Determinants of Inflation in a Micro Economy: The Case of Northern Cyprus

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ABSTRACT

This thesis aims to identify the determinants of inflation in Northern Cyprus. The thesis uses monthly data from 2015-2021. Unit root test results indicate that there is mixed-order integration for variables. The bounds test under the ARDL approach verified that the variables have a long-run association. The findings indicate that inflation rates in Turkey, minimum wage, electricity prices, exchange rates and government spending are the factors that have a significant impact on the long-term inflation rates in Northern Cyprus. Specifically, a 10 percentage point increase in inflation rates in Turkey, minimum wage, electricity prices, exchange rates, and government spending will result in a 9.4, 0.7, 0.99, 1.3, and -0.29 percentage point rise in inflation rates in Northern Cyprus, respectively. Therefore the main finding of this study is that the Türkiye's inflation rate largely determines and causes inflation in Northern Cyprus.

Keywords: Inflation rates, Exchange rates, ARDL approach, Northern Cyprus

ÖZ

Bu araştırma, Kuzey Kıbrıs'ta enflasyonu belirleyen faktörleri tespit etmeyi amaçlamaktadır. Araştırmada, 2015-2021 dönemi için aylık veriler kullanılmıştır. Birim kök testleri, enflasyonu belirleyen değişkenler için karışık sıralı entegrasyonun bulunmasıyla sonuçlanmıştır. ARDL yaklaşımı altındaki sınır testi, değişkenlerin uzun dönemli bir ilişkiye sahip olduğunu doğrulamıştır. Sonuçlar, Türkiye'deki enflasyon oranları, asgari ücret, elektrik fiyatları, döviz kurları ve kamu harcamaları Kuzey Kıbrıs'ın uzun vadeli enflasyon oranları üzerinde önemli ve anlamlı etkisi olduğunu göstermektedir. Özellikle, Türkiye'deki enflasyon oranlarında, asgari ücrette, elektrik fiyatlarında döviz kurlarında ve kamu harcamalarında meydana gelen yüzde 10 puanlik bir artış sırasıyla Kuzey Kıbrıs'ın enflasyon oranlarında yüzde 9,4, yüzde 0,7, yüzde 0,99, yüzde 1,3 ve yüzde eksi 0,29 puanlik artışa neden olacaktır. Özetle çalışma, Türkiyede yaşanan enflasyonunun Kuzey Kıbrıs enflasyon oranlarını büyük ölçüde etkilediğini ve belirlediğini göstermektedir.

Anahtar Kelimeler: Enflasyon oranları, Döviz kurları, ARDL yaklaşımı, Kuzey Kıbrıs

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ADF	Augmented Dickey Fuller
ARDL	Auto-Regressive Distributed Lag
CPI	Consumer Price Index
ECT	Error Correction Term
ELEC	Electricity
EXC	Exchange Rates
GDP	Gross Domestic Product
GVTEXP	Government Expenditure
I (0)	Integrated Of Order Zero
I (1)	Integrated Of Order One
IMP	Import
INF	Inflation
INFTR	Inflation Rates in Turkiye
IRTR	Discount Rates in Turkiye
JB	Jarque-Bera
MAX	Maximum Value
MIN	Minimum Value
MINWAGE	Minimum Wage
MS	Money Supply
PP	Phillips-Perron
S.D	Standard Deviation

Chapter 1

INTRODUCTION

1.1 Background of the Study

Inflation Rate is generally defined as the general price level rise or the increase in a country's cost of living. The institutional and economic factors determining inflation are currently of considerable interest, primarily due to their effects on monetary policy. Therefore, research on the factors influencing inflation is extensive and rising (Catao & Terrones, 2005). Global developments have less of an impact on Northern Cyprus's economy than changes in the Turkish Lira and the Turkish economy. This situation exists because Turkiye is the most significant trading partner for goods and services in Northern Cyprus and the use of the Turkish Lira as a legal tender. Therefore, rather than global developments, developments in the Turkish economy and the Turkish Lira have a more significant impact on the growth or contraction trends of the economy (Amca, Süreç, & Çerkez, 2019). In 2018, the Turkish Lira experienced a significant depreciation that rapidly increased the inflation rate, reaching 30%. In the summer of 2021, the government of Turkiye had a policy change consisting of low-interest rates, aiming to stimulate investment and growth and devaluing the Turkish Lira to help solve the current account deficit. The expansionary monetary policy by the Central Bank of Turkiye led to a dramatic decline in the value of the Lira, causing inflation to reach 19.6% in 2021 and 72.3% in 2022. This shock directly led to increase in prices, with inflation of 19.6% in 2021 and 72.3 % in 2022 (İnceiplik, 2023). Northern Cyprus, an import-based economy, is

affected more as the exchange rate pass-through is higher on the island. Especially in periods of dramatic fluctuations in the forex market, the degree of pass-through increases, which was the case in Northern Cyprus in 2021 and 2022. Northern Cyprus's inflation rate from 1980 to 2010 reached 93% at the start of 1980, but it was comparatively constant from 1980 until 1993. Nevertheless, the following year (1994), the inflation rate increased rapidly by 154%. As a result, Northern Cyprus had its highest inflation rate of 215%, registered in 1994. After that, the rate continuously decreased until its lowest point (2.7%) in 2005. Average Northern Cyprus inflation rates from 1980 to 2010 and for the three sub-periods were calculated. Throughout the periods, the average inflation rates were erratic. In the period from 1980 to 1990, the inflation rate was an average of 52.20%, 1990-2000 saw the highest average inflation rate of 81.85%, and finally, the period from 2000 to 2010 saw the lowest 21.22% of inflation (Kaşif, 2015).

A decline in the quantity of goods and products and a rise in the money supply are accepted to be two of the main reasons for inflation. Hyperinflation, creeping inflation, walking inflation, and running inflation are four types of inflation (Ackley, 1978). Creeping inflation is perfectly natural inflation which is safe and helpful for the development of the economy. While walking inflation is more substantial than creeping one, it is a situation of prices rising somewhat up to single digits annually. Double digits of annual inflation are a sign of running inflation. This type of inflation mainly affects the poor and middle class of the country. Hyperinflation is the strongest, where prices rise rapidly and uncontrollably. This kind of is perilous for economies, and they harm the stability and performance of the economy. Low inflation rates and price stability is essential for a healthy economy (Lim, & Sek,

2015). There are three primary causes of inflation: monetary, fiscal, and balance of payment. Expansion in the money supply is considered to cause inflation in the monetary aspect, while deficits in the budget are the fundamental reason for inflation in the fiscal aspect. Nevertheless, as government deficits are frequently supported by money creation in developing nations, the fiscal element is strongly related to monetary theories of inflation. The exchange rate is essential in the balance of payment element. The breakdown of the currency rate leads to inflation through an increased wage indexation process, which is usually satisfied, or through rising import costs and a spike in inflationary anticipation (Iya & Aminu, 2014).

As inflation is one of the leading causes of poverty, low standard of living, and growth in developing countries such as Nigeria, a study reveals that growth in the financing of the government deficit, expansion of the money supply, and depreciation of the exchange rate which cause a setback on agricultural and industrial production were the cause of the inflation pressure. Government income and the economy's underperformance are highly correlated with inflation. Additionally, inflation hinders productivity and makes it harder for economic actors to plan their budgets and the future, especially when businesses are compelled to divert resources from producing goods and providing services, which discourages investment and slows growth (Iya & Aminu, 2014).

The research on exchange rate pass-through also looks at the transmission mechanism from exchange rate to inflation. One of the causes of historically high inflation has indeed been exchange rate pass-through. Exchange rate pass-through is still substantial in nations with historically high inflation even though inflation is comparatively steady and pass-through has decreased recently due to increased local

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and global competitiveness. One extreme scenario is pricing to market, which implies no pass-through because of the fixed import price and is more likely to happen in industrialised nations. The sale of imported items on the domestic market at the current exchange rate is the opposite extreme circumstance. This is common in nations with historically high inflation rates (Deniz, Tekçe & Yilmaz, 2016). Since the beginning of the 1990s, many fluctuations have been seen in the Turkish Lira against other currencies such as the British pound, American dollar and Euro. As movements of capital liberalised in Turkiye, the Turkish Lira became freely tradable worldwide as it became convertible against other currencies. Starting from 2013, we have seen enormous depreciation of the Turkish Lira, around 40% against the American dollar and English pound, also approximately 20% against the euro. On the flip side, a non-stop current deficit balance with on-going capital inflows has made overvaluation of the Turkish Lira on different time bases, which encourage the market to react, resulting in high fluctuations in exchanges of the Turkish Lira. Due to that, there has always been a question about the stability of the Turkish Lira's equilibrium exchange rate. So an explicit declaration about purchasing power parity equilibrium for exchange rate determination of the Turkish Lira requires additional research (Vural, 2019).

1.2 Purpose and Motivation of Study

This research aims to identify the effects of determinants on inflation rates in Northern Cyprus for both the short and long term. The research uses the monthly data over the period 2015-2021. Inflation is an important economic indicator affecting the citizens' overall economic stability and purchasing power parity. As Northern Cyprus has had inflation problems in the past, it is essential to find the source and effects of inflation. As Northern Cyprus does not have its currency, the

currency of Turkiye is used. The depreciation of the Turkish Lira is considered the main reason for inflation. In this study, we aim to test the exchange rates' effect on inflation together with other independent variables such as money supply, government expenditure, imports, minimum wage, electricity, discount rates, and inflation rates of Turkiye.

The previous literature about the determinant of inflation in Northern Cyprus is limited. This study has the motivation to expand the literature in this area by presenting a more comprehensive analysis. This analysis can provide helpful information for policymakers to lower inflation and achieve a more stable economy.

