için kısa vadeli planlar üzerinde durulur ve ülkedeki üretim olanakları azalmaya başlar. Bir diğer aşırı uç olan deflasyonda ise sıfırın altına inen enflasyon reel faizlerde artırıcı bir etkiye neden olur. Bu durum ekonomik birimlerin enflasyon beklentilerini de etkileyip, ekonomide risk primini artırabilir. Böyle bir duruma düşen bir ülkedeki merkez bankası geleneksel olmayan para politikası araçlarını kullanarak ülkenin deflasyon sarmalına girmesini engellemeye çalışır.

1970'lerdeki yüksek enflasyon oranlarından sonra (1974 itibariyle medyan küresel enflasyon yüzde 16.16 olmuştu ki, bu oran 2018 yılındaki medyan küresel enflasyonun 4 katıdır) dünya ekonomisinde belirli dezenflasyon dönemleri başladı. Gelişmiş ülkelerde 1980li yılların ortalarında başlayan bu süreç gelişmekte olan ülkelerde yaklaşık 10 yıl sonra vuku buldu. Bu süreç birçok gelişmekte olan ülkenin enflasyon oranını tek haneye düşürdüğü 2000li yılların ilk yarısına kadar sürdü. 2008 küresel krizi sonrası dönem ise enflasyon oranları açısından istikrarsız görüntülere sahne oldu.

Gelişmekte olan ülkelerde yüksek enflasyon deneyimlerinden sonra yaşanan bu dezenflasyon sürecine 1990ların ortalarından itibaren dünya ekonomisinde önemli bir aktör olarak ortaya çıkan Çin'in küresel rekabeti artırmasından kaynaklı yaşanan fiyat düşüşleri ve küreselleşme hareketi sonucu düşük maliyetli ve dolayısıyla düşük

fiyatlı tüketim mallarının temsili hanehalkı tüketim sepetlerinde daha fazla yer almasıyla ilgisi vardır. Bu noktada, küreselleşme kavramı küreselleşmenin dünya ekonomisi,ve dünyadaki enflasyon dinamikleri üstündeki etkisinden bahsetmek önem arz etmektedir.

Dünyada 1980li yıllarda ortaya çıkıp, 1990lı yıllarda hızını artırarak dünya ekonomisini etki altına alan küreselleşme, 2. Dünya Savaşı sonrası dönemde başlayıp ağırlık kazanan korumacı ve görece kapalı ekonomi politikaları uygulayan sosyal refah devleti anlayışını ve ekonomi politikalarını reddedip, devletin ekonomi üzerindeki ağırlığını azaltıp, uluslararası ticaret ve finansal hareketlerin önündeki bütün engellerin kaldırıması gerektiğini savunan fikir ve politikalar bütünüdür. Bu düşünceye dayanan ekonomi politikalarında serbest piyasa ekonomisi kuralları esas olup, ekonomi ağırlıklı olarak özel sektör etrafında döner. Devlet ekonomide önemli bir aktör değildir.

Dünya ekonomisi küreselleştikçe dışsal faktörlerin ülke ekonomileri ve enflasyon dinamikleri üzerindeki rolü artmıştır. Bu dönemde, dünya ticaretine konu olan mal ve hizmetlerin kapsamı ciddi ölçüde artmış, ayrıca emek ve sermayenin mobilizasyonu sayesinde mal ve hizmetlerin üretiminin yüksek maliyetli bölgelerden düşük maliyetli bölgelere kayması ve serbest ticaret önündeki engellerin kalkması ile (gümrük vergileri, ithalat kotaları, vb.) dışsal faktörlerin enflasyon dinamikleri üzerindeki etkileri baskın hale gelmiştir. Finansal hareketlerin serbestleşmesi ve fiyat kontrollerinin kaldırılmasıyla bu dönemde gelişmekte olan ülkelerde döviz kuru geçişkenliklerinde de bir artış gözlemlenmiştir.

