



Does Inflation Affect Economic Growth? A case of Turkey and U.S

Mehmet Çanakci*

TOBB-ETU Visiting Academic, Faculty of Economics and Administrative Sciences, Public Finance, Inonu University, Turkey.

*Email: mehmet.canakci@inonu.edu.tr

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ABSTRACT

Understanding the interaction between growth and inflation is at the top of the macroeconomic problems. Whether inflation has an impact on growth has been debated for many years in economics literature. The content of these discussions has changed depending on the period of the world economy. For this reason, indicators such as inflation, fixed capital formation, and labor force values are among the basic indicators affecting the economic growth rate of a country. Therefore, this research aims to examine the effects of inflation on economic growth in the US and Turkey for period from 1990 to 2019, Gross domestic product is a dependent variable as a proxy of growth and development and consumer price index is an independent variable as a proxy of inflation. The results from empirical analysis show that inflation does not have a significant effect on GDP in the long run for both countries, but is effective in the short run. The results of this study can provide an estimate of how effective the inflation factor of developed or developing countries can be.

Keywords: Inflation, Gross Domestic Product, Cobb Douglas Production Function, ARDL

JEL Classifications: E31, E01, O47, E23

1. INTRODUCTION

After the Second World War, Keynesian policies came to the fore both in developed and developing countries, and as a result of policies that increased total demand, there was an increase in production as well as an increase in inflation. In this period, inflation was not perceived as a problem, and even theses about the positive effect of inflation on economic growth came up. However, while the high inflation rates continued in many countries in the 1970s, the thesis that inflation had a positive effect on growth began to be discussed as the growth rates started to decrease. High or hyperinflation in the 1980s, especially in Latin American countries, increased instability in these economies and negatively affected the development of the countries. These developments led to the emergence and strengthening of the thesis that inflation negatively affected growth.

In many states around the today's world, considerable and stable economic growth plus low inflation in the value of things are the main objectives of a state's economic policy. Inflation means that there is either a growth in the constant supply of money or, in simpler terms, the prices. Gross domestic product (GDP) represents the overall income from the economy of a state. It is essential to remember that the GDP figures, as described and explained to investors, are already fluctuated and adjusted just in case of inflation. If one were to elaborate, if the overall GDP of a state was determined to be 6% more than last year, but the overall inflation in this period was pointed out to be 2%, GDP growth as a whole will be determined as 4%—or overall growth over this period (Gokal and Hanif, 2004).

A commonly embraced thought in macroeconomics is that in order to have an increased growth over time, low inflation is essential. Although the main argument about the precision of the connection

between these two factors of inflation and growth persists to this day, the ambiguity concerning this link's validity and reality has been a matter of constant thought and interest (Munir and Mansur, 2009). Different schools of thought offer additional evidence on the link between inflation and economic growth. For instance, structuralists believe that inflation is necessary for economic growth, but according to monetarists' view, inflation is harmful to economic growth (Mallik and Chowdhury, 2001).

Advancements in commodity, service, and financial business sectors require that the nations see the world as a worldwide market by the nations. The nations that assess this cycle of globalization could improve their expectations for everyday comforts financially and socially. Quick changes in science and innovation, simple admittance to data, and endeavors to expand capital profitability essentially structure the premise of globalization. These improvements influence the nations in financial, social, and social regions and offer new open doors for expanding the general public's government assistance. Other than this, these advancements convey a few perils with them. One of the main perils being referred to is the deteriorating global and public conveyance of pay with the expanding vulnerability in monetary business sectors (Setterfield, 2016).

Alongside the speeding up in the globalization cycle, the slacks in the reception of worldwide standards (legitimate and institutional) and macroeconomic imbalance characteristics bring about the expansion in the delicacy against the worldwide emergencies. To profit by the open doors uncovered with globalization and to wipe out the negative impacts of globalization, macroeconomic unsteadiness variables should be eliminated, and underlying changes that lead to productive use of assets should be figured out. Notwithstanding those measures, social strategies towards low-pay people would eliminate the general public's uneven characters and reinforce social harmony and improvement.

After 1980, Turkey has applied and improved the conditions for turning into an open market economy. During this period, foreign trade was not bound by limitations; export arranged industrialization strategy was received, and pivotal advances were taken to rebuild and improve the monetary business sectors. In 1989, the advancement of worldwide capital developments was the correlative side of the globalization cycle. Inside the structure of rebuilding of public area, privatization endeavors quickened. In any case, the insecure world of politics postponed the cycle of progress and caused different macroeconomic and primary issues. The main issues being referred to are; persistent high inflation, absence of interest in assembling industry, slow improvement of profitability level because of non-materialization of changes that would upgrade severe climate, the tension on monetary business sectors because of the lopsided characteristics in the public account and expanding actual loan costs (Setterfield, 2016).

Over the most recent 30 years, inflation has generally been low in the US economy, with the Consumer Price Index commonly rising 2% to 4% every year. If we look back over the twentieth century, there have been a few periods where inflation caused the value level to increase at twofold digit rates. However, nothing

has approached hyperinflation—an upheaval of high inflation that is frequently observed when economies move from a controlled economy to a market-arranged economy (Hellerstein, 1997).