1.3 Research Questions

1. What are the main determinants of inflation in Northern Cyprus?

2. What are the sizes of the effect of determinants on inflation in Northern Cyprus in the short and long term?

1.4 Scope and Limitation of Study

This study investigates the causes of inflation in Northern Cyprus, where monthly macroeconomic data is used throughout 2015-2021. One can argue from observations that Northern Cyprus has monopolistic competition in most sectors. Importers & Wholesalers control the market by themselves as there is no competition. Given that there is no smooth functioning of the markets; firms can contribute to inflation by increasing the prices of the goods without the fear of competition. However, there is no micro and sectorial data to be used to measure the effect of the monopolistic structure of Northern Cyprus on inflation. In addition, there are no wholesale or import prices for the goods. Therefore this study is limited

to analysing only the consumer price index (CPI) for the inflation rates in Northern Cyprus.

1.5 Proposed Structure

The study has five chapters starting with the introduction and continuing with the chapter on literature review, where more detailed information is given about theories and types of inflation, empirical review, and a more comprehensive explanation of inflation. Chapter 3 is about the data and methodology of the study in which statistical methods and detailed information of research data are explained. Then in Chapter 4, empirical results and the interpretations of the result are stated. Chapter 5 summarises the conclusions of the thesis.

Chapter 2

LITERATURE REVIEW

2.1 Introduction to Inflation

A standard definition of inflation is a steady, on-going increase in the general price level as determined by the consumer price index (CPI). While there is considerable disagreement about calculating the consequences and perks of inflation on economic and social repercussions, it is generally agreed that low inflation rates are better for any country. To maintain a healthy economy, the government's priority is to manage inflation; as a result, the monetary authority must identify and comprehend the factors that contribute to inflation. Clearly defining the origins and drivers makes it considerably simpler to control inflation (Pahlavani & Rahimi, 2009).

According to the widely accepted explanation, inflation is a persistent and continuous rise in the average price of services and goods. In other words, a persistent decline in the buying power of money is brought on by an increase in the amount of credit and money that are readily accessible relative to what the economy has produced (Nigusse, Tadesse & Melaku, 2019). A definite indication of a commodity price for no specific period cannot be the definition of inflation. For inflation to persist, there needs to be a sustained rise in the average cost of goods and services. The level of domestic pricing preserves the smooth operation of all economic activity in a particular nation. In other phrases, irregular variations in local

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prices of goods and services account for the vast majority of a country's on-going economic instability (Mishkin, 2007).

According to Christensen (2001), there has been a long-standing, direct correlation between the money supply and the inflation rate. If the money supply rises , there will be a corresponding increase in demand for goods and services, inevitably leading to more inflation as more money chases after the same amount of goods and services. Alvarez et al. (2001) have also stated that the money supply and inflation rate are positively correlated, and an adverse change in interest rates will occur as the money supply expands. Because of this, when the market's money supply keeps growing, the inflation rate will likewise increase.

The principal causes of inflation are different for developed and developing countries. The expansion of the Money supply is a significant reason for inflation in developed countries. However, the inflation phenomenon in developing countries is primarily driven by factors often associated with budget deficits, such as excess money growth and depreciation of exchange rates brought on by a balance of payments problem (Sargent & Wallace, 1981).

2.2 Theories and Types of Inflation

2.2.1 Quantity Theory of Money

The quantity Theory of money is one of the most fundamental economic theories still in use. This Theory explains that price changes are strongly affected by the changes in the total money circulating inside the economy. Orthodox policy recommendations for upholding the gold standard were firmly grounded in the quantity theory of

money and supplied the dominant conceptual framework for interpreting contemporary financial events. (Totonchi, 2011).

2.2.2 Monetary Theory of Inflation

The monetary theory of inflation is one of the most famous economic theories. Since "only money matters," according to Milton Friedman and his adherents, when it comes to regulating the economy, monetary policy is considered an excellent tool in comparison to fiscal policy. According to the Monetarist price level in the long run and the output and the price level in the short run are determined by the money supply. This underlines that the impact of the money supply is limited in affecting the level of output in the long run. Total production is not a core reason for the formation of the monetary phenomenon of inflation; conversely, a rise in money supply is a core inflation unit. Initially, the quantity theory of money provided a straightforward justification for it (Friedman & Schwartz, 2008).

2.2.3 Demand Pull Inflation

The Demand-Pull İnflation is explained as the increase in the aggregate demand by John Maynard Keynes (1883–1946) and his adherents. The total demand consists of investments, consumptions and government expenditures. When the total demand for products and services exceeds the maximum supply available at full employment, the inflationary gap occurs. As The Gap rises between demand and supply, inflation rates also rise similarly. Keynes' demand-pull inflation theory clearly states that reducing each aspect of total demand is an effective way to tackle inflation and ease demand pressure. We must take this approach seriously and implement it as soon as possible. Failure to do so may result in further complications and negative economic consequences. The government uses taxes to lower demand and spending in order to maintain a stable inflation rate or lower them. In extreme conditions like inflation

during a war, managing the money supply or decreasing spending may not be feasible. In such instances, raising taxes could be the most appropriate measure to control demand directly (Keynes, 1936).

2.2.4 Cost Push Inflation

Cost-push inflation is one of the alternative theories of inflation. Its primary cause is the growth in money wages that occurs more quickly than the labour supply. The cost of producing goods increases as employers are under intense pressure from labour unions to raise wages significantly. In response, businesses increase the cost of their goods. Despite increased costs, increasing income allows employees to purchase the same quantity of goods as before. Conversely, the price rise prompts unions to call for even preeminent pay. In this manner, the wage-cost cycle creates inflation due to cost-push or wage push (Humphrey, 1998).

In addition, as wages and prices surge, this will cause the cost of living to increment as a companion. As the cost of the products will be superior, it will directly affect the business and commodities that use them as input. This cycle will spread and cause inflation in the whole economy. Moreover, Cost-push İnflation may happen because the cost of imported raw materials has increased. Cost-push inflation also happens thanks the profit-push inflation. Some businesses have the power to manipulate the prices of their goods in the market by themselves to increase their profit; These businesses are called oligopolistic and monopolistic. Once the unions mandate to increase the employers' salaries, these businesses increase their cost of products as there is no competition in their sectors. A resulting rise in employers' salaries indirectly contributes to cost-push inflation (Totonchi, 2011).

2.2.5 Structural Inflation

One of the widely accepted theories of inflation is the idea of structural inflation. It is about how structural variables affect inflation. Considering a structural improvement, this inflation generates a cost allocated for quick economic expansion (Totonchi, 2011). Another inflationary aspect that structuralism emphasises is the accelerated and rapid expansion of the service sector, which is linked to immigration and the population boom. The framework of an inflationary social policy structure is still being analysed to understand how elements such as the residual distribution network structure, exclusive quasi- and structure of established industries, high labour costs, obstacle structure, and other small yet significant factors fit into it In developed investment nations; social class differences and varying levels of competition for a significant share of the National Income often cause hidden inflation. The competition caused by hyperinflation in less developed nations leads to successful structuralism. Particularly in rapid economic expansion and increased social migration, competition intensifies. New social groupings are given access to political and economic resources, and by using inflation, an effort is made to consolidate power and alter the income distribution. According to this perspective, inflation is a visible indicator of economic change, and society is a product of the economy's quick and dynamic expansion (McCallum, 1990).

2.2.6 Expectations-Augmented Phillips Curve

According to the modern version of the Phillips curve, three factors affect inflation: anticipated inflation, cyclical unemployment (the extent to which unemployment deviates from its natural rate), and supply shocks. The initial factor in the Phillips curve suggests that inflation tends to persist. This results from past inflation impacting people's expectations of future inflation, which then influences the prices

and wages they establish. The second factor is referred to as demand-pull inflation, while the third factor is known as cost-push inflation (Mankiw, 2012). We've previously discussed these two factors in detail.

During the late 1960s, policymakers observed a negative slope in the Phillips Curve, which suggested a trade-off between inflation and unemployment. Implementing expansionary demand policies to decrease unemployment could result in unpredictable inflation (Gordon, 2018).

Phelps (1967, 1968) and Friedman (1968) introduced the idea of having different short-run Phillips Curves for various expected inflation rates. They proposed that there is a balance point for unemployment (U*) when actual and expected inflation rates match. However, if attempts are made to lower unemployment below U*, actual inflation will exceed expected inflation. This will cause people to adjust their expectations for future inflation, resulting in an upward shift in the short-run Phillips Curve. If unemployment remains below U*, this cycle will continue, and persistent efforts to keep unemployment below U* will continuously increase the inflation rate. Eventually, the Phillips Curve will become vertical at U* in the long run.

Based on the expectations-augmented Phillips curve theory, an increase in actual inflation leads to an increase in expected inflation. This, in turn, causes the Phillips curve to shift upwards, increasing wages at the same rate as inflation. If policymakers aim to achieve an unemployment rate below the non-accelerating inflation rate of unemployment, it will lead to a continued escalation of inflation. However, hyperinflation harms the economy by undermining the functions of money (Black, Hashimzade & Myles, 2012).

2.3 Economic Landscape of Northern Cyprus

Briguglio (1995) states that small and developing island economies share specific characteristics. As one such economy, Northern Cyprus has limited natural and human resources and a small domestic market. Its economy is mainly based on services, particularly tourism, and like other small economies, it relies on foreign markets and increasing demand from abroad for its economic growth. While the region has distinct features, it faces specific challenges in transitioning towards a sustainable economy. One of the main obstacles is that it lacks diplomatic recognition from other countries, except Turkey. Another difficulty is the close economic and political ties with Turkey, which impact the Northern Cyprus economy and its use of the Turkish Lira currency. These factors, along with the structural and cyclical fluctuations in business, affect the overall economic situation in the region (YDE, 2019).