Bu yeni ekonomik koşullarda, döviz kuru geçişkenliğinin artmasıyla beraber, gelişmekte olan ülkelerin birtakım zayıflıkları daha da ön plana çıkmıştır. Negatif karakterli dışsal bir şoka maruz kalan bir gelişmekte olan ülkenin para birimine olan talep azalıp, bu durum yerli para biriminde değer kaybına yol açınca, bu şokun etkisi yerel ekonomide ve enflasyon oranlarında daha görünür etkilere sebep olur. Döviz cinsinden yükümlülüklerine karşın, genellikle yerli para cinsinden varlıklara sahip olan bu ülkelerde, bütün bu gelişmeler yerli paranın devalüasyon/değer kaybı yaşamasının enflasyon üzerinde artırıcı bir etkiye neden olmasına yol açar.

1990ların ikinci yarısında gelişmekte olan ülkelerde başlayan dezenflasyon sürecini de bu bağlamda değerlendirmek gerekir. Bu dönemin en çok öne çıkan

özellikleri gelişmekte olan ülkelerin para birimlerinde yaşanan değer artışları ve ekonominin hemen hemen her alanında önemli bir payı olan petrol fiyatlarının 1990lardaki düşüşüdür. Ayrıca , bu dönemde birçok gelişmekte olan ülke yapısal değişiklikler yaşamış, sabit döviz kurundan dalgalı kura, farklı para politikası rejimlerinden de enflasyon hedeflemesi rejimine geçiş yapmıştır. Ayrıca, bu duruma etki eden gelişmeler her ülkede aynı olsa da bu etkilerin göreli önemleri ülkeden ülkeye farklılık göstermektedir.

Bu ülke bazlı farklılıklar, 2008 krizi öncesi durumda farklı trendlere neden olmasa da, kriz sonrası dönemde daha da belirginleşip, enflasyon oranlarında farklı yönelimlere sebep olmuştur. Örneğin, kriz sonrası dönemde birçok Doğu Avrupa ülkesi düşük enflasyon oranları görmeye devam ederken, Türkiye ,Rusya, Brezilya gibi birçok ülkede enflasyon oranlarının görece arttığı görülmüştür.

Bu çalışmada, seçili gelişmekte olan ülkelerde enflasyonun belirleyicileri birtakım ekonometrik metotlar kullanılarak incelenmiştir. Bu çalışmanın amaçları, gelişmekte olan ülkelerde enflasyonu etkileyen içsel ve dışsal faktörleri sırlayıp , hangi grubun bu bağlamda daha etkili olduğunu tespit etmektir. Bunu yaparken enflasyonun zaman bağlı değişimlerine de değinilmektedir. Ayrıca, bu dinamikleri incelerken farklı ekonomik yapılara sahip ülkelere beraber göz atarak, ülkelerin subjektif koşullarının enflasyon dinamikleri üzerinde ne denli etkili olduğu ifade edilmiştir.

Bu çalışmadaki temel amaç, küreselleşme sonrası enflasyon dinamiklerinin dışsal faktörler lehine değişip değişmediğini tespit etmektir.

Bu çalışamnın literature en büyük katkısı çalışmanın aynı model içerisinde birçok gelişmekte olan ülkenin enflasyon dinamiklerinin beraber incelenmesine olanak sağlamasıdır. Literatürdeki benzer çalışmalar incelendiğinde söz konusu çalışmaların genellikle tek ülke veya ekonomik yönden birbirine benzeyen birkaç ülkeye ayrı ayrı yapılan analizlerden ibaret olduğu görülmektedir. Fakat, bu çalışma panel veri ekonometrisinin olanakları kullanılarak birden fazla ve yapı bakımından farklı özellikler gösteren gelişmekte olan ülkelere yönelik bir analiz yapma fırsatı sunmuştur.

Çalışmamız betimleyici istatistik , literatür taraması ,ekonometrik model ve sonuç kısımlarından oluşmaktadır.