Americans are most worried that inflation may bring down their way of life - which their salaries will not stay aware of the ascent in costs. This uneasiness is especially articulated for retired people, uncomfortable with inflation acclimations to their annuities and monetary ventures. To anticipate retirement requires shaping desires for costs later on. Inflation makes this more troublesome because even a progression of little, unforeseen expansions in the overall value level can essentially dissolve the genuine (changed for inflation) estimation of reserve funds over the long run. Shiller finds that stress over inflation's costs increments drastically as people close to retirement age. Americans conceived previously or after 1940 contrast more in their assessment of inflation's belongings than do the US and German populaces in general (Hellerstein, 1997).

Different studies have investigated the influence of different macroeconomic variables on the economic growth of different countries. Some of these studies investigated the influence of GDP, money circulating in the economy, unemployment rate, and other related factors on the economic growth of different countries. Very limited studies have investigated the influence of inflation on the economic growth of different countries. It is mostly because of the fact that inflation data is mostly available on monthly basis. Macroeconomic variables like exchange rate data are available on daily basis and daily data frequency is considered to be more reliable for having generalized and better results as compared to monthly data availability. Due to limited time and resources, it was not possible to increase the timeline of this study. It is highly recommended for future researchers that they should increase the timeline of such relevant studies in order to investigate the influence of inflation on economic growth specifically in Turkey and the United States in order to generalized results in a proper manner.

This study can be considered important because it is contributing positively to the relevant literature gap in the United States and Turkey. The study is relevant because it is providing important information to policy makers on the relationship between inflation and economic growth in Turkey and the United States. The study is responsible for contributing positively to academic literature related to inflation and economic growth relationship. Different studies have been conducted in a pass in order to investigate the correlation prevailing between these two macroeconomic variables and the influence of one variable on another variable.

It is important for any government to have control over inflation in order to have progressive economic growth. This study will help to contribute positively towards information related to the correlation prevailing between inflation and economic growth in Turkey and the United States of America (USA). This will help the policymakers in these two countries to formulate appropriate and relevant monetary policies in order to control inflation accordingly to have a positive influence on economic growth in respective countries. In order to make sure that inflation is not exceeding a

dangerous level, it is important that appropriate monetary policy tools should be utilized and implemented accordingly. One of the most important and primary fiscal objectives of any type of government is to have control over the inflation prevailing in the economy. That is why this study can be considered as significantly contributing to the literature and relevant research gap.

Thus, this paper aims to empirically analyze the impact of inflation on the development and growth of two countries separately i.e. the U.S. and Turkey.

This paper is structured as follows: Section II presents the literature review. Section III presents the information and methodology utilized. Results and investigation are presented in Section IV. The last section draws an overall discussion and conclusion.

2. LITERATURE REVIEW

Past work, both hypothetical and observational, is divided concerning their view on the inflation-growth relationship. The acquired results show that the connection between inflation and monetary growth is not steady.

Mundell (1963) and Tobin (1965) clarified the effect of inflation on monetary growth dependent on the neoclassical growth hypothesis. They contend that an expansion in the ostensible loan cost brought about by inflation makes speculation more best than utilization. This way will cause an expansion in the amassing of capital, which will prompt financial growth. This is the notable Mundell-Tobin Effect. Sidrauski (1967) built up a hypothetical model by examining the connection between inflation and monetary growth. His model cash is super-impartial, implying that the pace of cash growth has no genuine impact on the consistent state. In any case, his resulting hypothetical investigation shows that in most broad cases, consistent state supply of capital will be decreased because of inflation. Stockman (1981) built up a drawn out balance growth model with the suspicion of “money ahead of time limitation.” His hypothesis is despite the finish of the Mundell Tobin Effect.

In the model of Stockman (1981), venture and genuine cash adjust are supplements; however, in the model of Mundell (1963) and Tobin (1965), those two factors are substitutes. As per this hypothesis, people will later get the degree of profitability as cash. In this way, speculation and genuine cash will be diminished by inflation. Therefore, inflation will contrarily influence financial growth. Then again, the more significant part of the experimental investigations directed in the 1990s likewise found a negative connection between inflation and monetary growth. Expressly, Gregorio (1999) contemplated 12 Latin American nations utilizing information from 1950 to 1985. By Generalized Least Squares (GLS), he found a negative connection between inflation and growth.

Robert and Zhu (1995) examined the impacts of inflation on financial growth by utilizing board information for around 100 nations from 1960-1990. From the observational investigation, he found that the assessed effect of inflation on monetary growth is significantly negative. In any case, the author got factually critical

outcomes just when high inflation information was remembered for the example. He assessed that a 10 percent rate increment in the average inflation every year lessens the per capita GDP growth rate by 0.2-0.3 percent. Further, Sarel (1996) considered the chance of a nonlinear effect of inflation on monetary growth. He utilized board information covering 87 nations for the time of 1970-1990. His discoveries show a huge underlying break in the capacity that relates growth to inflation. As indicated by his outcomes, the assessed primary break happens when the inflation rate is around 8 percent. Beneath this rate, he found that inflation does not appear to affect financial growth significantly.

Sarel (1996) likewise found that inflation surpassing 8 percent diminishes the monetary growth rate. Paul et al. (1997) considered the inflation-growth relationship for 70 nations from 1960-1989. Their discoveries show no causal connection between inflation and monetary growth in 40% of the nations. Therefore, in 20% of the nations, they revealed bidirectional causality, and in the remainder of the nations, they found a unidirectional relationship, which is either inflation to growth or the other way around.