The Northern Cyprus economy faces a significant issue as it does not have its currency printed by its central bank. This absence means there is no monetary policy to regulate the currency. However, the lack of monetary policy negatively impacts the economy. It becomes difficult to control inflation, establish a disciplined budget policy, and create effective product and service markets. Investments in the country may not be stable, and reaching the maximum production level and full employment becomes challenging. Maintaining an external balance is also impossible, making it a significant structural problem for the economy (Şafakli & Özdeşer, 2002).

In Northern Cyprus, it is clear that most sectors suffer from a lack of competition in the market. The monopolistic structure has resulted in several drawbacks for many

nations, including low-quality products, limited technological development, and high prices due to a lack of competition (Bade & Parkin, 2009).

There are concerns about the effectiveness of the fiscal policy of the Northern Cyprus economy because wealthy organizations and individuals can avoid paying taxes and receive exemptions. Therefore this has made it difficult for the government to collect sufficient tax revenue, which is essential for its operations. As a result, generating a significant amount of tax income has become a challenging task (Şafakli & Özdeşer, 2002).

2.4 Empirical Review

Naseem (2018) examined the macroeconomic factors influencing inflation in Saudi Arabia from 2000 to 2016. The same study measured the impacts of various explanatory variables on inflation, where these factors are; a pegged exchange rate with the US dollar, money supply, price of oil, unemployment, exports, and imports. The empirical results revealed that unemployment is an insignificant variable in terms of affecting inflation. On the other hand, the other variables have a notable effect on inflation in Saudi Arabia. The fixed exchange rate has the highest coefficient with 66.93, which indicates its influence on inflation is more than other significant variables.

Mukhtarov, Mammadov, and Ahmadov, (2019) conducted research using Johansen Cointegration and Vector error correction models to estimate the impact of exchange rates and oil prices on inflation in Azerbaijan. The unit root test results of the research indicate that variables are non-stationary at the level where they are stationary at the first difference level. Results of the Vector error correction model

show that a 1% rise in the oil prices and exchange rates cause a 0.56% and 1.81% increase in inflation in the long run, respectively, during the period from 1995 to 2017.

A previous study in Ghana that used an error correction mechanism to inspect the connection between inflation, monetary growth, and exchange rate illustrates that there is a long-run relationship between inflation, real income, exchange rate, and money supply. These results show a long-run positive effect of money supply and exchange rate on inflation while a negative effect on real income in Ghana (Abradu-Otoo, 2003).

Ordinary Least squares estimator used to measure determinants of inflation in Ghana. Results indicate that money supply and real exchange rates are the core factors of inflation. Although contraction of money supply, expenditure, and actual output lower the level of inflation, an increase in exchange rate puts upward pressure on price levels (Gyebi & Boafo, 2013).

The connection between inflation and its determinants is examined by the autoregressive Distributed Lag (ARDL) for 28 countries which are divided into two groups; high and low-inflation countries for the long run and short run according to the data gathered from IMF (Lim, & Sek, 2015). Yearly data on money supply, import of goods and services, national expenditure, gross domestic growth, and inflation are obtained from the database of IMF for 1970 to 2011 to test determinants of inflation. Pooled Mean Group (PMG) and Mean Group (MG) estimators are used to estimate models. To choose a preferred estimator Hausman test is used. Inf = f (GDP-growth, imp, ne, m4) is described as the general model for calculating

determinants of inflation. Inflation is a function of gross domestic product growth, imports, national expenditure, and money supply. Both national expenditure and money supply remarkably influence inflation in the long run in countries with high inflation. While money supply has an adverse effect, national expenditure has oblique beneficial effects on inflation. The impact of GDP growth on inflation is negative in countries with low inflation, but there is a positive impact on inflation implied by imports of trade. In the short run, both imports, money supply, and GDP growth are insignificant in countries with high inflation. In countries with low inflation, these factors hold importance in the short term. Further, except for importing goods and services, GDP growth and money supply benefit inflation in low-inflation countries (Lim & Sek, 2015).

A paper that searched for inflation determinants in Nigeria showed that the ADF test confirms that the variables; interest rates, money supply, exchange rate, and government expenditure are stationary in the model. The Granger causality test shows that money supply is not the reason for inflation and that inflation and exchange rate are the cause of money supply. The Johansen cointegration test proves that there is a long-run relationship between variables and inflation. According to The VEC error correction, the exchange rate and money supply have been detected to cause the interest rate in the long run within variables of the model. Inflation is determined negatively by the exchange rate and government expenditure while positively by interest rate and money supply. Exchange rates and interest rates are highly significant on the inflation rate; on the other hand, government expenditure and money supply have a pretty low significance level in influencing the inflation rate (Iya & Aminu, 2014).

The study utilizes a practical approach to analyse the external and internal factors that play a part in inflation in the Gulf Cooperation Council (GCC). In the study, they utilize the vector error correction model (VECM) and cointegration test to assess the factors contributing to inflation over the short and long term. Results show that domestic and foreign factors explain inflation well. However, it has been established that high inflation in trading partners results in upward momentum in inflation in four out of seven countries. Additionally, inflation increases due to the high credit usage and rise in government expenditure due to oil earnings. Inflation can worsen in situations when government expenditure increases. However, investments done by the government are helping the supply side, which eases capacity limitations. These will eventually slow the price increase rate. (Morsy & Kandil, 2009).

Monfared, and Akin, (2017) included exchange rate and money supply as inflation variables in Iran from 1997 to 2011, and VAR analysis was used to research the relationship. The results indicate that both variables positively affect inflation, into the details contribution of exchange, money supply, and the inflation itself are respectively 1.33%, 62.11%, and 36.54% according to variance decomposition. As a result, the most significant contributor to inflation in the Iranian economy is the money supply, followed by inflation and the currency rate.

Once searching at the quarterly set of data for Brazil between 1968 and 1985, Durevall (2012) presents the argument that soaring money and oil prices cause inflation to rise while rising output induces inflation to fall. By controlling for several other measures, including oil price, unemployment rate and industrial production, and real exchange rate, Masso and Staehr (2005) assess whether the Phillips curve exists for the three Baltic nations, which illustrates the relationship

between the output gap and inflationary expectations on the present rate of inflation. The outcomes vary depending on the country, yet variations in industrial output and the currency rate significantly impact inflation. On the other hand, Lim and Papi (1997) point out that fiscal deficits and real exchange rates significantly influence Turkiye's inflation rate from 1970-1995. Deficits in the public sector were also discovered to have an immediate and significant effect on inflation, yet salary fluctuations have no impact on inflation.

The factors contributing to Iraq's inflation between 1995 and 2015 were examined. The ADF and PP unit root tests were used to determine the stationarity of the indicators. Furthermore, the long- and short-run correlations between the variables were examined using the ARDL bounds testing approach to cointegration. According to the findings, an expansion of the money supply is the primary cause of excessive inflation over the long term. Additionally, it is evident from the findings that import openness contributed to increases in Iraq's total price level throughout the research period. Concerning the exchange rate, the research showed that one requirement for reducing inflation in Iraq is the devaluation of the local currency (Al-Jafari & Altaee 2019).

The research was done on the critical determinants of the annual inflation rate in Bangladesh from the year 1981 to the year 2009. An unconstrained error-correction model (UECM) variant of the ARDL approach was utilized to determine the elasticity of inflation's short- and long-term determinants. The empirical finding displays that domestic rice production has a significant and negative impact on the inflation rates in the short run. The broad money supply (M2) and domestic oil prices, on the other hand, have a small but beneficial influence on the annual

inflation rate. The most important policies to reduce inflation in Bangladesh are sustaining and enhancing the production of domestic rice and ensuring better coordination between fiscal and monetary policies.(Khatun & Ahamad, 2012).

Establishing the source of inflation is accomplished through research in Iran, where the ARDL technique is used for analysing the relationship between inflation and the determinants. According to the result of the research, inflation in Iran is primarily driven by the currency rate, gross domestic product, liquidity, and the price index of imported commodities (Ghavam & Tashkini, 2005).

Another study using the ARDL technique is conducted on the key factors influencing inflation in Iran from 1971 to 2006. The degree of imported inflation, exchange rate, liquidity, and anticipated inflation rates are the primary factors of inflation. In the short and long terms, each determinant is statistically significant and potent. Furthermore, the research's error correction term value, which was roughly -0.40, made it possible to quickly alter the short-term influence of variables on inflation to reach the long-term (Pahlavani & Rahimi, 2009).

Research on Jamaica's inflation rate between 1960 and 2021 found that factors like exchange rate, GDP, government spending, agricultural output, money supply, and oil prices significantly affect CPI. However, interest rates had no significant effect. A 1% rise in agricultural output could increase inflation by 0.65%, while a 1% increase in the exchange rate could lead to a 0.60% increase in CPI. Government spending and world oil prices could impact CPI by 0.38% and 0.14%, respectively. A 1% increase in international oil prices had minimal effect (Indalmanie, 2023).

Various factors, such as real national income, past inflation rates, changes in unit labour costs, past inflation rates, the rate of price change in the non-tradable sector, consumer credit rates and import prices, influence inflation in Barbados. While import prices have the most significant impact on inflation, other factors also have a role to play (Cumberbatch, 1995).

The inflation rates in Fiji were analysed using a hybrid open-economy model, which examined monthly data from February 1996 to December 2020. The findings suggest that the expectations of forward and backwards-looking agents can explain up to 85% of the inflation rates, while other variables only contribute 10%. This indicates that addressing political and economic uncertainties is essential for achieving and maintaining a stable economy (Narayan, Cirikisuva & Naivutu, 2023).