İkinci kısımda enflasyonla ilgili birtakım bilgi ve enflasyonun çeşitli değişkenlerle ilişkisi betimleyici istatistikler kullanılarak incelenmiştir. Bu kısımda

farklı enflasyon çeşitleri, (Tüketici fiyat endeksi (TÜFE) bazlı enflasyon, Üretici Fiyat Endeksi (ÜFE) bazlı enflasyon ve Gayri Safi Yurtiçi hasıla Deflatörü bazlı enflasyon) aralarındaki ilişkiler ve zamanla bu ilişkilerdeki değişim, enflasyonun tarihsel hareketleri, gelişmiş ve gelişmekte olan ülkelerin enflasyın dinamiklerindeki farklılıklar ve bu farklılıklara neden olan yapısal farklılıklar incelenmiştir.

Bu kısımdan elde edilen bilgiler eşliğidne birtakım çıkarımlar yapılmıştır. Şöyle ki, öncelikle küreselleşme öncesi dönemde tüketici fiyat endeksi bazlı enflasyon ile gayri safi yurtiçi hasıla deflatörü bazlı enflasyon arasındaki korelasyon küreselleşme sonrası dönemde düşmüştür. Bunun da temel sebebi, tüketici fiyat endeksi bazlı enflasyonun tüketim sepetinde her türlü mal varken gayri safi yurtiçi hasıla deflatörü bazlı enflasyonda ithal malların yer almamasıdır. Küreselleşme ile birlikte serbest ticaret ile hanehalkı tüketim sepetlerinde ithal malların oranı artmış, bu da iki ölçünün birbirlerinden ayrılıp aralandaki korelasyonu düşürmüştür. İkinci olarak, gelişmiş ve gelişmekte olan ülkeler farklı enflasyon geçmişlerine sahiplerdir. Gelişmekte olan ülkeler tarihsel olartak daha yüksek ve değişken (oynak) enflasyon oranlarına sahip olmuşlardır. Dezenflasyon süreçlerinde gelişmekte olan ülkeler gelişmiş ülkeleri yaklaşık 10 yıl sonra takip etmiştir. Son olarak, gelişmiş ve gelişmekte olan ülkelerin ekonomik yapılarındaki farklılıklar enflasyon yapılarına da sirayet etmiştir. Örneğin, döviz kuru gelişmekte olan ülkelerde enflasyonla yakın bir ilişki içerisinde olup, enflasyonla arasında yüksek bir korelasyon barındırırken , gelişmiş ülekerde böyle bir durum söz konusu değildir. Bunun da temel sebebi, gelişmekte olan ülkelerin para birimlerinin dışsal etkilere karşı daha savunmasız olmasıdır. Birçok gelişmekte olan ülke yerli sanayisinde ithal ara mallara bapımlıyken, döviz kurunda yaşanbilecek bir artış, hem ithal mal fiyatlarına hem de üretimde ithal ara mal kullanan malların maliyetlerindeki artışa sebep olacaktır. Fakat yine de bütün farklılıklarına rağmen her iki ülke grubunu da beraber etkileyen değişkenler mevcuttur. Petrol ve gıda fiyatları da bu fatörlerden gösterilebilir.

Üçüncü kısımda, enflasyon dinamikleri ile ilgili genel bir literatür taraması yapılmıştır. Bu bölümün genel amacı küreselleşme öncesi ve sonrası lüteratürü karşılaştırıp, küreselleşmenin enflsyon literatürü üzerinde bir değişikliğe sebep olup olmadığını incelemektir. Bu incelemeden yaptığımız çıkarım enflasyon literatüründe iki genel akım olduğudur. Bunlardan ilki, ki biz geleneksel görüş olarak tanımlıyoruz, enflasyonun içsel dinamikler,özellikle para arzı, tarafından belirlendiğin

savunmaktadırlar. Bu görüşe göre gereğindne fazla parasal büyüme enfşasyona sebep olmakta, ve enflasyonla mücadele etmek için bu parasal büyüklüklerin büyüme oranları kontrol altına alınmalıdır. Bunun karşısında, özellikle 1990lardan itibaren popülerlik kazanan diğer görüşe göre ise enflasyon küreselleşme ile birlikte dışsal fatörlerin ağırlıklı olarak etkilediği bir kavram haline gelmiştir. Özellikle gelişmekte olan ülkelerde bu durum ticaret ve döviz kuru kanalıyla kendini göstermiştir.

