

THE INFLATION DYNAMICS OF THE TURKISH ECONOMY IN 1990-2011 PERIOD

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ABSTRACT

In 2004, Turkey managed to reduce the chronic high inflation rates that characterized its economy over the period 1975-2001 to single digits, thanks to economic policies implemented in the aftermath of the 2001 financial crisis. This paper analyzes inflation dynamics in the Turkish economy both in the short- and the long-run, over the period January 1990 to December 2011 by using the Johansen Cointegration Test and the Vector Error Correction model (VEC). Empirical results show that the inflation rates in Turkey are mainly related to changes in money supply, economic growth, nominal exchange rates, dollarization and real wages.

Keywords: Inflation, Turkish Economy, Johansen Cointegration, Vector Error Correction, Impulse-Response Functions

JEL Code: C32, E31, E51, E62

TÜRKİYE EKONOMİSİNDE 1990 - 2011 DÖNEMİNDE ENFLASYON DİNAMİKLERİ

ÖZ

Türkiye, 2001 yılındaki ekonomik kriz sonrası uygulamış olduğu ekonomik politikalar sonucunda 1975-2001 yılları arasında kronik bir sorun haline gelmiş olan enflasyon oranını 2004 yılında tek haneli rakamlara düşürmeyi başarmıştır. Bu çalışmada, Ocak 1990 – Aralık 2011 dönemi Türkiye ekonomisindeki enflasyon dinamikleri, uzun ve kısa dönemle riçin Johansen Cointegration Test ve Vector Error Correction modeli (VEC) kullanılarak analiz edilmektedir. Analiz sonuçları ilgili dönemde Türkiye'deki enflasyonun temel olarak para arzı, ekonomik büyüme, nominal döviz kuru, dolarizasyon ve reel ücretlerdeki değişikliklerden kaynaklandığını ortaya koymaktadır.

AnahtarKelimeler: Enflasyon, Türkiye Ekonomisi, Johansen Cointegration, Vector Error Correction, Impulse-Response Functions

JelKodu: C32, E31, E51, E62

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1. INTRODUCTION

Inflation, which is usually defined as a sustained rise in the general level of prices, is one of the most important issues in economics. In literature, numerous theories exist for modeling inflation and understanding its causes, and they may be divided in four general categories. The Quantity Theory of Money (QTM) is one of the oldest theories, dating back to at least the mid-sixteenth century.¹ Within the QTM framework, Fisher's (1911) famous equation is as follows:

$$MV = PT \quad (1.1)$$

In the equation of 1.1, M denotes the stock of money, V is the velocity of circulation of money, P is the general price level and T is the total number of transactions taking place in an economy over a certain period of time. This theory states that, under the assumption that the total number of transactions and the velocity of circulation of money are fixed, changes in the general level of prices are determined by changes in the quantity of money in circulation. Classical and neo-classical economists primarily benefited from QTM to help explain inflation. Moreover, the founder of Monetarism, Friedman (1963), stated that inflation is always and everywhere a monetary phenomenon. According to monetarists, the money supply is the determinant of both the level of output and prices in the short-run, and of the level of prices in the long-run.

The second group of theories on inflation is related to Keynes's early studies. According to Keynes's (1936) Demand-Pull Inflation Theory, inflation simply appears when the value of aggregate demand exceeds the value of aggregate supply. Here, the increase in the gap between aggregate demand and supply is considered as the source of inflation. Besides, Keynes (1936) also states that prices, instead of being pulled up by excess demand, may also be pushed up as a result of a rise in the cost of production such as rising wages and increases in corporate taxes, while the demand for goods and services remains fixed (Cost-Push Inflation Theory²).

The third category takes into account expectations phenomenon. Here, prices increases are influenced by the economic agents' expectations. The stickiness of prices/wages, and possible indexation experiences in the economy show here the role of inertial factors in explaining inflation (Kibritcioglu, 2004).

Lastly, according to Structural Inflation Theory, inflation is explained by structural factors. As specified in Kibritcioglu (2002), first generation structuralist inflation models are developed in the 1960s in order to explain Latin American inflation by productivity differences between the industrial and agricultural sectors. Political and/or institutional weaknesses may also be considered as structural factors, having an important impact on general price levels (Kibritcioglu, 2004).