Over 21 years, from 1990 to 2010, a study was conducted to investigate how inflation operates in the Maldives. The research found that exchange rates and foreign prices are the main factors influencing inflation in the country. The study shows that when there is a change in nominal exchange rates, it has a significant and rapid impact on domestic prices, which is known as exchange rate pass-through. Additionally, the research found a direct connection between the money supply expansion and inflation in the Maldives. To sum up, the study reveals that inflation in the Maldives is influenced mainly by exchange rates and foreign prices, where changes in exchange rates immediately affect domestic prices, and monetary expansion contributes to inflation (Adam, 2014).

Limited research has been conducted on the causes of inflation in Northern Cyprus. However, a study carried out in 2021 by Yektaoğlu, Gökmenoğlu, and Kaakeh

thoroughly examined monthly data from 2006 to 2019 using the ARDL technique. The study's findings assert that various factors, including oil prices, exchange rates, M2 money supply, interest rates, and inflation rates in Turkey, significantly influence inflation rates in Northern Cyprus. In particular, it is crucial to note that inflation rates in Turkey substantially impact inflation in Northern Cyprus.

Another recent research on productivity dynamics in Northern Cyprus reveals that external instability negatively impacts productivity in Northern Cyprus, while improvements in socio-economic infrastructure have a positive effect. The same study finds that Türkiye's macroeconomic instability is mainly caused by inflation, and fluctuations in the value of the Turkish lira have been negatively affecting resource allocation and TFP in Northern Cyprus. The economy of Northern Cyprus is highly vulnerable due to the persistent negative impact of external instability on TFP (İsmihan, Besim, Sertoğlu, 2019).

Artam, Besim and Gökmenoğlu (2021) also find that the degree of exchange rate pass-through is high, as much as 20%-28% from 2005 to 2020 in Northern Cyprus. So for every 10% depreciation of the Turkish lira, the consumer price index will increase by 2 to 2.8%.

Chapter 3

RESEARCH DATA AND METHODOLOGY

Determinants of inflation have been examined with the use of many different methods benefitting from a vast amount of theories for many countries. This study examines the determinants of inflation in Northern Cyprus. This chapter will introduce and outline the research design, macroeconomic and social data of Northern Cyprus, source of the data and variables, descriptive statistics, and the statistical method of the study.

3.1 Research Design

This thesis aims to assess the effect of independent variables on inflation in Northern Cyprus. The used data unit is in percentages, and variables are monthly change values. The study aims to find how the change in the consumer price index and inflation is affected monthly.

3.2 Macroeconomic and Social Data Analysis

This section aims to provide an analysis of Northern Cyprus's macroeconomic and social data through three separate tables. The tables presented in this section are based on data collected from the TRNC Statistical Institute and the Turkish Cypriot Chamber of Commerce.

Table 1: Macroeconomic and Social Data

	2016	2017	2018	2019	2020	2021
Real Growth Rate (% change)	3,6	5,4	1,3	0,2	-16,2	4,0
GDP (Million TL)	11.601	14.544	18.324	21.395	21.407	30.143
GDP per capita (Current prices. US$)	13.897	14.187	13.277	12.649	10.055	11.129
Imports(Million $)	1.557	1.778	1.816	1.597	1.221	1.251
Export (Million $)	105,5	105,6	100,9	82,5	101,1	106,8
Foreign Trade Balance (Excess + / Deficit -)	-1.452	-1.672	-1.715	-1.515	-1.120	-1.144
Consumer Price Index (CPI, %)	10,2	14,7	30	11,7	15,03	46,1
Total Employment	118.387	120.999	132.411	138.438	132.885	125.739
Labor Force Participation Rate (%)	51,4	51,2	50,5	51,3	51,1	43,8
Employment Rate (%)	48,2	48,2	47,1	48,1	45,9	40,4
Unemployment rate (%)	6,4	5,8	6,8	6,3	10,1	7,8
Exchange Rates (TL/$)	3,02	3,65	4,83	5,68	7,02	8,92
Exchange Rates (TL/$ % change)	10,62	20,86	32,33	17,60	23,59	27,07

Table 1 presents various macroeconomic and social indicators for Northern Cyprus over six years from 2016 to 2021. One of the most striking aspects of the table is that despite the yearly increase in the nominal gross domestic product (GDP), GDP per capita in US$ decreases every year after reaching a peak in 2017. This can be explained by the growing inflation rates (CPI) and the fall in the value of the Turkish Lira. Exchange rates have similar trends with CPI, which descriptively shows that changes (decreases) in the value of TL pass on to the inflation in Northern Cyprus. The other striking indicator is the trade deficit which shows that exports of goods are only approximately 10% of the imports. This shows that Northern Cyprus is an import-addict country. Nevertheless, the deficit in the trade balance is financed by

the surplus of the services trade. The real growth rate of the country was negative in 2020, mainly related to the global covid-19 crisis.

Table 2: Shares of Sectors in GDP

	2016	2017	2018	2019	2020	2021
1. Agriculture	5,6	4,5	6,2	5,5	6,0	8,3
2. Industry	9,2	9,7	8,4	7,8	9,6	7,5
3. Construction	4,4	5,8	5,9	5,8	9,6	7,5
4. Trade-Tourism	19,7	20,1	20,8	22,2	12,8	13,8
5. Transport-Communication	8,3	8,0	7,3	7,3	6,4	9,2
6. Financial Institutions	7,7	6,9	8,1	8,0	7,9	8,9
7. Home Ownership	4,6	4,5	4,9	5,2	6,3	7,3
8. Self-Employment and Services	14,5	15,7	15,8	13,2	12,9	14,2
9. Public Services	15,9	15,1	13,4	16,1	19,4	15,5
10. Import Duties	10,2	9,7	9,2	9,0	9,1	7,8
GDP	100,0	100,0	100,0	100,0	100,0	100,0

This table shows the shares of different sectors in the Gross Domestic Product (GDP) from 2016 to 2021. GDP is the total value of goods and services produced within a country's borders in a given period. The table has ten rows, each representing a sector and six columns representing a year. The sectors are Agriculture, Industry, Construction, Trade-Tourism, Transport-Communication, Financial Institutions, Home Ownership, Self-Employment and Services, Public Services, and Import Duties. The table displays the percentage share values of each sector's contribution to the total GDP in a given year. The table shows that Northern Cyprus is a serviced-based economy producing over 70 per cent of its value added by services. The leading sectors are Tourism and Trade, and Public Sector and Self-employment and

services also have a significant share in the GDP of Northern Cyprus. On the other hand, the Industry and Agricultural sectors are more complementary. Last but not least, the Construction sector produces about 8 per cent of GDP and has recently become a popular destination, especially for foreign estate buyers.

Table 3: Real Growth Rates of Sectors

	2016	2017	2018	2019	2020	2021
1. Agriculture	-7,3	4,9	2,6	2,7	1,8	-1,5
2. Industry	7,3	4,4	-12,4	-14,7	-15,0	16,8
3. Construction	5,7	10,6	7,6	3,9	-25,6	23,0
4. Trade-Tourism	4,8	9,0	0,4	-2,7	-35,6	5,4
5. Transport-Communication	5,3	6,9	3,5	3,5	-16,6	32,8
6. Financial Institutions	2,0	3,1	2,7	1,2	0,5	-2,0
7. Home Ownership	3,5	3,8	4,6	5,0	3,6	3,8
8. Self-Employment and Services	3,6	7,7	5,3	1,3	-16,0	3,1
9. Public Services	-0,2	-0,8	1,3	3,7	-1,5	-5,5
10. Import Duties	9,0	0,5	2,4	3,6	-16,4	-26,1
Real Growth GDP	3,6	5,4	1,3	0,2	-16,2	3,9

Table 3 shows the real growth rates of different economic sectors from 2016 to 2021. The real growth rates of these sectors have varied widely over the years. In 2016, most sectors experienced positive growth, with industry-leading at 7.3%. On the other hand, agriculture shrunk by -7.3%. Growth rates in 2017 varied widely, with industry and agriculture growing at around 4.4% and 4.9%, respectively. The construction sector experienced a significant growth rate of 10.6%, while the public services sector experienced a decline of -0.8%. In 2018, the industrial sector experienced a sharp decline in growth rate, recording a negative growth rate of -

12.4%, while the trade-tourism sector grew at a meagre 0.4%. In the same year, Turkish Lira started to depreciate at high rates, which led to a doubling of inflation from 15% in 2017 to 30% in 2018 (Table 1). In 2019, most sectors experienced positive growth rates, with transport-communication growing at 3.5%, while the trade-tourism sector declined at -2.7%. 2020 was particularly challenging for most sectors due to the COVID-19 pandemic, with all sectors experiencing negative growth rates. The trade-tourism sector was hit the hardest, declining at -35.6%, while the construction sector declined by -25.6%. In 2021, most sectors experienced a recovery in their growth rates, with the transport-communication sector growing at 32.8% and the construction sector growing at 23.0%. The import duties sector recorded the most significant decline at -26.1%. The real growth rate of the overall GDP improved to 3.9% in 2021 from -16.2% in 2020.