Erbaykal and Okuyan (2008) inspected the inflation and monetary growth relationship in Turkey. To examine the since quite a while ago run connection between the factors, they applied the Bonds test system created by Pesaran et al. (2001). They did not discover a factually huge relationship since a while ago, yet they found a measurably critical short-run connection between inflation and monetary growth.

Baharumshah et al. (2016) investigated the connection between inflation, vulnerability, and financial growth in a board of 94 arising and non-industrial nations. Given the framework—summed up technique for minutes (GMM), they found an inflation limit past inflation and yield growth have adversely corresponded. The negative impact of inflation on financial growth is felt, particularly at exorbitantly significant levels of inflation. The exact outcomes uphold the selection of approaches designed to accomplish lower inflation rates in the IT money-related system. Aydın et al. (2016) likewise researched the part of inflation limit level in the connection between inflation and financial growth for 224 developing business sector nations during 1980-2013. Discoveries demonstrated that inflation has a measurably high and negative impact on monetary growth over the limit level.

Tatliyer (2017) dissected the connection between inflation and monetary growth in the Turkish economy from 1950 to 2015. Exact discoveries demonstrate that higher moderate inflation can go with higher monetary growth. Consequently, it is inferred that there is no negative connection between monetary growth and moderate inflation. To summarize, it appears to be that there is no agreement on the idea of a connection between inflation and monetary growth in Turkey, similarly to the consequences of the investigations zeroing in on other nations' encounters on the planet.

Different relevant studies have been conducted in past. One of the studies conducted in past and best gated the influence of inflation rate on GDP growth of European countries. The study simply utilized the linear regression analysis technique in order

to investigate the formulated objectives. The study included the inflation rate as an independent variable and the GDP of different selected European countries was selected as a dependent variable. Results of the study clearly suggested that the inflation rate is responsible for having a significant influence on economic growth. Results of the study further suggested that inflation is responsible for having a positive association and influence with the economic growth rate prevailing in European countries. This positive relationship between inflation rate and GDP suggests that an increase in the level of inflation is responsible for an increase in the level of growth rate and vice-versa (Kryeziu and Durguti, 2019).

A relevant study was conducted in past investigating the influence of inflation on the economic growth of Tanzania. The study simply applied the co-integration technique as well as the correlation efficient technique in order to investigate the relationship prevailing between inflation and economic growth in Tanzania. The study collected extensive data from 1990 till 2011. Results of the study clearly suggested that inflation is responsible for having a negative influence on economic growth in Tanzania. This clearly suggests that an increase in the level of inflation is responsible for decreasing the economic growth of Tanzania and vice-versa. Results of the study also suggested that there was no correlation prevailing between inflation and economic growth during the selected time. Results also suggested that there is no long-run correlation prevailing between inflation and economic growth in Tanzania (Kasidi and Mwanemela, 2016).

One of the similar studies conducted in past investigated the influence of inflation rate on economic growth in Africa. The study simply applied the regression analysis technique in order to investigate the formulated objective. Results of this study provided a piece of clear evidence that a low inflation rate is responsible for having a positive and significant influence on the economic growth of African countries and low-income countries. Results of the study further suggested that there prevails an inverse relationship between inflation rate and economic growth in most of the low-income African countries. This clearly suggests that an increase in the level of inflation is responsible for decreasing the growth of African countries and vice versa (African Development Bank, 2017).

A similar study was conducted in the past in which the influence of inflation on economic growth in Pakistan was recently investigated. The study simply applied correlation analysis techniques as well as multiple linear regression analysis techniques in order to investigate formulated object is. Results of this study provided evidence for having a moderate and significant relationship between inflation and economic growth in Pakistan. The result of the study also suggested that inflation can be considered as a significant and important element for predicting economic growth in Pakistan. Policymakers should make sure that they keep inflation under control in order to have a positive economic influence on the Economy of Pakistan in long run (Sultan and Faiza, 2016).

Another similar study conducted and past investigated the relationship prevailing between inflation and economic growth. The study simply applied regression analysis technique as well as co

integration technique in order to investigate formulated objectives. Results of the study clearly suggested that there prevails a positive and significant long-run relationship between the macroeconomic variable in inflation and economic growth in Finland. Results of the study also suggested that the economy of Finland was responsible for having the highest rate of economic growth when the inflation rate prevailing in the economy was at 4%. This clearly suggests that it is important for the government to maintain an appropriate inflation rate in order to have a positive influence on the economic growth of that specific economy. It might be possible that the ideal inflation rate for the economy might be different in different economic cycles but it is important to make sure that appropriate monetary tools are being applied in order to control the inflation rate prevailing in the economy (Sattarov, 2011).

One of the most significant objectives for any type of country is to have sustainable and high economic growth in the long run. There are different factors associated which economic growth that is responsible for influencing economic growth. Inflation is considered to be one of the most significant macroeconomic indicators among such indicators. A similar study was conducted recently in order to investigate the relationship prevailing between inflation and economic growth. The study applied the Granger causality technique in order to investigate the influence of inflation on economic growth and vice versa. The result of the study clearly provided evidence for having a negative relationship between economic growth and inflation. The study also provided evidence that inflation is responsible for influencing economic growth and can be used to predict economic growth for different countries around the globe (Mamo, 2012).