Turkey had a painful experience of high and chronic inflation over the period from 1975 to 2004. Several disinflation efforts, backed by international organizations such as the International Monetary Fund (IMF) from the late 1970s to 2001, failed in one by another. However, during this relatively long period, this highly chronic inflation never turned into hyperinflation in Turkey (Akcaay et al., 2002, Kibritcioglu, 2004). As shown in Figure 1.1, the average ratio of inflation was around 40% in the 1980s, increased to levels of 70% in the 1990s, and then decreased to single digits after 2004.

¹ Since gold and silver coming from the Americas to Europe were being minted into coins, there was a rise in inflation.

² This theory is also called the *mark-up* inflation theory.

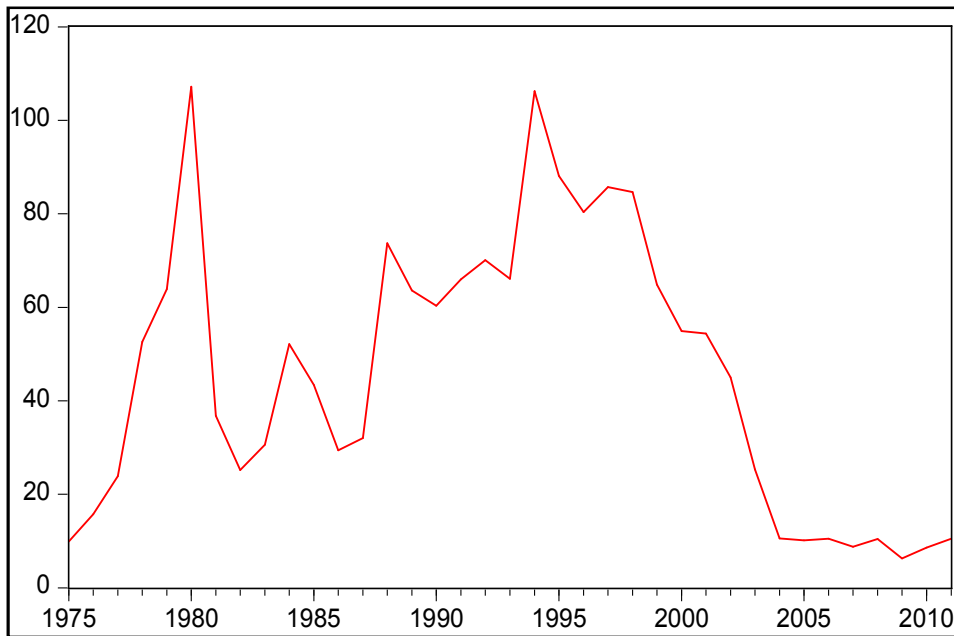


Figure 1.1
Annual inflation rates in Turkey (Consumer prices, %)

Source: Authors' calculations with the data obtained from the IMF International Financial Statistics (IFS)

The inflation rates in Turkey have fallen drastically in the aftermath of the severe 2000-2001 financial crisis. This strong decrease is 'believed' to have come about as a result of the establishment of the independent central bank focusing mainly on fighting inflation in 2001, of an inflation targeting regime used since 2002, and of tight fiscal policies implemented in 2001.³ But inflation still remains a concern for both economic agents and monetary authorities.

It is commonly argued that high inflation rates in Turkey have been due to⁴:

- political instability and poor quality of institutions that generate economic instability;
- high public sector budget deficits compensated in general by monetization and/or domestic borrowing;
- rises in interest rates due to high public sector borrowing requirements;
- increasing money supply which in turn generates increases in private consumption;
- depreciation of the Turkish Lira feeding into inflation by an exchange-rate pass-through mechanism;
- occasional increases in world prices of imported products (particularly crude oil);
- economic agents' persistent inflationary expectations fed by past inflation rates.

³ See Yilmaz and Ari (2013) for a detailed descriptive analysis on the Turkish inflation for the period 2001-2011.

⁴ Kibritcioglu (2004) provides an extensive theoretical and empirical discussion on the sources of inflation in the Turkish economy.