3.3 Source of the Data

Table 4: Source and Measure of the Data

Variable	Measure	Source
Inflation (INF)	CPI (Monthly %)	TRNC Statistical Institute
Money Supply (MS)	Nominal Money Supply TRY (M3 monthly %)	Central Bank of TRNC
Government Expenditure(GVTEXP)	Government Expenditure (Monthly %)	TRNC Ministry of Finance
Discount Rates in Turkiye (IRTR)	Discount rate (Monthly %)	Central Bank of Turkiye (TCMB)
Inflation Rates in Turkiye(INFTR)	CPI Inflation Rate (Monthly %)	Central Bank of Turkiye (TCMB)
Import (IMP)	Import in dollars (Monthly %)	Ministry of Economy and Energy , Turkish Cypriot Chamber of Commerce
Minimum Wage (MINWAGE)	Minimum Wage (Monthly %)	TRNC Statistical Institute
Electricity (ELEC)	Electricity (Monthly %)	TRNC Statistical Institute

	Exchange Rate ((1\$=n ₺) (monthly %))	Central Bank of Turkiye (TCMB)
Exchange Rates (EXC)		

Table 4 represents the variables that will be used in our study. The period of the study includes a monthly time frame of February 2015 to December 2021. The study aims to find the determinants of inflation in Northern Cyprus. All variables are in monthly percentage change of the Turkish Lira except for the import variable. The source of data gathered from different institutions is also stated in Table 1, some being from local TRNC institutions and others from Turkiye. In the variable section of Table 1, shortened codes of variables are stated in parentheses.

3.4 Descriptive Analysis

Table 5: Descriptive Statistics

Variable	Observations	Mean	Max	Min	S.D	JB	Prob.
INF	83	1.48976	15.16	-1.6	2.17228	1333.499	0
MS	83	2.15218	22.48649	-4.98481	3.69159	517.1343	0
GVTEXP	83	11.633	215.1801	-69.6551	48.14986	147.598	0
IRTR	83	1.3861	111.4286	-29.4118	15.42927	4832.504	0
INFTR	83	1.23602	13.58	-1.44	1.69376	4117.197	0
IMP	83	2.15663	65	-46	19.64904	3.95476	0.13843
MINWAGE	83	1.36122	21.26984	0	4.27217	512.5173	0
ELEC	83	0.77527	20.67278	-15.0006	4.95514	181.9412	0
EXC	83	2.27389	28.55798	-8.29239	5.36357	218.9876	0

The data in Table 5 has descriptive statistics for each variable, with 83 observations. For the INF variable, the mean is 1.49%, and the maximum and minimum values are 15.16% and -1.6%, respectively, indicating a range of 16.76% for inflation. Similarly, the MS variable has a mean of 2.15%, with maximum and minimum values of 22.50% and -4.99%, respectively, indicating a range of 27.5% for money supply. The GVTEXP variable has a mean of 11.63%, with maximum and minimum values of 215.18% and -69.66%, respectively, indicating a range of about 285%. For the IRTR variable, the mean is 1.39%, with maximum and minimum values of 111.42% and -29.41%, respectively, indicating a range of 140.8%. The INFTR variable has a mean of 1.24%, with maximum and minimum values of 13.58% and -1.44%, respectively, indicating a range of 15%. The IMP variable has a mean of only 2.16%, with maximum and minimum values of 65% and 46%, respectively, indicating a range of 111%. For the MINWAGE variable, the mean is 1.36%, with maximum and minimum values of 21.27% and 0%, respectively, indicating a range of 21.26%. The minimum value of MINWAGE is 0%, as the minimum wage does not decrease and only changes twice a year mostly rather than every month. For instance, as the minimum wage changes every six months, this six-month minimum wage is the same for every month, which makes the percentage change according to the previous month's 0%. The ELEC variable has a mean of 0.77%, with maximum and minimum values of 21.27% and -15%, respectively, indicating a range of 36.27%. Similarly, the EXC variable has a mean of 2.27%, with maximum and minimum values of 28.56% and -8.29%, respectively, indicating a range of 36.85%. Overall, the variables INF, MS, INFTR, MINWAGE, ELEC, and EXC have a narrow range of values below 40%, whereas the GVTEXP, IRTR, and IMP variables have a broad range above 100%.

The standard deviation values of our data vary by each variable. The S.D values of variables INF, MS, INFTR, MINWAGE, ELEC, and EXC are below 6, indicating that these data have the most negligible variation, which also explains the narrow range of these data. On the other hand, the variables GVTEXP, IRTR and IMP have S.D values above 10, such as 48.15, 15.43 and 19.65, respectively, indicating that their data are furthest from their mean value on average. A high S.D value also explains the wide range of these variables.

Jarque-Berra test shows the normality assumption of each variable as the probability value of each variable is 0% except the IMP variable. It has been found that not all variables are normally distributed except for the IMP variable. Based on this, we reject the null hypothesis that all variables are normally distributed. However, the probability value of the IMP variable is 14%, which means we cannot deny the null hypothesis for this variable. Therefore, the IMP variable is normally distributed.

3.5 Model and Analysis

In the beginning, the unit root test is performed to check whether variables are stationary or not for the time series study. If variables have mixed order of integration, the ARDL method is used where the F-bound test, stability tests, long run and short run are performed inside.

Empirical Model;

$INF_t = \beta_1 MS_t + \beta_2 GVTEXP_t + \beta_3 IRTR_t + \beta_4 INFTR_t + \beta_5 IMP_t + \beta_6 MINWAGE_t + \beta_7 ELEC_t + \beta_8 EXC_t + \in_t$ (1)

The coefficients of the variables are represented by β_1, β_2, β_3, β_4, β_5, β_6, β_7, and β_8.

3.5.1 The Unit Root Test

The stationarity of the series should be examined to prevent spurious regression problems during model estimation. Dickey, D. A., & Fuller, W. A. (1981) created three models by incorporating the estimated coefficients of the independent variable into the model: a model without a constant, another with constant, and one with a constant and trend. When the null hypothesis cannot be rejected, it indicates a non-stationary series with a unit root. Conversely, rejection of the null hypothesis confirms that the series is stationary and lacks a unit root, ultimately resulting in acceptance of the alternative hypothesis. The study by Phillips, P. C., & Perron, P. (1988) used a nonparametric addition to the model that included correcting error terms to address the covariance and randomness of error terms. The PP Unit Root Test uses the same critical values as the ADF Unit Root Test and the same hypothesis is tested. The series is stationary when the null hypothesis is not accepted, while the series is not stationary when the alternate hypothesis is rejected. The null hypothesis is defined as the series has a unit root. Hence the alternate hypothesis is defined as the series is stationary.

3.5.2 The ARDL Analysis

Ghatak & Siddiki (2001) states that While the Johansen cointegration techniques require larger samples for the results to be valid, The ARDL method should be recognized as a precious technique for identifying long-term connections between variables under study. It is founded on cointegration and is widely regarded as a ground breaking approach. Adequate estimations are highly available for small-sized sample models. Variables in the system do not have to be equally integrated when using the ARDL technique; the series might be I (0) or I (1). Adequate estimations can be produced even for interval variables and small sample sizes. The ARDL

technique also permits varied lag lengths for the variables, and short- and long-term estimations can be performed using a single simplified equation. Since the ARDL limits test approach employs an unrestricted error correction model, it has more robust statistical qualities than the Engle-Granger method. Three steps make up the ARDL strategy. The first phase examines the variables' long-term relationships. The following stages involve the estimation of the long and short-term elasticity, respectively, if there is a cointegration relationship between the variables (Narayan & Smyth, 2006).

The ARDL model has several benefits. It can detect long-term equilibrium relationships (like cointegration tests) and provide long-term coefficients (like VECM, DOLS, FMOLS, and CCR techniques). Additionally, the ARDL model permits various variables to have different lags and performs well with small samples (Pesaran & Shin, 1998; Haug, 2002). Equation 2 displays the standard ARDL bounds test method, as Pesaran et al. (2001) recommended.

$$\Delta INF_t = \alpha_0 + \sum_{i=1}^{m} b_i \Delta INF_{t-i} + \sum_{i=0}^{n} c_i \Delta MS + \sum_{i=0}^{o} d_i \Delta GVTEXP_{t-i} +$$

$$\sum_{i=0}^{p} e_i \Delta IRTR_{t-i} + \sum_{i=0}^{q} f_i \Delta INFTR_{t-i} + \sum_{i=0}^{r} g_i \Delta IMP_{t-i} +$$

$$\sum_{i=0}^{s} h_i \Delta MINWAGE_{t-i} + \sum_{i=0}^{t} i_i \Delta ELEC_{t-i} + \sum_{i=0}^{u} j_i \Delta EXC_{t-i} + \lambda_1 INF_{t-1} +$$

$$\lambda_2 MS_{t-i} + \lambda_3 GVTEXP_{t-i} + \lambda_4 IRTR_{t-i} + \lambda_5 INFTR_{t-i} + \lambda_6 IMP_{t-i} +$$

$$\lambda_7 MINWAGE_{t-i} + \lambda_8 ELEC_{t-i} + \lambda_9 EXC_{t-i} + \varepsilon_t \qquad (2)$$

Where Δ, α_0, t and ε_t respectively show the difference operator, the constant term, the time, and the stochastic error term. The $b_i \dots j_i$ are the long-run coefficients, while $\lambda_1 \dots \lambda_9$ are the short-run coefficients.

Chapter 4

EMPIRICAL RESULTS

In In this chapter, firstly, the unit root test results of the research data will be presented. Then the chapter will continue with the F- bound test result, the diagnostics and stability test results, and the long-run model and short-run error correction model outcomes through the ARDL approach. The estimation results of the long-run and short-run models will be discussed according to the previous literature.

The study's period spans from February 2015 through December 2021. The study's key objective identifies the root reasons for inflation in Northern Cyprus. Data for the study was acquired from the Central Bank of Turkiye and the number of institutions in Northern Cyprus.

4.1 Unit Root Test Analysis

Table 6: Unit Root Test results. (ADF and PP Test)

Statistics.