3. METHODOLOGY

3.1. Modeling Approach

Time series analysis involves developing models that best capture or describe an observed time series in order to understand the underlying causes. The yearly time series has been gathered from 1990 to 2019 for Turkey and the U.S. The data for Gross Domestic Product (GDP), inflation (INF), Gross Fixed Capital Formation (GFCF), and total labor force (L) have been collected from the World Bank.

3.2. Variables

Gross domestic product is a dependent variable in this study and refers to the logarithm of the GDP in constant local currency unit for both variables. The regression has other control variables as well to complete the empirical analysis. The choice of these variables, following a general application in the literature, we adopt a standard is assumed to be characterized by a Cobb-Douglas production function. Gross fixed capital formation (GFCF) is used as a control variable as a proxy for capital. A positive coefficient is standard as a more noteworthy venture is identified with the constructive growth outcome (Mankiw et al., 1992). The labor force includes individuals ages 15 and over 15 who supply work to create merchandise and ventures during a predetermined period.

Since the objective of this research is to analyze the impact of inflation on the growth and development of the U.S. and Turkey, the major independent variable of this research is inflation.

GDP, the dependent variable, is used as a proxy of growth and development in the U.S. and Turkey.

Variables used in this research

Variable	Denoted by	Description
GDP	GDP	GDP (constant LCU)
INF	Inflation	Annual change of Consumer price index
Capital proxy by Gross Fixed Capital Formation	GFCF	Gross fixed capital formation (constant LCU)
Labor Force	LF	Labor force, total

3.3. Sample and Data Sources

This research utilized the auxiliary yearly time series data for the year 1990-2019, the data were sourced from World Bank Data Bank. The explanation of this example size is the accessibility of information; the data for the labor force, a control variable of the model, is available from 1990 to onwards for both the U.S. and Turkey. This research utilized the Cobb Douglas Production Function to infer the model.

The Cobb-Douglas production function is a type of production specification that describes how production records in an economy behave as a function of the inputs used in production. Despite the fact that it isn't considered an innovative model. The following are the most significant advantages of this form: it is well-known for its precision, it can be applied to entire economies, and it can be used for macro or micro-estimations.

A Cobb-Douglas production function can be written in the following form.

$$Y = \alpha_1 L^{\alpha_2} K^{\alpha_3} \tag{1}$$

By taking the log of the above equation, the equation become

$$\ln Y = \alpha_1 + \alpha_2 \ln L + \alpha_3 \ln K \tag{1.1}$$

3.4. Variable Operationalization

The process of designing methodologically sound study designs includes a step called operationalization. A research begins with a concept and conceptualization of that concept, which are clearly defined and outlined by a theoretical foundation, in order to operationalize a variable under study.

In this research, the GDP is utilized as a dependent variable and inflation as an independent variable. Notwithstanding, other control variables are likewise utilized in the model as utilized in other past investigations i.e. capital and labor.

The gross fixed capital formation (GFCF) is generally utilized for the proxy of K or capital and Y is known as the output or Gross Domestic Product (GDP), so we can replace the K by GFCF, L by LF (Labor Force), and Y by GDP in the equation (1.1). Gross domestic product is utilized as growth and development in the U.S. and Turkey.

3.5. Empirical Model

Henceforth, the equation (1.1) can be modified to gauge the concerning factors of this research. ARDL model shown in

equation (1) will be estimated for Turkey since both of the terms are insignificant. However constant and trend term are found significant for U.S., therefore equation (2) will be estimated for U.S. while Y denotes GDP and X_j denotes relative independent variables.

$$Y_t = \sum_{i=1}^p \xi_i \Delta Y_{t-i} + \sum_{j=1}^k \sum_{l_j=0}^{q_j} \beta_{j,l_j} X_{j,t-l_j} + e_t \tag{1}$$

$$Y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^p \xi_i \Delta Y_{t-i} + \sum_{j=1}^k \sum_{l_j=0}^{q_j} \beta_{j,l_j} X_{j,t-l_j} + e_t \tag{2}$$

All the variables are collected from the World Development Indicators provided by the World Bank from 1990-2019 and logarithmically transformed except for inflation since its already a ratio and be able to get negative values.

The model can be estimated empirically to find out the impact of inflation on the growth and development of the U.S. and Turkey. The model is estimated on Eviews software and results are presented in the next section.

3.6. Analysis and Results

Before ARDL estimation ADF and PP unit roots test are applied for both countries to ensure that variables fit prerequisite, which is being I(i) i<2, and results are shown in Table 1.

We use Augmented Dickey and Fuller (1981) (ADF test), Phillips and Perron (1988) (PP test) unit root tests. Table 1 shows the results of the stationary evaluation. The unit root tests indicates that all of the variables are stationary at first difference in both the ADF and PP tests when the null hypothesis (H0: Data is not stationary) is tested against the alternative hypothesis (H1: Data is stationary). Since integration degree of all series are less than two, which is a prerequisite, we proceed to estimate ARDL(p,q,q,q). Akaike information criteria used for optimal lag selection and results are shown in Figure 1.