A fragile political environment, successive coalition governments, early general elections, military pressures on the political scene materialized by a coup in 1980 and a “soft” coup in 1997, and military operations related to domestic and external geopolitical reasons created all the ingredients of an unstable political structure from the late 1970s to the beginning of the 2000s (Ari, 2012). In this unstable political context, public sector expenditure increased due to populism (i.e. election economy policies) and crony capitalism (i.e. close relationships between business people and government officials). High public expenditure accompanied by an inefficient tax collection system, caused high public sector budget deficits (on average 8% of GDP from 1993 to 2002) and led in parallel to an increase in the public sector borrowing requirements (12% of GDP in 2001) and in public debt stock (115% of GDP in 2002).⁵

Increasing interest rates resulting from the crowding-out effect of public sector borrowing in Turkey’s shallow domestic capital markets, reduced private investments and economic growth (about 3.5% on average from 1990 to 2002) which in turn deteriorated even more the budget balance.⁶ Moreover, financing those deficits by printing money led to high money supply that caused increases in private consumption thus creating inflationary pressures. High money supply and inflation rates also generated the continuous depreciation of the Turkish Lira that in turn fed into inflation by an exchange-rate pass-through mechanism. Depreciation of the Turkish Lira also caused a significant dollarization in the Turkish economy that reduced the efficiency of the monetary policy. Furthermore, occasional increases in the world prices of imported goods and economic agents’ persistent inflationary expectations also contributed to high levels of inflation in the Turkish economy. In addition, two deep financial crises occurred in 1994 and 2001 which led to severe economic consequences (in terms of severe currency depreciation and excessive output losses) affected inflation rates in Turkey.

The paper is organized as follows. Section 2 presents the literature review. Section 3 presents the main features of the empirical model. Section 4 presents estimation results of the model and its possible implications for fighting inflation in the Turkish economy. Section 5 presents the concluding remarks.

2. LITERATURE REVIEW

Many empirical studies using different test methods and different explanatory variables have been realized in order to understand inflation dynamics in the Turkish economy.⁷ However, the empirical results of this existing literature on the causes of inflation in the Turkish economy are mixed and inconsistent.

Pongsaparn (2002), Ozdemir and Saygili (2008) and Karacaland Bahmani-Oskooee(2008) find that monetary factors play a significant role in determining inflation, while Us (2004) and Yilmaz (2010) argues contrarily that high prices in Turkey do not result from an expansionary monetary policy.

Dibooglu and Kibritcioglu (2001), and Pongsaparn (2002) report the importance of public sector budget deficits over high inflation rates, while Akcay et al. (2002) and Tekin-Koru and Ozmen (2003) find no relationship between budget deficits and high inflation rates in the Turkish economy. Besides, Dibooglu and Kibritcioglu (2004) see a limited role for budget deficits in the

⁵ See Figure A1 in Appendix for selected indicators of the Turkish economy, 1990–2011.

⁶ See Figure A1 in Appendix for selected indicators of the Turkish economy, 1990–2011.

⁷ See Table A1 in Appendix for a detailed analysis of recently selected empirical papers on inflation in Turkey.

inflationary process. Karacal and Bahmani-Oskooee (2008) and Kia (2010) show that high budget deficits do have a positive impact on prices in the short-run, but there is no relationship in the long-run.

Dibooglu and Kibritcioglu (2001; 2004), Arbatli (2003), Aysoy and Kipici (2005), Karacal and Bahmani-Oskooee (2008) and Kia (2010) find that a depreciation of the Turkish Lira has a significant effect on high inflation rates in the Turkish economy. Furthermore, Bahmani-Oskooee and Domac (2003) and Karacal and Bahmani-Oskooee (2008) show that dollarization is an important indicator in explaining the behavior of inflation both in the short- and long-run.

Erlat (2002), Domac (2003), Aysoy and Kipici (2005), Karacal and Bahmani-Oskooee (2008) and Baskaya et al. (2012) state the importance of expectations on inflation rates as the inflation rate generally has a significant long-term memory component.

As mentioned above, according to the results of the empirical papers, there is no consensus on the relationship between inflation, monetary and fiscal factors. Nevertheless, empirical studies generally find a positive correlation between inflation and depreciation of the Turkish Lira and inflation expectations. It should also be noted that existing empirical papers contain some weaknesses.

First, they mainly focus on demand-side factors like money supply and budget deficits and ignore other factors that generate increases in general price levels. Second, they use a very small set of explanatory variables which does not present the 'whole picture' of inflation dynamics in the Turkish economy. Hence, this study aims to fulfill these shortages by using a large set of explanatory variables representing different sectors of the economy that allow for a broader view on inflation determinants in the Turkish economy. Moreover, this paper is quite extensive as it covers the entire post-trade and financial liberalization era (1990–2011).