Çalışmamızın asıl katkısını oluşturan dördüncü kısımda seçili gelişmekte olan ülkelerin enflasyon dinamikleri birtakım ekonometrik metotlar kullanılarak incelenmiştir. Bu kısımda temel olarak iki önemli ekonometrik araç kullanılmıştır. Bunlar, panel vektör otoregresif model (PVAR) ve klasik vektör otoregresif modeldir (VAR). Bu çalışmada panel vektörotoregresif model kullanmamızdaki temel amaç, birden fazla ülkenin enflasyon analizini toplulaştırılmış bir veri setiyle yapmak istememizdir. Böylece, bu ülkeler için ortak bir açıklayıcı değişkenin olup olmadığını öğrenmiş olacağız.

Panel vektörotoregresif modeler ilk defa Holtz tarafından 1988 yılındaki bir makalede tartışılmış ve literature girmiştir Özellikle uzun dönem ekonomik olaylara olan ilginin artması ve ilgili verinin uygunluğu birçok iktisatçıyı dinamik panel modeler üzerinde çalışmaya teşvik etmiştir. Panel vektor otoregresif modeler birtakım avantajlara sahiptirler. İlk olarak, zaman serisi modellerinde karşımıza çıkan en önemli sorunlardan biri olan durağanlık koşulu panel vektör otoregresif modelerde esnetilmiştir. İlgili literatürdeki teorik çalışmalar, ki en önemlisi Chamberlain ‘in 1983 yılındaki çalışmasıdır, birden fazla yatay kesitten oluşan dinamik panel modellerinde durağanlık koşulunun esnetilebileceği göstermiştir. İkinci olarak, kendisi ayrıca bir vektör otoregresif model olduğu için varyans ayrıştırması tahmini ve dürtü-tepki fonskiyonlarını kullanabilme olanağını bize sağlamaktadır. Ayrıca,birden fazla ülkeyi ele aldığımız için farklı ülke gruplarını aynı anda etkileyen değişkeni testip etmek açısından pvar modeler önemli araçlardır.

Panel vektör otoregresif modelimizin tahmininde temel araç olarak Genelleştirilmiş Momentler Metodu (GMM) kullanılmıştır. GMM panel vektör otoregresif modeller için oldukça yaygın bir araçtır, zira diğer yaygın alternatif olan en küçük kareler (EKK) dinamik modelleri tahmin etmede belli başlı sorunlar yaşamaktadır. Regresyon sürecini devam ettirirken, analizimizi güçlendirecek

birtakım testleri de ayrıca modelimize uygulamış bulunuyoruz. Bunlar Windmeijer'in standrt hata düzeltmeleri, Hansen'in aşırı tanımlama modeli ve system kararlılık testidir.

Bir sonraki aşamada, veri dönüşümü için iki alternatiften biri olan ileri orthogonal sapmalar veya diğer adıyla Helmert Dönüşümünü ilk fark dönüşümüne tercih ettik. Çünkü, literatürde halihazırda bulunan benzer çalışmaların hemen hemen hepsi Helmert dönüşümünün ilk fark dönüşümüne göre daha kullanışlı ve asimptotik olarak yansız olduğunu ifade eder.

Bu regresyonun yanında asıl kullandığımız araç da varyans ayrıştırması tahminidir. Bu araç bir endeojen değişkenin, ki bizim özelimizde enflasyon, içindeki değişimin yüzde kaçının diğer değişkenler tarafından açıklandığını gösterir.