ARDL estimation results are given in Table 2 and we can perform diagnostic tests. Although these coefficients are ignored, diagnostic tests are performed on the model as a result of the estimation results.

Cointegration analyses (Sandalcilar, 2012) are an analyzing tool for assessing long-term relationships between time series. To decide if there is a relationship between the variables, the series must be stationary, as described in previous sections. However, since most economic series are not stationary, cointegration analyses are needed. Even though these time series are not stationary in and of themselves, when a stationary process is generated on an integrated level, a long-term relationship between the variables can be revealed (Bozkurt, 2007) The ARDL approach was developed by Pesaran et al. (2001), and it can be used to examine the long-term relationship between series.

In Table 3, some tests such as autocorrelation, changing variance and normality are performed to examine whether the model

Table 1: ADF and PP test

		USA				Turkey			
		Unit root test table (pp)				Unit root test table (pp)			
		At level				At level			
		Log (gdp)	Inf	Log (gfcf)	Log (lf)	Log (gdpt)	Inf	Log (gfcft)	Log (lft)
With Constant									
t-Statistic		-1.6534	-4.2227	-1.1423	-3.3061	0.6114	-0.9371	-6.5601	2.1804
Prob.		0.4435	0.0026	0.685	0.0239	0.9876	0.7615	0	0.9999
With Constant & Trend									
t-Statistic		-1.1397	-5.2716	-1.6342	-1.325	-2.5007	-1.7801	-1.5243	-0.621
Prob.		0.9043	0.001	0.754	0.8612	0.3254	0.6882	0.7974	0.9699
		At first difference				At first difference			
		d (LOG (GDP))	d (INF)	d (LOG (GFCF))	d (LOG (LF))	d (LOG (GDPT))	d (INF)	d (LOG (GFCFT))	d (LOG (LFT))
With Constant									
t-Statistic		-3.541	-12.9741	-2.9126	-2.7852	-5.91	-5.2021	-2.1904	-5.1729
Prob.		0.0142	0	0.0565	0.0732	0	0.0002	0.2139	0.0002
With Constant & Trend									
t-Statistic		-4.0626	-16.2011	-3.0687	-4.1143	-6.2939	-5.1105	-4.4862	-6.215
Prob.		0.018	0	0.1329	0.016	0.0001	0.0016	0.0069	0.0001
		Unit root test table (ADF)				Unit root test table (ADF)			
		At Level				At Level			
		LOG (GDP)	INF	LOG (GFCF)	LOG (LF)	LOG (GDPT)	INF	LOG (GFCFT)	LOG (LFT)
With Constant									
t-Statistic		-2.2442	-4.2238	-1.6305	-3.339	0.2802	-4.7579	-6.8357	1.738
Prob.		0.1962	0.0026	0.4539	0.0225	0.973	0.0009	0	0.9995
With Constant & Trend									
t-Statistic		-2.1311	-4.718	-2.8346	-2.3075	-2.4166	-2.2452	-1.5466	-0.7367
Prob.		0.5072	0.0038	0.1976	0.4166	0.364	0.4461	0.7891	0.9603
		At first difference				At first difference			
		d (LOG (GDP))	d (INF)	d (LOG (GFCF))	d (LOG (LF))	d (LOG (GDPT))	d (INF)	d (LOG (GFCFT))	d (LOG (LFT))
With Constant									
t-Statistic		-3.541	-6.0888	-3.1307	-2.8304	-5.3565	-1.5853	-0.9921	-2.5012
Prob.		0.0142	0	0.0357	0.0669	0.0002	0.4744	0.7414	0.1267
With Constant & Trend									
t-Statistic		-4.0505	-6.0149	-3.586	-4.0951	-5.2645	-3.6716	-2.3682	-6.1866
Prob.		0.0185	0.0002	0.0502	0.0167	0.0011	0.0421	0.3864	0.0001

Figure 1: Uses Akaike information criterion to reveal the optimal delays, and the model selection is shown graphically. Here, the model with the minimum Akaike value has been tested