3. THE MODEL

Here, we use the Johansen Cointegration test for the long-run analysis and a VEC model for testing the short-run relationship between inflation rates and seven other variables.⁸

The model is estimated by using monthly data for the period 1990:01–2011:12. The data for the variables of the model is gathered from the IFS, June 2012, and from the Central Bank of Republic of Turkey (CBRT). In this paper, a broad set of seven variables are explored, as shown in equation 3.1, on the basis of the theoretical and empirical inflation literature.

$$CPI = f(M1, NER, F / M2Y, IPROD, RWAGE, UNEMP, BUDGET) \quad (3.1)$$

As indicated in Table 3.1, all variables are used in logarithmic form, except for general budget balance (BUDGET) and unemployment rates (UNEMP). LCPI is Turkey's consumer prices index. Theoretically, increases in money supply (LM1), in nominal exchange rates (LNER), in economic growth (represented here by a proxy variable: industrial production index, LIPROD), in real wages and in dollarization (represented here by a proxy variable: foreign deposits over broad money supply M2Y, LF/M2Y), are expected to raise inflation rates, while increases in unemployment rates

⁸ See Johansen and Juselius (1990) and Johansen (1991) for further information on Johansen Cointegration test and Harris and Sollis (2003) for further information on VEC models.

and an improving budget balance should reduce inflation rates in the domestic economy. Expected impacts (signs) of the variables on the inflation rates are summarized in the below equation 3.2.⁹

$$\frac{\partial CPI}{\partial M1} > 0, \frac{\partial CPI}{\partial NER} > 0, \frac{\partial CPI}{\partial F/M2Y} > 0, \frac{\partial CPI}{\partial IPROD} > 0, \frac{\partial CPI}{\partial RWAGE} > 0, \frac{\partial CPI}{\partial UNEMP} < 0, \frac{\partial CPI}{\partial BUDGET} < 0 \quad (3.2)$$

Table 3.1
Variables: Definitions and Sources

<i>Variable</i>	<i>Definition</i>	<i>Source</i>
<i>LCPI</i>	Natural logarithm of Consumer Prices Index (2005=100)	IFS
<i>LMI</i>	Natural logarithm of M1	CBRT
<i>LNER</i>	Natural logarithm of Nominal Exchange Rate (National currency per U.S Dollar, end of period)	IFS
<i>LIPROD</i>	Natural logarithm of Industrial Production Index (2005=100)	IFS
<i>BUDGET</i>	General Budget Balance	CBRT
<i>UNEMP</i>	Unemployment Rate	IFS, CBRT
<i>LRWAGE</i>	Natural logarithm of Real Wage Index (2005=100)	CBRT
<i>LF/M2Y</i>	Natural logarithm of Foreign Deposits/M2Y	CBRT

Notes: L denotes natural logarithm.

4. EMPIRICAL RESULTS

In order to properly specify the Johansen Cointegration tests and the VEC models, the variables need to be tested for unit roots. We test the stationarity of our variables by performing the Augmented Dickey–Fuller (ADF) unit root test. The test results for all variables in levels and first differences are given in Table 4.1. Statistical evidence indicates non-stationary variables in levels, but all variables are stationary at their first differences as we reject the null hypothesis of a unit root at the 1% or 5% significance levels.¹⁰

Table 4.1
Results of ADF Tests for Unit Roots

<i>Variable</i>	<i>Level</i>	<i>First Difference</i>
<i>LCPI</i>	0.69	10.1***
<i>BUDGET</i>	-1.54	-4.39***
<i>LF/M2Y</i>	-2.63	-11.6***
<i>LIPROD</i>	-1.62	-24.8***
<i>LMI</i>	0.27	-3.78**
<i>LNER</i>	-0.98	-4.28***
<i>LRWAGE</i>	-2.75	-10.2***
<i>UNEMP</i>	-2.40	-3.89**

Notes: ***, ** denote statistical significance at the 1%, 5% level, respectively.

⁹ However, expected signs of these variables may change from one country to another due to macroeconomic dynamics, as confirmed by empirical papers.

¹⁰ Optimal lag lengths are based on the Akaike (AIC), Schwartz (SIC) and Hannan-Quinn (HIC) Information Criteria and also on their modified values.

In order to understand the long-term relationship between inflation and its determinants, we run the Johansen Cointegration test over the period 1990-2011. According to the Johansen Cointegration test results, given in Table 4.2, we have four cointegrating vector depending on Trace statistics and only one cointegrating vector depending on Maximum Eigenvalue statistics. Therefore, we can affirm that there is a long-run relationship between the variables of the model. The long-term coefficients resulting from the Johansen Cointegration test are presented in Table 4.3.