(Level Form)	INF	MS	IMP	GVTEXP	IRTR	MINWAGE	ELEC	EXC	INFTR
τT (ADF)	-2.37	-8.13*	-9.20*	-3.99*	-8.96*	-2.15	-80.61*	-5.17*	-2.32
τμ(ADF)	-2.02	-7.93*	-9.19*	-3.82*	-9.00*	-1.55	-80.67*	-5.04*	-1,75
τT (PP)	-2.58	-8.10*	-20.86*	-18.90*	-8.96*	-10.07*	-80.61*	-3.11	-2.32
τμ(PP)	-2.20	-7.86*	-19.25*	-18.81*	-9.00*	-11.45*	-80.67*	-3.07*	-2.06

Statistics.

(First Difference)	INF	MS	IMP	GVTEXP	IRTR	MINWAGE	ELEC	EXC	INFTR
τT (ADF)	-7,66*	-14.61*	-9.65*	-8.51*	-8.57*	-10.43*	-16.45*	-8.83*	-6.66*
τμ(ADF)	-7.57*	-14.70*	-9.72*	-8.62*	-8.62*	-10.53*	-16.54*	-8.73*	-6.51*
τT (PP)	-7.24*	-31.27*	-66.40*	-36.18*	-80.20*	-88.07*	-57.78*	-8.84*	-6.71*
τμ(PP)	-7.20*	-29.11*	-64.42*	-36.11*	-77.39*	-80.71*	-49.75*	-8.53*	-6.61*

Note: ADF is the Augmented-Dickey Fuller unit root test and PP is Phillips–Perron Unit root test. The Trend and intercept model is defined as τT. While τμ is the model with the intercept and without the trend.*, **, *** signs show that the null hypothesis is rejected at 1%, 5%, 10% significance levels, respectively.

For INF, INFTR variables, ADF, and PP tests indicate that variables have unit roots on level forms; we cannot reject the null hypothesis at a 1%, 5%, or 10% level of significance. According to ADF and PP tests, these variables are stationary at the first difference level, as the Null hypothesis is rejected at a 1% significance level. MINWAGE variable has a unit root according to the ADF test of trend and intercept and intercepts only model. The PP test indicates the MINWAGE variable is stationary at level, thus able to reject the null hypothesis of the variable having unit root at 1 % level of significance. Moreover, the ADF and the PP test results display MINWAGE variable is stationary at all conditions on the first difference part, as we can reject the null hypothesis. For the variable EXC, The ADF test shows we can reject the null hypothesis at both levels and the first difference form at a 1 % significance level. The PP test result for the variable EXC displays that we cannot reject the null hypothesis for the trend and intercept model of level form, except for this model, we can reject the null hypothesis on the remaining level form models and all the first difference models. For the variables MINWAGE and EXC, most of the test results confirmed that they are stationary at first difference. To conclude, INF, INFTR, MINWAGE, and EXC variables have an integration order of 1 as all possess unit roots at the level and achieve stationarity following the first difference. The majority rule determines the order of integration of each variable.

For MS, IMP, GVTEXP, IRTR, and ELEC variables, The ADF and PP test indicates that we can reject the null hypothesis that shows that mean variables have a unit root on the level form. Moreover, this shows that our variables are stationary at the level in all models. Further, in detail, the rejection null hypothesis of the variables is at 1%. MS, IMP, GVTEXP, IRTR, and ELEC variables are stationary at the first

difference on all models, according to the ADF and PP test results in Table 1. Overall, the test result for our five variables mentioned in this paragraph shows that we have zero order of integration. The majority rule determines the order of integration of each variable. According to our rule MS, IMP, GVTEXP, IRTR, and ELEC variables are integrated in order of zero (I (0)).

In general, our variables have mix order of integration I (0) and I (1). We, therefore, continue our process with the ARDL Model.

4.2 Bounds Test

The bound test determines whether variables have a long-term relationship. Specifically, it is employed in the ARDL model to assess the importance of lagged levels and differences of variables, enabling the estimation of a long-term level relationship when dealing with stationary and non-stationary variables.

Table 7: Bounds Test for the level of relationship

F- Statistic Value	Level of Significant	I(0)	I(1)	Conclusion
	10%	1.95	3.06	H0 Rejected
	5%	2.22	3.39	H0 Rejected
15.165418	1%	2.79	4.1	H0 Rejected

Note: Null Hypothesis: No levels relationship, Asymptotic: n=1000

The bound test is applied in this thesis according to the ARDL approach for analysing the level of equilibrium relationship between the dependent and explanatory variables with a blended order of integration. Table 7 above displays the outcome of the boundary test. The F-stat value of the F-bound test is 15.17, above the upper bound value of all level significance. Hence, this indicates a long-run relationship between the dependent variable inflation and its explanatory variables, as the null hypothesis is not accepted. Next, the goodness of fit of the model is required to be inspected by various diagnostics, such as normality, heteroskesdacity, autocorrelation, and stability tests, before we continue to represent the estimation of long-run and short-run coefficients of our model under the ARDL approach.

4.3 Diagnostic and Stability Tests

Table 8: The Results of the Diagnostic Test

Test Statistic	F-Version	Probability Value
Serial Correlation(LM Test)	0.115	0.891
Normality	2.179 (Jarque-Bera)	0.336
Heteroskedasticity (Harvey)	0.696	0.801
Ramsey RESET Test	0.746	0.391

Note: The straight lines represent critical bounds at 5% significance level

Figure 1: CUSUM Stability Test Results

Note: The straight lines represent critical bounds at 5% significance level
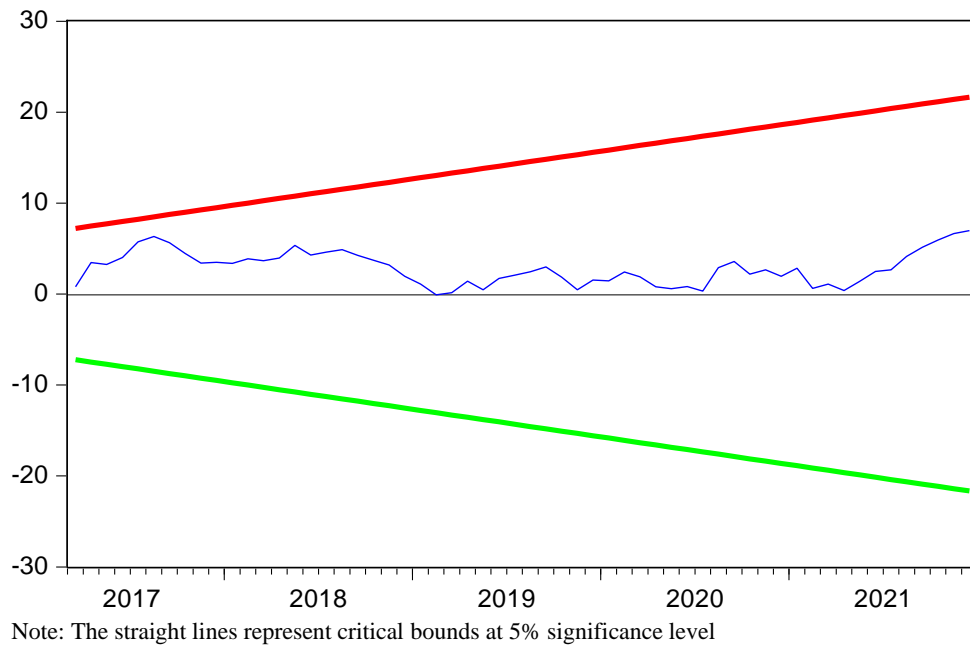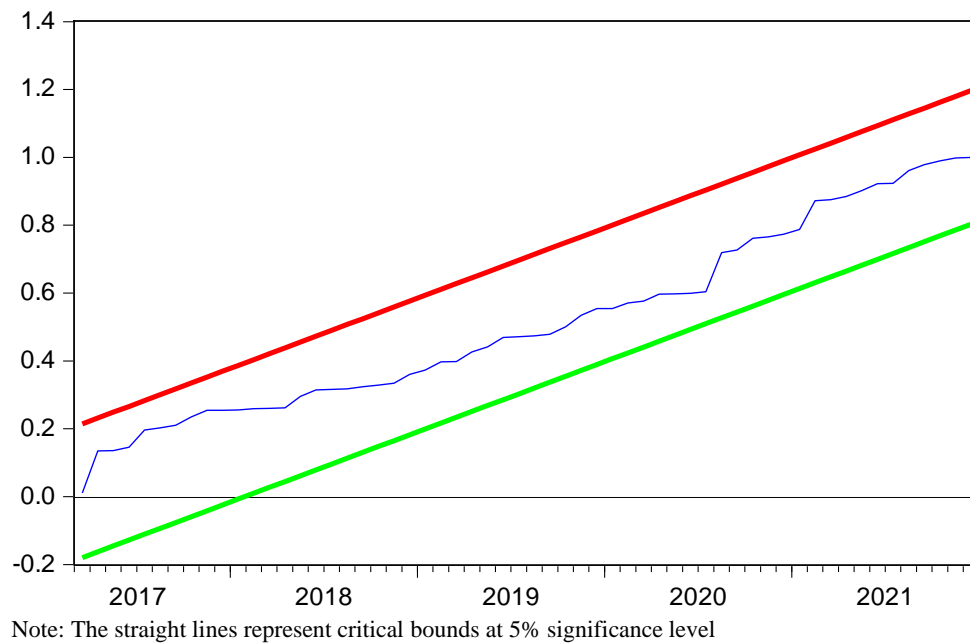
Figure 2: CUSUMSQ Stability Test Results

Table 8, Figure 1, and Figure 2 are tools to verify the model's validity. CUSUM and CUSUMSQ Tests are essential to check the model's stability. Table 8 indicates the results of the diagnostics tests. Serial correlation, normality, heteroskedasticity and

Ramsey reset tests are reported in the diagnostics test. Serial correlation test results indicate that we failed to reject the Null hypothesis. So there is no autocorrelation. Normality test results show that we fail to reject the null hypothesis, so the model is normally distributed. The heteroskedasticity test result displays that we failed to reject the null hypothesis, and there is no heteroskedasticity. The Ramsey reset test results indicates that there is no model specification error. All four diagnostic test results justify that the ARDL approach in this thesis is reliable and valid. Also, the outcomes of the CUSUM test are demonstrated in Figure 1, and Figure 2 displays the outcomes of the CUSUMSQ test in the model. The crucial straight lines in Figures 1 and 2 are the two lines in the top and bottom directions where at a significance value of 5%, the straight lines reflect critical bounds. The statistical value of CUSUM and CUSUMSQ is shown by the middle line in both figures, where the statistic's value falls inside the crucial range, which is between the inside of the upper red and the lower green straight line. These results suggest that the ARDL model used in this work is long- and short-term stable.