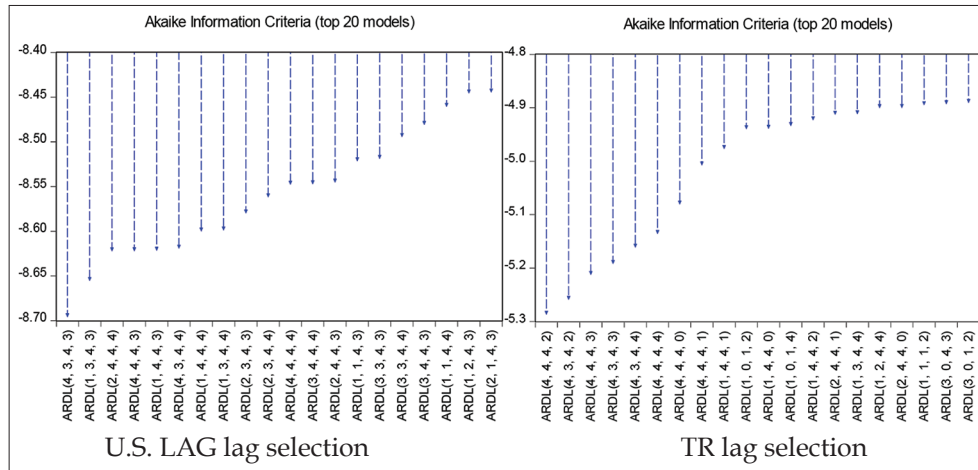


Table 2: ARDL estimation results

USA/ARDL (4, 3, 4, 3)				Turkey/(4, 4, 4, 2)			
Variable	Coefficient	t-Statistic	Prob.*	Variable	Coefficient	t-Statistic	Prob.*
LOG (GDP(-1))	-0.642859	-1.611526	0.1511	LOG (GDPT(-1))	0.717514	2.837416	0.0195
LOG (GDP(-2))	0.143191	0.608402	0.5621	LOG (GDPT(-2))	0.077248	0.185516	0.8569
LOG (GDP(-3))	0.028188	0.114146	0.9123	LOG (GDPT(-3))	-0.758805	-2.016519	0.0745
LOG (GDP(-4))	-0.257186	-1.423382	0.1976	LOG (GDPT(-4))	0.830614	2.533013	0.0321
INF	0.000279*	0.17457	0.8664	INF	-0.002373	-3.746533	0.0046
INF(-1)	-0.00404	-1.960219	0.0908	INF(-1)	-0.000181	-0.158789	0.8773
INF(-2)	-6.81E-05	-0.029767	0.9771	INF(-2)	-0.000608	-0.615689	0.5533
INF(-3)	0.003908	2.28131	0.0565	INF(-3)	-0.001816	-2.008282	0.0755
LOG (GFCF)	0.325642	9.856474	0	INF(-4)	-0.000488	-0.995614	0.3455
LOG (GFCF(-1))	0.234616	1.561349	0.1624	LOG (GFCFT)	0.302926	6.286499	0.0001
LOG (GFCF(-2))	0.004941	0.045924	0.9647	LOG (GFCFT(-1))	-0.240459	-3.648099	0.0053
LOG (GFCF(-3))	-0.13172	-1.149999	0.2879	LOG (GFCFT(-2))	0.069537	0.542897	0.6004
LOG (GFCF(-4))	0.227922	3.524298	0.0097	LOG (GFCFT(-3))	0.18119	1.503743	0.1669
LOG (LF)	-0.529879	-1.534604	0.1688	LOG (GFCFT(-4))	-0.304765	-3.101578	0.0127
LOG (LF(-1))	0.58802	1.234477	0.2569	LOG (LFT)	0.64141	1.553213	0.1548
LOG (LF(-2))	-0.057888	-0.149219	0.8856	LOG (LFT(-1))	0.281953	0.528137	0.6102
LOG (LF(-3))	0.917631	2.209185	0.0629	LOG (LFT(-2))	-0.719322	-1.963035	0.0812
C	16.18035	4.651335	0.0023				
@TREND	0.005583	3.788415	0.0068				

*significant at 5 percent

provides the necessary assumptions. The results show that no deviation from the assumptions was observed for both countries.

The results of the Lagrange multiplier, serial correlation, Ramsey’s misspecification, Jacque and Berra normality, and autoregressive conditional heteroscedasticity tests show that our model passed all four diagnostic tests so we cannot reject any hypothesis, demonstrating its consistency and performance.

The blue lines for both CUSUM and CUSUMSQ lie within the vital bounds and are important at 5%, as shown in Figures 2 and 3. This is statistical confirmation that our model is robust and that the predicted results are correct.

According to the test results, both models do not have identification error, autocorrelation, variance and deviation from normality.

A cumulative total (CUSUM) chart is a control chart that is used to track minor changes in the process mean. It calculates the

Table 3: Diagnostics

Results	USA		Turkey	
	Test stat.	Prob.	Test stat.	Prob.
Breusch-Pagan-Godfrey	18.91731	0.5138	16.44279	0.4927
Het.Test				
Breusch-Godfrey AC	10.50832	0.0892	2.526946	0.195
LM Test				
Jarque-Bera Normality	0.6676	0.7161	0.1038	0.9493
RAMSEY RESET test	0.478021	0.6335	1.1853	0.308

total number of deviations from a goal. When we examine the CUSUMQ graph to see if there are structural breaks in Figure 2, no structural break was observed for USA and it was concluded that the 1-period break observed for TR was negligible.

When an economy undergoes systemic changes, the structural properties of data that are used as indicators of the economy are altered. Checking if there is a shift in the average and trend of a sequence, as well as whether the average and trend change the

integration level of the series, is used to determine if the structural changes at hand have an effect on the characteristics of a time series.

Structural break is not detected for the USA, the structural fracture occurs in Turkey are negligible.

Table 4 shows cointegration at a significance level of 1% for two countries according to the F boundary test, and the t test shows that this cointegration is valid.

The existence of cointegration for both countries was found with the F limit test, and it was proven that the cointegration is valid with the t-bound test.