Table 4.2
Johansen's Test for Number of Cointegrating Vectors

Test Statistics				
Trace Statistic	Trace		Maximum Eigenvalue	
	1 % C.V.	Max-Eigen Statistic	1 % C.V.	
$r = 0$	240.6*	182.0	60.5*	60.0
$r \leq 1$	180.1*	145.4	49.8	53.1
$r \leq 2$	130.3*	113.4	38.7	46.7
$r \leq 3$	91.6*	85.3	34.6	40.3
$r \leq 4$	57.0	61.3	22.9	33.7
$r \leq 5$	34.1	41.2	17.2	27.1
$r \leq 6$	16.9	25.1	11.5	20.2
$r \leq 7$	5.4	12.8	5.4	12.8

Notes: * denotes statistical significance at the 1% level.

According to test results, indicators such as money supply (M1), dollarization (F/M2Y), unemployment rate (UNEMP) and economic growth (IPROD) are statistically significant. These indicators therefore have an impact on inflation in the long-run. As expected in the theory, an increase in money supply and in dollarization causes a rise in the Turkish inflation rates (CPI). Moreover, an increase in unemployment rates (UNEMP), again according to the theory, reduces the Turkish inflation rates because aggregate demand decreases following to a fall in aggregate income in the domestic economy, all due to falling employment rates. However, contrary to the theory, increases in economic growth reduce inflation rates in the Turkish economy. This result is quite interesting; it explains quite well the actual situation in Turkey where inflation rates have been reduced despite high economic growth rates (5.5% on average) recorded in the 2002-2011 period. Nevertheless, contrary to our expectations and to the economic theory, indicators for nominal exchange rates (NER), real wages (RWAGE), and budget balances (BUDGET) are not statistically significant. Therefore, we can conclude that changes in these factors do not have any significant impact on Turkey's inflation rates in the long-run.

Table 4.3
Cointegration Equation

	<i>C</i>	<i>LMI</i>	<i>LNER</i>	<i>LIPROD</i>	<i>LRWAGE</i>	<i>UNEMP</i>	<i>LF/M2Y</i>	<i>BUDGET</i>
<i>LCPI</i>	8.05	2.27***	-1.42	-4.56 ***	-0.08	-0.35***	1.78**	-0.000013
	[3.10]	[-1.94]	[-2.76]	[-0.12]	[-4.77]	[2.06]	[-0.85]	

Notes: ***, ** denote statistical significance at the 1%, 5% level, respectively. The values in bracket are t-statistics.

A short-run relationship between inflation and explanatory variables is obtained by the VEC model. According to the VEC model results, given in Table 4.4, the error correction term is negative and significant. The model shows us that any disequilibrium in the current period is corrected by 1% in the next period. Besides, LM statistics and White heteroscedasticity test results do not indicate any autocorrelation or heteroscedasticity problem at the 1% significance level.

In the short-run, the Turkish inflation rates are positively affected by an increase in nominal exchange rates and in real wages. Moreover, previous rates of inflation (inflation inertia), shown here by Δ CPI and economic growth, also have a positive and significant impact on inflation rates in the short-run. Nevertheless, contrary to the long-run, changes in money supply (M1), in unemployment rates (UNEMP) and in dollarization (F/M2Y) do not have any significant effect on the Turkish inflation rates in the short-run. Furthermore, the budget balance (BUDGET) does not have any significant impact on Turkey's inflation rates in the short-run either.

As a part of our econometric analysis, we implement impulse response functions (IRF) that show us the response of an endogenous variable to a one-unit (one standard deviation) shock in the explanatory variables of the model. The investigation of the IRF shows that inflation rates augment following a shock in inflation. This points to inflation inertia possibly due to the existence of backward looking expectations (in contracts for wages, rents, etc.) in the economy. A shock in nominal exchange rates also leads to an increase in inflation rates.

What's more, in response to a money supply shock, inflation initially falls and then gradually rises. Contrary to a money supply shock, the inflation rate initially rises in response to a shock in economic growth, but falls back down after 3 lags. In addition, a shock in real wages generally leads to increases (after 3 lags onwards) in inflation rates. In response to a shock in the dollarization indicator, inflation initially rises (until 6 lags). Moreover, a shock in unemployment rates negatively affects the inflation rate. In other words, inflation falls down in parallel to rising unemployment rates, confirming a probable Philips curve effect in the Turkish economy. Lastly, a shock in budget balances does not have any significant effect on the inflation rates as shown in Figure 4.1.