Analizde kullandığımız değişkenler temel olarak literatür ve betimleyici istatistiklerde elde ettiğimiz bilgilere dayanmaktadır. Modelde enflasyonu tüketici fiyat endeksindeki yüzdelik değişim temsil etmektedir. Gıda ve petrol fiyatları ayrı ayrı modele eklenmek yerine, dünya emtiya fiyat endeksi adı altında birleştirilip, bu endeksteki yüzdelik değişim dünya emtiya fiyat enflasyonu olarak modele eklenmiştir. Çıktığı açığı için de aylık toplam sanayi üretim endeksi kullanılmıştır. Döviz kuru için nominel efektif döviz kuru kullanılmış, para politikasının etkisini gözlemlemek için ülkelerin politika faizleri toplanmıştır. Son olarak da, küreselleşmenin etkisi görmek amacıyla söz konusu ülkenin ithalatındaki yüzdelik değişim modele dahil edilmiştir.

Panel vektör otoregresif modeler teorik bazda zaman serisi versiyonlarına göre modelde içsel dğeişkenlere ek olarak dışsal ve önceden belirlenmiş (pre-determined) değişken ekleme imkanı da verir. Fakat, bu dğeişkenler varyans ayrıştırma tahmini sonuçlarına dahil edilmediği için, biz klasik zaman serisi vektör otoregresif modelerde olduğu gibi bütün değişkenleri içsel kabul ettik. Araç değişkenler (instrumental variable) için ise bu değişkenlerin sayısına yönelik minimum ve maksimum değerleri girip, konuya ilişkin kodun uygun sayıyı kendisinin seçmesini istedik.

Arrelano ve Bover'in (1991) önerdiği metodolojiyi takip ettik ve ayrıca iki aşamalı bir tahmin modeli kullandık. Hansen'in modelde aşırı özdeşim sorunu olup olmadığını ölçen J istatistiğinin ilk aşamada işlevsiz kalması ve modelin ilk aşamanın iktisadi olarak anlamsız sonuçlar vermesi sonucunda böyle bir yolu kullanmayı daha uygun bulduk. Ayrıca, iki aşamalı tahmin modelinin bir aşamalıya göre daha düşük bir varyansa sahip olması da bu kararımızı destekleyen ayrı bir nedendir.

Modelimiz için veri seti olarak dokuz enflasyon hedeflemesi uygulayan gelişmekte olan ülkenin 1995 ile 2019 arasındaki verilerini kullandık. Bu ülkeler Brezilya, Şili, Kolombiya, Çek Cumhuriyeti, Macaristan, Meksika, Polonya, Güney Afrika ve Türkiye'dir.

Çalışmada özellikle enflasyon hedeflemesi uygulayan ülkeleri seçmemizin nedeni esasında geleneksel görüş ve enflasyon hedeflemesinin temelini oluşturan enflasyonun talep kaynaklı bir sorun olduğu ve para politikasında kısa vadeli faizleri kullanılarak kontrol altına alınabileceği savını test etmektir. Ayrıca, bu ülkeler dünya ekonomisine entegre olmuş orta üst gelir grubuna dahil ülkeler oldukları için küreselleşmenin enflasyon dinamikleri üzerine etkisi daha iyi test edilebilir. Son olarak, gelişmekte olan ülkelerin her kısmından ülkeleri bir araya getirerek, farklı koşullar altındaki ülkeler için ortak bir değişkenin olup olmadığını incelemek istememiz bu ülke seçiminindeki etkenlerdir. Bu bağlamda, seçmiş olduğumuz ülkeleri üç ana grupta toplamak mümkündür. Bir yanda yüksek/hiperneflasyon dönemleri geçirmiş, görece düşük ticaret - milli gelir oranına sahip Latin Amerika ülkeleri, diğer yanda görece düşük enflasyon tecrübelerine sahip ticaret- milli gelir oranı yüksek Avrupa Birliği üyesi Doğu Avrupa ülkeleri ile Türkiye ve Güney Afrika iki gibi bu iki ucun ortasında yer alan ülkeler vardır.