Table 4: Limit tests

USA			Turkey		
F-Bounds test	k=3	8.502702	F-Bounds test	k=3	8.470155
	F-stat			F-stat	
Signif.	I (0)	I (1)	Signif.	I (0)	I (1)
10%	3.47	4.45	1%	2.01	3.1
5.0%	4.01	5.07	2.5%	2.45	3.63
3%	4.52	5.62	5%	2.87	4.16
1%	5.17	6.36	10%	3.42	4.84
t-Bounds Test	t-stat	-5.535815	t-Bounds Test	t-stat	-6.72117
Signif.	I (0)	I (1)	Signif.	I (0)	I (1)
10%	-3.13	-3.84	1%	-1.62	-3
5.0%	-3.41	-4.16	2.5%	-1.95	-3.33
3%	-3.65	-4.42	5%	-2.24	-3.64
1%	-3.96	-4.73	10%	-2.58	-3.97

The Bound test indicates that the variables are cointegrated for P=0.01

Table 5: Long-term coefficients

Long run USA					Long run Turkey				
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	4.54E-05	0.002379	0.019077	0.9853	INF	-0.040963	0.060314	-0.67916	0.5141
LOG (GFCF)	0.382608	0.019021	20.11548	0	LOG (GFCF)	0.06318	0.098561	0.641029	0.5375
LOG (LF)	0.530978	0.101855	5.213099	0.0012	LOG (LF)	1.529216	0.153696	9.949583	0

Table 6: Error correction equation

ECM USA					ECM Turkey				
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.18035	2.324487	6.960826	0.0002	DLOG (GDPT(-1))	-0.149057	0.19362	-0.76985	0.4611
@TREND	0.005583	0.000727	7.681598	0.0001	DLOG (GDPT(-2))	-0.071809	0.221112	-0.32476	0.7528
DLOG (GDP(-1))	0.085807	0.123939	0.692329	0.511	DLOG (GDPT(-3))	-0.830614	0.192207	-4.32145	0.0019
DLOG (GDP(-2))	0.228997	0.118637	1.930241	0.0949	D (INF)	-0.002373	0.000512	-4.63239	0.0012
DLOG (GDP(-3))	0.257186	0.134649	1.910044	0.0978	D (INF(-1))	0.002912	0.000813	3.583758	0.0059
D (INF)	0.000279	0.001193	0.233644	0.8219	D (INF(-2))	0.002304	0.00056	4.115994	0.0026
D (INF(-1))	-0.00384	0.001025	-3.74622	0.0072	D (INF(-3))	0.000488	0.000379	1.286235	0.2305
D (INF(-2))	-0.003908	0.001115	-3.504132	0.0099	DLOG (GFCFT)	0.302926	0.028392	10.66925	0
DLOG (GFCF)	0.325642	0.020381	15.97786	0	DLOG (GFCFT(-1))	0.054037	0.058515	0.923471	0.3799
DLOG (GFCF (-1))	-0.101144	0.049683	-2.035772	0.0812	DLOG (GFCFT(-2))	0.123574	0.076625	1.612706	0.1413
DLOG (GFCF (-2))	-0.096202	0.049233	-1.954031	0.0916	DLOG (GFCFT(-3))	0.304765	0.062317	4.890544	0.0009
DLOG (GFCF (-3))	-0.227922	0.052933	-4.305898	0.0035	DLOG (LFT)	0.64141	0.258798	2.478418	0.0351
DLOG (LF)	-0.529879	0.246736	-2.14755	0.0689	DLOG (LFT(-1))	0.719322	0.209139	3.439437	0.0074
DLOG (LF(-1))	-0.859742	0.193465	-4.443908	0.003	CointEq(-1)*	-0.133429	0.019852	-6.72117	0.0001
DLOG (LF(-2))	-0.917631	0.297416	-3.085349	0.0177					
CointEq(-1)*	-1.728666	0.248	-6.970428	0.0002					

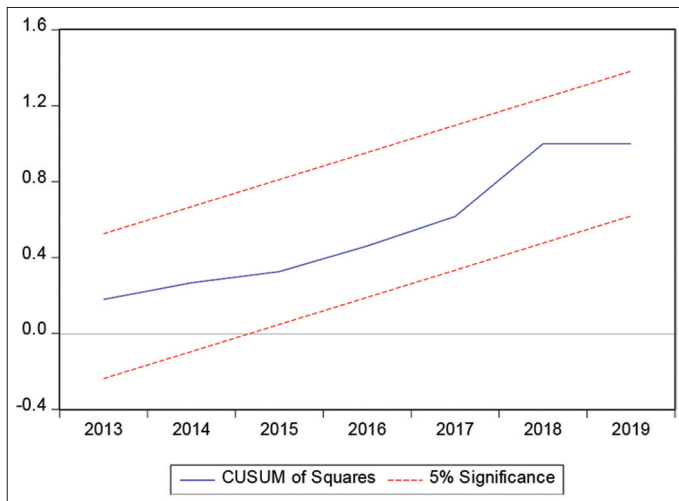
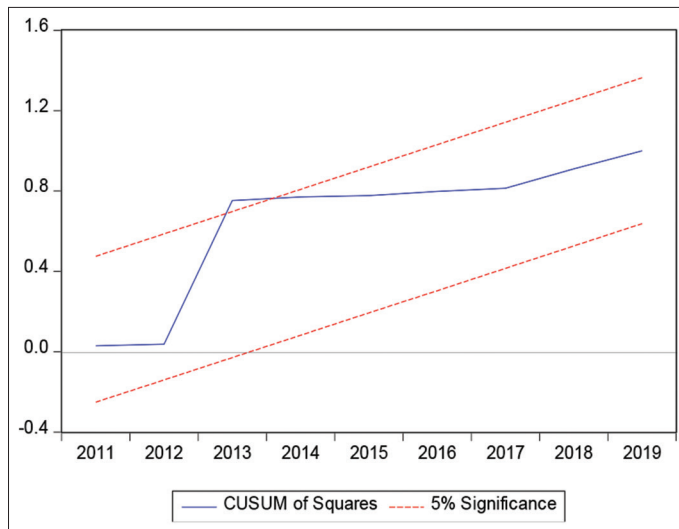
Table 5 shows the long-term coefficients for both countries, it was found to be significant for the USA compared to 1%, and it affects in the same direction. LF is found in 1% level of significance for Turkey affect the same direction.