Finally, we implement the Cusum Test in order to verify if the coefficients of the models are stable in the short- and long-run. As seen in Figure 4.2, the Cusum Test stays in the confidence interval; it means that the coefficients of our models are stable and robust.

Table 4.4
VECM Results

VECM Results (Dependent Variable: Δ LCPI)									
Coefficient Estimates of									
Lags	ECT	Δ CPI	Δ LMI	Δ LNER	Δ LIPROD	Δ LRWAGE	Δ UNEMP	Δ LF/M2Y	Δ BUDGET
1	-0.01** [-2.39]	0.36** [2.39]	0.04 [1.05]	0.04 [1.78]	0.07** [2.09]	0.02 [0.19]	0.002 [0.21]	0.05 [0.79]	4.73E-07 [1.36]
2		-0.18 [-0.96]	-0.11*** [-2.75]	0.05 ** [2.49]	0.02 [0.42]	-0.06 [-0.37]	0.01 [0.49]	0.04 [0.68]	6.12E-07 [1.64]
3		0.31 [1.69]	-0.07 [-1.78]	0.06 *** [2.66]	0.03 [0.80]	0.31 [1.89]	0.002 [0.20]	-0.10 [-1.58]	3.19E-07 [0.84]
4		-0.28 [-1.59]	-0.01 [-0.26]	0.03 [1.26]	0.09*** [2.69]	-0.22 [-1.34]	0.003 [0.26]	-0.13** [-2.12]	2.61E-07 [0.68]
5		0.08 [0.43]	0.02 [0.50]	0.06 *** [2.65]	0.05 [1.48]	0.01 [0.03]	0.01 [0.71]	-0.08 [-1.30]	-2.95E-07 [-0.75]
6		0.38** [2.09]	-0.0005 [-0.01]	0.04 [1.92]	0.09*** [2.61]	0.43** [2.50]	0.002 [0.17]	0.06 [0.92]	-1.44E-07 [0.39]
7		-0.25 [-1.37]	-0.01 [-0.30]	0.03 [1.40]	0.08** [2.28]	-0.30 [-1.75]	-0.002 [-0.15]	-0.07 [-1.07]	-2.28E-08 [-0.06]
8		-0.27 [-1.43]	-0.03 [-0.76]	0.04 ** [2.11]	0.01 [0.30]	-0.12 [-0.66]	0.0003 [0.01]	-0.001 [-0.01]	2.07E-07 [0.54]
9		0.40** [2.14]	0.03 [0.66]	0.03 [1.53]	-0.01 [-0.27]	0.14 [0.83]	-0.005 [-0.43]	-0.06 [-1.03]	1.38E-07 [0.36]
10		-0.20 [-1.15]	-0.05 [-1.30]	-0.02 [-0.83]	-0.005 [-0.14]	0.004 [0.03]	0.01 [1.14]	0.07 [1.27]	-4.38E-08 [-0.12]
11		0.16 [0.97]	0.06 [1.46]	-0.02 [-1.04]	0.03 [1.06]	-0.02 [-0.11]	0.0004 [0.04]	-0.02 [-0.27]	-3.42E-07 [-0.93]
12		-0.003 [-0.02]	-0.06 [-1.74]	-0.02 [-0.93]	0.02 [0.60]	-0.06 [-0.55]	-0.001 [-0.10]	-0.03 [-0.60]	-2.09E-07 [-0.59]

Notes: ***, ** denote statistical significance at the 1%, 5% level, respectively. The values in bracket are t-statistics.