4.4 The Long-Run Analysis

Table 9 displays the long-run level of coefficients from the ARDL approach.

Table 9: The Level of Coefficients from the ARDL approach in the Long-Run Model

Dependent Variable: INF			
Regressors	Coefficient	t-Statistic	Prob.
MS	0.0154	0.393	0.695
GVTEXP	-0.0294*	-2.77	0.007
IRTR	0.0052	0.436	0.665
INFTR	0.938*	4.836	0.000
IMP	-0.0052	-0.849	0.399
MINWAGE	0.0702***	1.967	0.054
ELEC	0.0986*	3.911	0.000

EXC	0.1322*	3.290	0.002

*, **, *** signs show the null hypothesis is rejected at 1%,5%,10% statistical significance levels, respectively. The null hypothesis: The coefficient is statistically not significant. The alternate hypothesis: The coefficient is statistically significant.

According to the model, the variables MS, IRTR, and IMP are statistically insignificant, which means they do not have any impact in the long term. According to 3 different research done by Abradu-Otoo, (2003), Al-Jafari, & Altaee, (2019), and Lim, & Sek, (2015); Money supply had a significant effect on inflation rates in the long term. Northern Cyprus Central Bank aims to provide financial stability by acting as a supervision and regulation institute; as the economy of Northern Cyprus operates within the Lira zone with Turkey, and the Turkish Lira (TL) is the legal tender in the region (İsmihan, Besim, & Sertoğlu, 2019). The Northern Cyprus Central Bank cannot set monetary policy. As a result, the Northern Cyprus Central Bank case cannot be analysed on this basis since defenders of central bank independence claim that there is an inverse link between inflation and central bank independence. Instead of the monetary policy used by the Northern Cyprus Central Bank, Turkiye's inflation mainly determines inflation for TRNC (Şafakli, & Özdeşer, 2011). The inflation of Türkiye indirectly reflects the role of the money supply in Northern Cyprus.

On the other hand, the variables GVTEXP, INFTR, ELEC, and EXC are statistically significant at the 1% level, while the variable MINWAGE is also significant except at the 10% level. Additionally, the data suggest that GVTEXP significantly and negatively impacts the dependent variable INF. Specifically, a 10 percentage point increase in GVTEXP will result in a minimal decrease of only 0.29 percentage points in the INF. Government Expenditure can have a beneficial effect on reducing the inflationary pressure in Northern Cyprus by providing subsidies and support to the

local business. Local business can expand their production capacity and lower the cost of production, which can lead to lower prices for goods and services with the government's help. According to a study conducted by Lim, & Sek, (2015), their research findings demonstrate that government expenditure, when analysed in the context of high inflation countries, has a negative coefficient that exerts a significant influence on long-term inflation rates. The remaining significant coefficients have a positive impact on the dependent variable INF. Our research shows that the variable INFTR has a significant and positive impact, resulting in a remarkable 9.4 percentage point increase in INF with a 10 percentage point increase in INFTR. It is clear that Turkiye, as the primary trading partner of Northern Cyprus, is accountable for the inflation in the region.

In contrast, the independent variables MINWAGE, ELEC, and EXC significantly and positively influence the dependent variable. Especially, ceteris paribus, a 10 percentage point rise in MINWAGE, ELEC, and EXC will cause 0.7, 0.99, and 1.32 percentage point increase in INF, respectively. Studies done by Pahlavani, & Rahimi, (2009) and Mukhtarov, Mammadov, & Ahmadov, (2019) illustrate that exchange rates positively and significantly influence inflation. According to a recent study by Artam, Besim, and Gökmenoğlu (2021), there is a persistent impact of exchange rates on inflation in Northern Cyprus for four months in all six models analysed. The study uses monthly data from 2004 to 2020 and found a pass-through effect ranging from 20% to 28%. The models estimated that a 10 percentage increase in exchange rates in the TRNC results in a 2.0 to 2.8 percentage points rise in the CPI. The magnitude of the exchange rate is low compared to the previous study since inflation in Turkiye captures a portion of the effect of the exchange rate on inflation. As for

minimum wage, we can argue that Northern Cyprus is more of a service-based economy where the labour share in creating value added is relatively higher than the capital and other inputs. So an increase in the cost of labour significantly impacts the prices.

To sum up, the variables MS, IRTR, and IMP are insignificant; the variable GVTEXP has a significant and negative impact. The variables MINWAGE, ELEC, and EXC have a significant and positive influence, and finally, INFTR has a significant and positive impact on the dependent variable INF in the long run.

4.5 Error Correction Model

Table 10: The Results of the Error Correction Model

Dependent Variable: D(INF)(1, 0, 3, 2, 4, 0, 0, 0, 0)*

Regressors	Coefficient	Std. Error	t-Statistic	Prob.
C	0.12267	0.08448	1.45216	0.1517
D(GVTEXP)	-0.00081	0.00193	-0.41824	0.6773
D(GVTEXP(-1))	0.01423	0.00269	5.28154	0.0000
D(GVTEXP(-2))	0.00837	0.00191	4.39332	0.0000
D(IRTR)	-0.00382	0.00473	-0.80910	0.4217
D(IRTR(-1))	-0.01195	0.00471	-2.53540	0.0139
D(INFTR)	0.82601	0.06263	13.1882	0.0000
D(INFTR(-1))	-0.28137	0.09261	-3.03832	0.0035
D(INFTR(-2))	0.17601	0.08840	1.99105	0.0510
D(INFTR(-3))	-0.17457	0.09732	-1.79382	0.0779
CointEq(-1)*	-0.91184	0.07331	-12.4373	0.0000
R-squared	0.864899	Akaike info criterion		2.372459
Adjusted R-squared	0.845031	Schwarz criterion		2.702382
F-statistic	43.53266	Hannan-Quinn criter.		2.504637
Prob (F-statistic)	0.000000	Durbin-Watson stat		2.046580

The findings of the short-run error correction model of the ARDL approach are shown in Table 10. According to the model results, the error correction term (ECT)

is equal to -0.912. The error correction term denotes the adjustment rate necessary to return the dynamic model to equilibrium. By GVTEXP, IRTR, and INFTR, the model's ECT projected that ınflation converges to the long-run equilibrium level by 91.2%.

In the short term, inflation in Northern Cyprus is influenced by certain explanatory variables such as GVEXP, IRTR, and INFTR.

4.6 Sensitivity Analyses

The appendices section includes four different variations of the model. Each model uses different combinations of independent variables. Appendix A presents the F-bound test results, indicating that all four models have a long-run relationship between inflation, the dependent variable, and its explanatory variables.

Appendix B provides the long-run coefficient for each model, while Appendix C presents the error correction result.

The INFTR variable is significant in every model, including the original one, demonstrating that inflation in Turkey primarily explains inflation in Northern Cyprus. Additionally, the variable ELEC is significant in the models where it is utilized, indicating that electricity tariffs contribute to inflation in Northern Cyprus.

In Model 5, the exchange rate is statistically insignificant due to the INFTR variable. INFTR extensively captures the effect of the exchange rate in this model. In Model 2, independent variables MINWAGE, ELEC, INFTR, and MS are used, and results show that MS has a positive and significant effect on inflation rates in the long run. However, in Models 3 and 4, where the EXC variable is included, the impact of MS

on inflation rates becomes statistically insignificant, similar to the original model. This suggests that the EXC variable alters the relationship between MS and inflation, making it statistically insignificant.

Chapter 5

CONCLUSION

In recent years, inflation has become a macroeconomic problem not only in the developing economies but in most developed economies as well. Northern Cyprus, as a developing economy, has always faced inflation problems. Inflation has been one of the structural problems that the economy has faced for the last four decades. However, the problem of inflation has grown, especially in the last few years. In this respect, the goal of this study is to examine what factors have caused inflation over the past six years.

This study demonstrates that the government expenditures, inflation rates in Turkiye, the minimum wage, electricity prices, and exchange rates significantly influence the long-term inflation rates in Northern Cyprus.

According to the research findings, there is a significant and negative relationship over the long run between government expenditures and the inflation rate; with a 10 percentage point change in government expenditures, an adverse change in inflation of a minimal 0.294 percentage point occurs. The model reveals that the money supply variables, discount rates in Turkiye, and imports are not statistically significant, indicating that their coefficients have no long-term significance. In the long run, the variables minimum wage, electricity tariffs, and exchange rates all have a significant, favourable influence on inflation rates in Northern Cyprus. The

magnitude of minimum wage, electricity tariffs and exchange rates are 0.07, 0.099, and 0.13 percentage points, respectively, indicating a 10 percentage point increase in the minimum wage, electricity tariffs and exchange rates will cause 0.7, 0.99, and 1.32 percentage point increase in inflation rates in Northern Cyprus, respectively. Inflation rates in Turkiye affect the inflation in Northern Cyprus as well; a 10 percentage point increase in inflation rates in Turkiye will cause a 9.4 percentage point rise in the inflation rates of Northern Cyprus. The result shows that Turkiye's inflation rate is the most significant factor in determining Northern Cyprus's inflation rate. On the other hand, Turkiye's inflation rate, interest rates and government expenditure variables are also significant in the error correction model.