GFCF and LF have been found to be significant for the United States and are affected in the same direction with GDP in the long term. In other words, the increase in fixed capital formation and the use of labor positively affects the GDP growth. For Turkey, only LF significant increase in the use of labor in the long term has been found to positively affect the GDP. In addition, effects on GDP due to the relatively high intensity of use of labor in Turkey is at significant levels in turkey.

Table 6, where the term short term examination and error correction is included, error correction was found to be significant in both countries compared to 1%.

For the ARDL model, the above results show both short-term and error correction test results. To start, both error correction term (CointEq). The t-statistics suggest that the value is meaningful.

In error correction models, error correction terms coefficient should take a value between 0 and -1. Therefore, the error correction model does not work for USA. For Turkey, deviations from equilibrium to a previous state of equilibrium each period converges with the 13% level. In the short term, while in the USA as a delayed response to national income, inflation, the impact of inflation in Turkey is starting to be felt in the current period.

Figure 2: Result of the CUSUMQ test USA**Figure 3:** Result of the CUSUMQ test Turkey

4. DISCUSSION AND CONCLUSION

For sustainable growth and economic stability, macroeconomic performance is critical (Bayraktar et al., 2016). In a nutshell, this research has empirically analyzed the impact of inflation on the growth and development of the U.S. and Turkey. The time-series data analysis is conducted and the data is collected from the world development indicators by the World Bank. Gross domestic product is the dependent variable as a proxy of growth and development and inflation is an independent variable as a proxy of inflation. The data covers the period from 1990 to 2019 and the results from empirical analysis indicate that inflation doesn't have impact on GDP in the long run. But in the short run it affects GDP differently countrywise.

An overall view of the connection between the inflation rate and growth is not clear in the literature. On one hand, few research studies conclude that inflation has a negative impact on the growth and development of a country. On the other hand, few research studies conclude that this impact is positive. However, this research is specific to the U.S. and Turkey and found the negative impact of inflation on the growth and development of both countries. The

unique view on the connection between growth and inflation in the present writing is that excellent inflation influence monetary growth decidedly in the short-run while it prompted a decrease in the expected financial exercises over the long haul. The high inflation rate has influenced the growth rate contrarily during the most recent 30 years in the Turkish case.

A high inflation rate that is industrious since the 1970s has assumed an essential part in the rise of social and financial issues, which prompted lower monetary growth. Both the inflation and growth rate figures and detailed investigations affirm this outcome. Corresponding to the globalization cycle on the planet, the worldwide capital streams became more critical, which made the nations see the entire world as a great market. Turkey's achievement in quite a world relies upon the financial arrangements that structure a stable macroeconomic climate and improve the seriousness of the nation. In this specific circumstance, notwithstanding a stable macroeconomic climate, it is vital to building up the arrangements that incorporate long haul points of view.

Studies conducted in past clearly suggest that inflation is considered to be responsible for having an adverse influence on the quantity of production because the expectation related to an increase in prices as well as the cost of input is responsible for creating uncertainty. This uncertainty negatively influences the level of production. This is also responsible for causing a reduction in the quality of manufactured goods and services. An increase in price level is responsible for creating a seller's market and is not suitable for or consumers in long run. That is why, it is highly important for government institutions to formulate policies in such a manner that inflation could be controlled in order to influence production positively and to have equilibrium in the market (Ashtikar, 2021).

It is important to understand that inflation is not only responsible for influencing economic growth in different countries but it is also responsible for influencing the purchasing power of consumers. An increase in inflation is responsible for decreasing the purchasing power of general consumers. This is mostly due to an increase in price level prevailing in the economy. An increase in inflation is also responsible for encouraging spending as well as investment related activities. High inflation rates are responsible for causing a decline in purchasing power due to which most of the consumers prefer to purchase things immediately before they become expensive and lose their worth in long run. Inflation is also responsible for increasing costs related to borrowing due to which loans from Financial Institutions and banks become expensive. It is important for the government to manage the prevailing inflation rate by utilizing appropriate monetary policy tools. All in all, to improve the nation's beneficial capability, the monetary specialists ought to detail extended haul techniques notwithstanding short-term approaches. Most importantly, it is vital to wipe out vulnerabilities brought about by high and ongoing inflation rates, develop a proficient public area, and eliminate other macroeconomic lopsided characteristics. The social issues originated from dynamic macroeconomic awkward nature have forestalled to close government assistance hole among Turkey

and industrialized nations. A proficient public area and moderate inflation rate can be gainful in eliminating vulnerabilities and cynicism in the business area and advancing the general public's profitable elements.

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