$R^2=0.80$, heteroscedasticity : $\chi^2 = 6961.13$, LM -Stat = 86.06

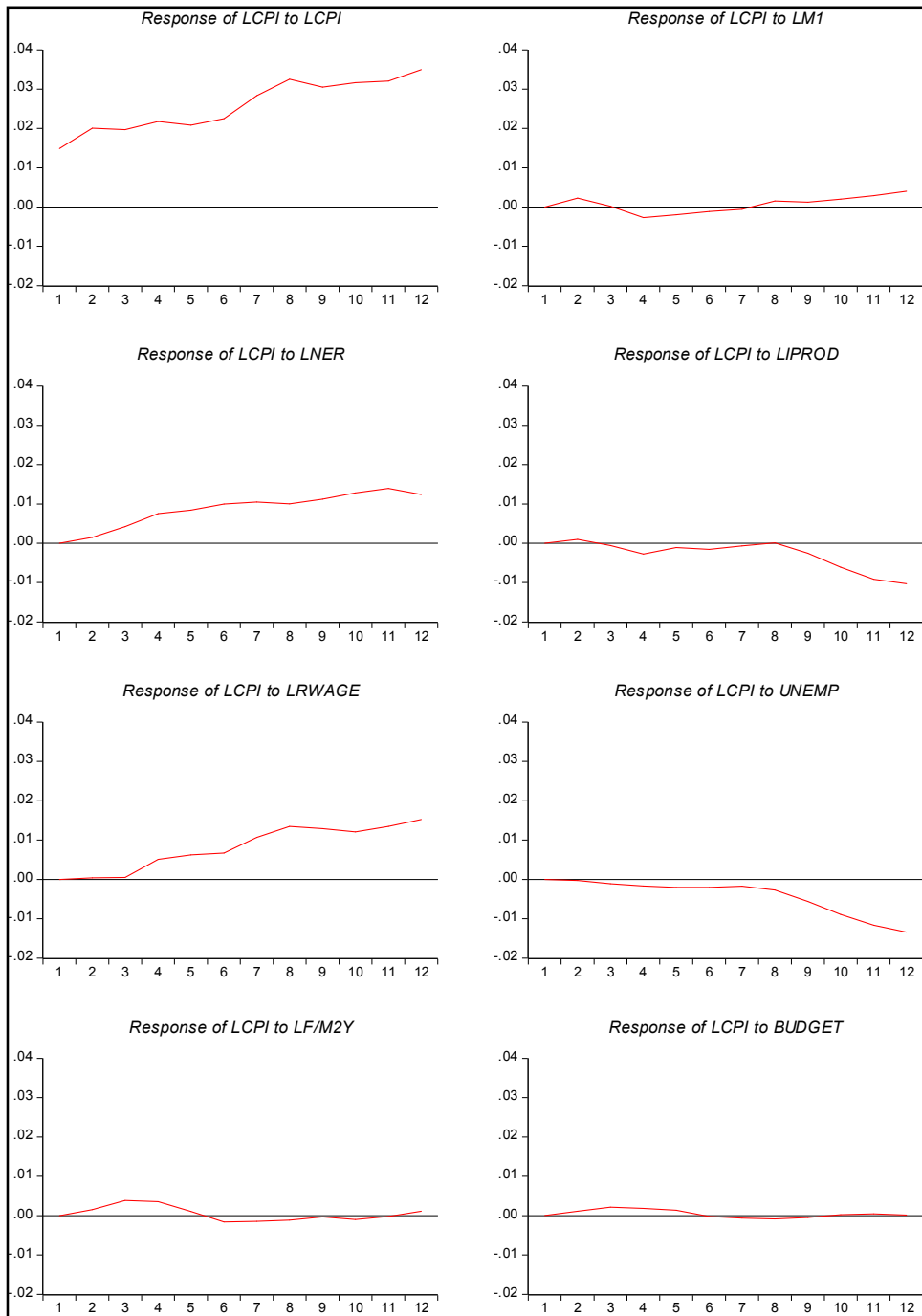


Figure 4.1
Response of LCPI to one-standard deviation shocks in explanatory variables