Panel vektör otoregresif modelimizin sonuçlarına göre döviz kuru incelenilen ülkelerin ortak ve başat enflasyon belirleyicisi olarak ön plana çıkmıştır. Bu sonuç betimleyici istatistikler ve literatür taramasından elde ettiğimiz sonuçlarla da tutarlı bir görüntü çizmektedir. Regresyon üç, altı ve dokuz ülkeyle yapıldığında döviz kuru her daim ana etken olarak ortaya çıkarken, diğer etkenlerin kendi aralarında sıralamaların düzenli değiştiği görülmektedir. Yani, ülke sayısı arttıkça döviz kurunun rolü dğeişmezken, diğer değişkenlerin durumları yeni katılan ülkelerin yapılarına göre değişkenlik göstermektedir.

Panel vektör otoregresif modeler ortak belirleyiciyi ve dinamik ilişkiyi gösterme açısından oldukça başarılı olsalar da, içerdiği karma veri yapısından kaynaklı olarak ülkelerin kendilerine özgü dinamiklerini gösterme açısından başarılı değillerdir. Bu yüzden bu modelde enflasyonun enflasyonun belirleyicileri açısından önemli bir etmen olan ülkelerin subjektif koşulları yeterince incelenememektedir. Bu bağlamda, ülkelerin subjektif koşullarına odaklanmamıza yardımcı olması için çalışmamızda zaman serisi- klasik vektör otoregresif modeler de kullanılmıştır. Bu iki teknik

çalışmamızda birbirlerini tamamlayıcı işlev görerek enflasyona içkin araştırma sorularımızı cevaplamamıza yardımcı olmuştur.

Standart vektör otoregresif modeler günümüzde uygulamalı ekonometirnin öemli araçlarından biridir. Kendisini diğer metotlardan ayıran en önemli özelliği bütün değikenlere içsel olarak yaklaşması ve bir değişkenin değerlerini diğer içsel değişkenlerin gecikmeli açıklayıcı değişkenlerini kullanarak yapması sonucu nedensellik ve geleceğe yönelik tahminlerde oldukça yaygın olarak kullanılan bir araç olmasıdır.

Vektör otoregresif modeler ilk defa Sims'in 1980 yılında yayınlanan bir makalede tartışılmış ve literature girmiştir. Bu çalışmada Sims, makroekonomik değişkenler arasındaki nedensellik ilişkiyi ifade etmek amacıyla birtakım modellere ihtiyaç duyulduğundan bahsedip, vektör otoregresif modellerin teorik zemimini hazırlamıştır.

Bu noktada, neden bir panel modelin üstüne ayrıca zaman serisi modeli de kullandığımızı bir daha vurgulamak faydalı olacaktır. Panel modeler ortak değişkeni tespit etme konusunda iyi olsalar da, çalışmanın başından beri ifade ettiğimiz, ülkelerin kendilerine has durumlarından kaynaklı değişik enflasyon dinmaiklerini ifade etmekte başarısız olmaktadır. Bu bağlamda, bizim araştırma sorularımızın en önemlilerinden biri olan ülkesel etkilerin enflasyon dinamiklerine etkisini ortaya çıkarmak için de ayrı bir ekonometrik model kurmak zorunlu hale gelmiştir. Bu bağlamda, klasik vektör otoregresif model ortaya çıkmıştır.

Bu kısımda vektör otogregresif modellerin iki önemli aracı olan varyans ayrıştırma tahmini ve dürtü teki fonksiyonları analizimizde bize yardımcı olmuştur. Varyans ayrıştırma tahmini bir önceki modelde açıklandığı için sadece dürtü tepki fonskiyonlarının tanımını yapmak yeterli olmalıdır. Dürtü tepki fonksiyonları, bir içsel değişkene diğer değişkenlerden gelen bir standart sapma büyüklüğünde bir şoka verdiği tepkinin ifade edildiği bir araçtır.