Overall, In the long run, the rise in the variables minimum wage, electricity costs, the inflation rate in Turkiye and exchange rates all caused an increase in inflation in Northern Cyprus, except for the expansion of the government expenditure. It is important to note that the coefficient of inflation rates in Turkiye is significantly higher than other explanatory variables and very close to 1. This indicates that Turkiye's inflation rate mainly determines Northern Cyprus's inflation.

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APPENDICES

Appendix A: Results of Bounds Test

Model 1:

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
F INF(MINWAGE, ELEC, INFTR, GVTEXP)	17.86650	10%	2.45	3.52
	4	5%	2.86	4.01
		1%	3.74	5.06

Model 2:

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
INF(ELEC, INFTR,MINWAGE, MS)	16.10737	10%	2.45	3.52
	4	5%	2.86	4.01
		1%	3.74	5.06

Model 3:

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
	11.719025	10%	2.26	3.35
F INF(MINWAGE, ELEC,INFTR,MS,EXC		5%	2.62	3.79
		1%	3.41	4.68

Model 4:

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
	12.899495	10%	2.26	3.35
F INF(GVTEXP, EXC, ELEC, MS, INFTR)				
		5%	2.62	3.79
		1%	3.41	4.68

NOTE: All models have successfully passed their diagnostics and stability test.

Appendix B: Results of the Level of Coefficients from the ARDL Approach in the Long-Run Model

Model 1:

Dependent Variable: INF				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
MINWAGE	0.035651	0.031160	1.144135	0.2568
ELEC	0.180062	0.028482	6.322056	0.0000
INFTR	1.100717	0.172251	6.390205	0.0000
GVTEXP	-0.037551	0.009623	-3.902109	0.0002

Model 2:

Dependent Variable: INF				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ELEC	0.092392	0.027189	3.398151	0.0012
INFTR	0.914444	0.210715	4.339725	0.0001
MINWAGE	-0.020254	0.030197	-0.670726	0.5047
MS	0.374282	0.106026	3.530087	0.0008

Model 3:

Dependent Variable: INF				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
MINWAGE	0.114801	0.094946	1.209117	0.2316
ELEC	0.085928	0.027302	3.147327	0.0026
INFTR	0.656459	0.132245	4.963945	0.0000
MS	0.054057	0.177612	0.304356	0.7620
EXC	0.199867	0.099000	2.018852	0.0482

Model 4:

Dependent Variable: INF

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GVTEXP	-0.018581	0.010418	-1.783569	0.0800
EXC	0.149633	0.095813	1.561714	0.1241
ELEC	0.099408	0.026096	3.809292	0.0004
MS	-0.040289	0.163995	-0.245669	0.8069
INFTR	1.064011	0.276524	3.847804	0.0003

Appendix C: Results of Error Correction Model

Model 1:
Dependent Variable: D(INF)
Selected Model: ARDL(1, 0, 1, 4, 3)
Included observations: 79

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.298863	0.101955	2.931329	0.0047
D(ELEC)	12.67590	1.628424	7.784154	0.0000
D(INFTR)	1.270697	0.082178	15.46278	0.0000
D(INFTR(-1))	-0.397568	0.107393	-3.702007	0.0004
D(INFTR(-2))	0.140923	0.103282	1.364454	0.1771
D(INFTR(-3))	-0.292862	0.112191	-2.610379	0.0112
D(GVTEXP)	-0.608490	0.227426	-2.675545	0.0094
D(GVTEXP(-1))	1.920339	0.351678	5.460511	0.0000
D(GVTEXP(-2))	1.000101	0.224345	4.457868	0.0000
CointEq(-1)*	-1.099184	0.112875	-9.738063	0.0000
R-squared	0.813484	Mean dependent var		0.171392
Adjusted R-squared	0.789156	S.D. dependent var		1.887562
S.E. of regression	0.866726	Akaike info criterion		2.669635
Sum squared resid	51.83373	Schwarz criterion		2.969565
Log likelihood	-95.45058	Hannan-Quinn criter.		2.789796
F-statistic	33.43799	Durbin-Watson stat		2.066135
Prob(F-statistic)	0.000000			

Model 2:
ARDL Error Correction Regression
Dependent Variable: D(INF)
Selected Model: ARDL(1, 0, 0, 4, 3)
Included observations: 79

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.389340	0.108342	-3.593636	0.0006
D(INFTR)	0.803918	0.093153	8.630058	0.0000
D(INFTR(-1))	-0.329852	0.127381	-2.589491	0.0118
D(INFTR(-2))	-0.043960	0.107445	-0.409140	0.6838
D(INFTR(-3))	-0.245580	0.113161	-2.170175	0.0336
D(MS)	9.970773	2.622491	3.802024	0.0003
D(MS(-1))	-9.801153	4.934061	-1.986427	0.0511
D(MS(-2))	-7.113118	3.654731	-1.946277	0.0559
CointEq(-1)*	-0.926789	0.100278	-9.242180	0.0000
R-squared	0.806158	Mean dependent var		0.171392
Adjusted R-squared	0.784004	S.D. dependent var		1.887562
S.E. of regression	0.877251	Akaike info criterion		2.682848
Sum squared resid	53.86986	Schwarz criterion		2.952786
Log likelihood	-96.97251	Hannan-Quinn criter.		2.790994
F-statistic	36.38975	Durbin-Watson stat		2.066026
Prob(F-statistic)	0.000000			

Model 3:
ARDL Error Correction Regression
Dependent Variable: D(INF)
Selected Model: ARDL(1, 5, 0, 0, 4, 5)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.061899	0.090503	-0.683946	0.4968
D(MINWAGE)	-1.774005	1.912137	-0.927761	0.3574
D(MINWAGE(-1))	-5.800715	2.540145	-2.283615	0.0261
D(MINWAGE(-2))	-7.074219	2.550319	-2.773857	0.0075
D(MINWAGE(-3))	-6.671904	2.382638	-2.800217	0.0070
D(MINWAGE(-4))	-6.845170	1.915453	-3.573655	0.0007
D(MS)	0.167005	3.317758	0.050337	0.9600
D(MS(-1))	0.692633	6.282249	0.110252	0.9126
D(MS(-2))	10.85091	7.108254	1.526522	0.1324
D(MS(-3))	17.29742	5.173666	3.343359	0.0015
D(EXC)	15.49975	3.467440	4.470085	0.0000
D(EXC(-1))	-6.085561	4.508769	-1.349717	0.1824
D(EXC(-2))	-10.56459	4.571570	-2.310933	0.0245
D(EXC(-3))	-4.029910	2.722022	-1.480484	0.1443
D(EXC(-4))	4.208795	2.503259	1.681326	0.0982
CointEq(-1)*	-0.868551	0.099315	-8.745399	0.0000

R-squared	0.861621	Mean dependent var		0.188718
Adjusted R-squared	0.828142	S.D. dependent var		1.893446
S.E. of regression	0.784942	Akaike info criterion		2.534269
Sum squared resid	38.20033	Schwarz criterion		3.017696
Log likelihood	-82.83649	Hannan-Quinn criter.		2.727794
F-statistic	25.73630	Durbin-Watson stat		1.951115
Prob(F-statistic)	0.000000			

Model 4 :
ARDL Error Correction Regression
Dependent Variable: D(INF)
Selected Model: ARDL(1, 3, 5, 0, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.075787	0.088857	0.852903	0.3974
D(GVTEXP)	-0.254953	0.227747	-1.119458	0.2678
D(GVTEXP(-1))	0.791860	0.290415	2.726647	0.0086
D(GVTEXP(-2))	0.717180	0.215612	3.326257	0.0016
D(EXC)	11.66311	3.791584	3.076051	0.0033
D(EXC(-1))	-1.821359	4.239100	-0.429657	0.6691
D(EXC(-2))	-9.413039	4.478545	-2.101807	0.0402
D(EXC(-3))	0.334388	3.357941	0.099581	0.9210
D(EXC(-4))	5.677061	2.624120	2.163415	0.0349
D(MS)	-0.119255	3.722506	-0.032036	0.9746
D(MS(-1))	2.404407	6.443120	0.373174	0.7105
D(MS(-2))	15.23365	7.498406	2.031585	0.0470
D(MS(-3))	16.29585	5.127848	3.177913	0.0024
D(INFTR)	0.878514	0.120839	7.270114	0.0000
D(INFTR(-1))	-0.522342	0.146053	-3.576383	0.0007
D(INFTR(-2))	0.008058	0.140883	0.057199	0.9546
D(INFTR(-3))	-0.364293	0.142596	-2.554730	0.0134
CointEq(-1)*	-0.943291	0.102657	-9.188743	0.0000

R-squared	0.870754	Mean dependent var		0.188718

Adjusted R-squared	0.834135	S.D. dependent var	1.893446
S.E. of regression	0.771135	Akaike info criterion	2.517269
Sum squared resid	35.67900	Schwarz criterion	3.061125
Log likelihood	-80.17349	Hannan-Quinn criter.	2.734984
F-statistic	23.77837	Durbin-Watson stat	1.972559
Prob(F-statistic)	0.000000		