Çalışmanın bu kısmında panel veri setinden seçilmiş 3 gelişmekte olan ülkeye ek olarak 3 de gelişmiş ülkse seçilip, bu ülkelerin enflasyon dinamikleri 3 ayrı dönemde incelenerek hem zaman hem de ülke yapısına bağlı olarak enflasyon dinamiklerindeki değişiklikler incelenmiştir. Bu dönemler, araştırma konu ülkelerin sabit döviz kuru uygulayıp hala yüksek enflasyona sahip oldukları 1990lar, enflasyonun tek haneye indiği ve yapısal değişiklikler geçirdikleri 2000ler ve 2008

krizi sonrası farklı bir dünya ekonomisi ile karşılaştıkları 2010lar şeklindedir. Bu analiz için seçtiğimiz üç ülke ise Brezilya,Macaristan ve Türkiye'dir. Bu ülkeleri veri setimize seçmemizin temel sebepleri ise panel veri setindeki gruplarının belli başlı temsilcileri olmalarıdır. Bir yanda hiperenflasyın tecrübeleri olan, ticaret milli gelir oranı yüzde 20 civarı Latin Amerika ülkesi Brezilya, diğer yandan AB üyesi ticaret milli gelir oranı yüzde 160 civarı ve görece düşük enflasyon tecrübeleri olan Macaristen ve ikisinin ortasında yer alan Türkiye seçilen ülkelerdir.

Bunlara ek olarak, gelişmiş ve gelişmekte olan ülkelerin enflasyon dinamiklerindeki farklılıkları göstermek için bu aşamada 3 gelişmiş ülkeye, Amerika, Birleşik Krallık ve Japonya, aynı dönemler için regresyonlar yapılmıştır.

Modelimiz panel vektör otoregresif modeldeki değişkenlerle aynı dğeişkenlere sahip olduğu için tekrar açıklamaya gerek duymuyoruz.

Analizimizi gerçekleştirirken modelin doğruluğunu test etmek amacıyla birtakım testler yapılmıştır. Öncelikle bütün değişkenlere Dickey Fuller birim kök testi yapıp, birim kök taşıyan, yani durağan olmayan değişkenlerin ilk farkları alınarak durağan hale geitilmişlerdir. Ayrıca otokorelasyon, Granger nedenselllik testi, değişken varyans ve system durağanlığı testlerinin hepsini geçen modeler kullanılmış, modelde kullanılan değişkenlerde kullanılacak gecikme sayısı içinde Akaike bilgi klriterinden faydalanılmıştır.

Bu analizin sonuçlarına göre elde ettiğimiz temel çıkarım, seçili gelişmekte olan ülkelerin enflasyon dinamiklerinin dışsal faktörler tarafından belirlendiğidir. Varyans ayrıştırma tahmini sonuçlarına göre incelediğimiz üç ülkenin üç döneminde de dışsal değişkenler enflasyonun çoğunluğunu açıklamaktadır. Ayrıca buna ek olarak, ülkelerin kendi yapılarındaki farklılıklar da birtakım çıkarımlar yapmamızı sağlamaktadır. Örneğin, incelenen ülkeler içerisinde an açık ekonomiye sahip olan Macaristan'da içsel dinamiklerin etkisi çok azken, en kapalı ülke Brezilya içsel dinamiklerin enflasyon üzerinde görece en fazla etkili olduğu ülke olarak karşımıza çıkmaktadır.Buna ek olarak, dışsal dinamikler içerisinde dünya emtiya fiyat enflasyonu ile ithalatların göreli konumu dönemden döneme ve ülkeden ülkeye değişirken, döviz kuru her ülkede önemli bir dğeişken olarak ortaya çıkmaktadır. Bunun tek istinası Macaristan'ın 2010lu yıllardaki sonuçlarıdır ki bunun da temel sebebi Avrupa Birliğinde geçirilen 10dan fazla yılda ülkeye yoğun miktarda Euro

girişi olmaıs ve ülkenin resmi döviz kuru politikasının Euro'yu referans para birimi olarak Kabul etmesiyle Macaristan ciddi döviz kuru şoklarıyla karşılaşmamıştır.

Gelişmiş ülkelere yapılan analizler sonucunda da ortaya çıkan sonuçlar daha önceki kısımlarda karşılaştığımız sonuçlarla parallellik göstermektedir. Öncelikle, gelişmekte olan ülkelerde önemli bir değişken olarak karşımıza çıkan döviz kuru gelişmiş ülkelerde böyle bir etkiye sahip değildir. Ayrıca, gelişmekte olan ülkelerde içsel dinamiklerin enflasyon üzerindeki rolü gelişmekte olan ülkelere göre daha fazladır.

Son olarak, dürtü-tepki fonksiyonlarını incelediğimizde karşımıza çıkan sonuçlar diğer önceki kısımdaki bulguları desteklemektedir. Bu sonuçlara göre gelişmekte olan ülkeler dışdal değişkenlere genellikle içsel dğeişkenlere göre daha görünür ve anlamlı tepkiler vermektedir. Özellikle döviz kurundaki değişimler bu noktada üç ülke için de ortak bir anlam ifade etmektedir. Döviz kruuna en anlamlı tepkiler de çoğu gelişmekte olan ülkenin para biriminin değer kazandığı 2000li yıllarda görülmüştür. Ayrıca, Brezilya en kapalı ülke olarak ithalata genellikle anlamsız tepkiler verirken, en açık ülke Macaristan'da bu durum tam tersi olup, her dönemde anlamlı tepkiler görülmüştür. İçsel dinamikler bazında ise elimizdeki ülkeler genellikle anlamsız tepkiler vermektedir.

Sonuç olarak, gelişmekte olan ülkelerde küreselleşmenin enflasyon dinamikleri üzerindeki etkilerini incelediğimiz çalışmamızda dünya ekonomisinde noliberal küreselleşmeci politikalar uygulandıkça enflasyonun da bundan etkilenip, dışsal faktörler tarafından kontrol edilen bir kavrama dönüştüğü görülmüştür. Bu bağlamda birtakım politika önerileri yapmak anlamlı olacaktır, şöyle ki; gelişmekte olan ülkelerde döviz kuru enflasyon üzerinde önemli bir etken olduğu için bu ülkelerdeki merkez bankalarının enflasyonun temel anlamda içsel dinamikerden kaynaklandığı ve faiz oranıyla kontrol edilebileceği savına dayanan enflasyon hedeflemesi rejimini değiştirip, enflasyonla mücadele etmek için döviz kuruna yönelik politikalara yönelmeleri sorunun ehemmiyeti açısından elzem bir durumdur.

Çalışmamızın daha derin bir analiz yapmasını engelleyen belli başlı unsurlar da bulunmaktadır. Örneğin, ne yazık ki 1980 öncesine içkin verilerin aylık ve çeyreklik bazda çoğu gelimekte olan ülke için olmaması bu tartışmada küreselleşme öncesi ve sonrası dönemleri karşılaştırma olanağını elimizden almıştır . Ayrıca,panel

vektör ototegresif modellerin görece yeni modeler olması analizin daha derin bir noktaya gelmesine az da olsa engel olmuştur.

Bu çalışma ve elde edilen sonuçlardan yola çıkılarak, gelecek çalışmalar için birtakım fikirler ortaya çıkmıştır. Çalışmanın temel sonucu olarak döziv kurunun ön plana çıkması ve yüksek enflasyon dönemlerinde bu ilişkinin artması döviz kuru ile enflasyon arasında lineer olmayan bir ilişki olup olmadığı, döviz kurundaki değişkenliğin hangi eşikten sonra enflasyona daha çok etki ettiği ayrıca bir araştırma konusu olabilir. Buna ek olarak, enflasyon hedeflemesi rejimin varsayımları ve bu varsayımların gelişmekte olan ülkelerde ne denli geçerli olduğu da ayrı bir araştırma konusu olarak karşımıza çıkmaktadır.

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