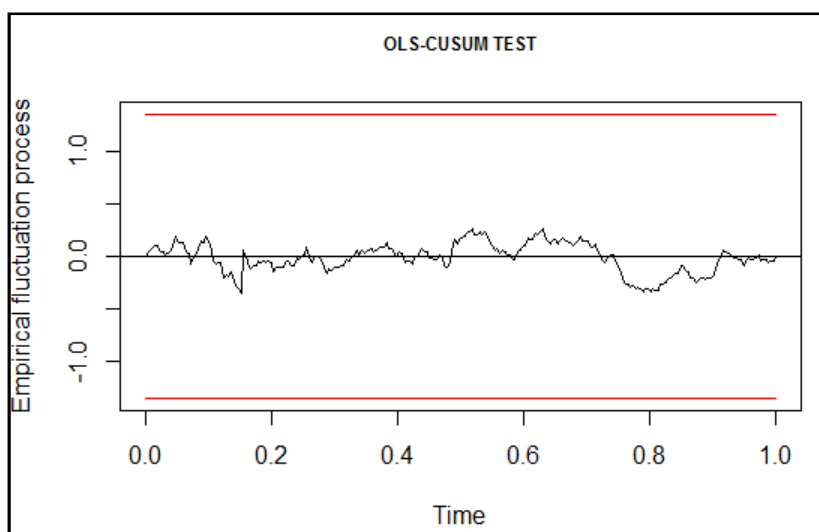


Figure 4.2
Cusum Test results

5. CONCLUDING REMARKS

This paper aimed at illustrating inflation dynamics in the Turkish economy in the 1990-2011 period. After summarizing the stylized facts of the Turkish inflation and the results of the previous empirical studies realized on the Turkish economy over the last twenty years, we used a Johansen Cointegration test and a VEC model in order to identify the short- and long-run determinants of inflation in Turkey. We also implemented an IRF analysis that shows the inflation rate's response to a one-unit shock in the explanatory variables of the model.

According to the estimation results, the inflation rates in Turkey are due to a combination of different economic factors. Increases in money supply lead to a rise in inflation rates in the long-run. Moreover, a depreciation of the domestic currency positively affects inflation rates in the short-run. An increase in dollarization provokes rising inflation rates in the long-run as well. Furthermore, economic growth increases inflation rates in the short-run, while it decreases inflation in the long-run. In addition, a decrease in unemployment rates and a rise in real wages lead to increasing inflation rates in the long- and the short-run, respectively. However, changes in budget balance do not affect inflation rates in the long- or the short-run. Lastly, previous rates of inflation (inflation inertia) also have a positive impact on the current inflation rates in the Turkish economy.

In this sense, the important question is how Turkey has managed to reduce the inflation rates over the 2002-2011 period. We can affirm that in spite of increasing money supply, continuous economic growth, stable unemployment rates creating pressure on real wages (very little increases as seen in Figure A1), overvaluation of the Lira working in parallel the decreasing dollarization in the economy, and improved inflation expectations have played a positive role in lowering inflation rates in the Turkish economy.

This study may be extended for further research, to include other explanatory variables like political stability and governance indicators (central bank independence in particular). Moreover, estimating separate models in a high-inflation (1980-2001) and a low-inflation (2002-2012) periods, may provide us with additional information concerning specific features of the inflation dynamics of the Turkish economy.

APPENDIX

Table A1
Selected recent empirical studies on causes of inflation in Turkey

Study	Data	Empirical Method(s)	Main Results
Dibooglu and Kibritcioglu (2001)	Quarterly data from 1980 to 2000	A dynamic open-economy aggregate supply – aggregate demand model with imperfect capital mobility and structural VAR models	A major component of inflation in Turkey has been “aggregate demand-driven” or “core” inflation. Real oil price, supply and balance-of payments shocks had no significant effect on inflation, while real aggregate demand shocks, which stemmed from changes in the money stock and autonomous aggregate-demand, can be interpreted as a combined result of changes in high public sector budget deficits and devaluations of the TL.
Pongsaparn (2002)	Quarterly data from 1989-2002	VAR and VEC models	Monetary and fiscal factors are playing a significant role in determining inflation.
Erlat (2002)	Monthly data from 1988 to 2000	Autoregressive fractionally integrated moving average (ARFIMA) models	The monthly inflation rate has generally a significant long memory component and will exhibit a great deal of resistance initially.
Akcay, Alper and Ozmucur (2002)	Annual data from 1970 to 2000	VEC models	Changes in the consolidated budget deficit have no permanent effect on the inflation rate, while changes in the public sector borrowing requirement lead to permanent effects on the inflation rate.
Domac (2003)	Monthly data from 1990 to 2002	Autoregressive distributed lag (ARDL) models	According to mark-up models, a rise in wages and a rise in nominal exchange rates have an important effect on domestic prices in the long-run. For monetary models, an increase in the money gap variable, measured as the proportionate deviation of the actual real money supply from its trend value, affects positively the evolution of the inflation. According to Phillips curve, the inflation inertia and the output gap cause a rise in inflation rate.
Tekin-Koru and Ozmen (2003)	Quarterly data from 1983-1999	VAR models	No support for the linkage between the budget deficit and inflation through the wealth effect in Turkey.
Bahmani-Oskooee and Domac (2003)	Monthly data over 1990-2001	VAR models	Shocks in dollarization have a positive impact on prices, exchange rate and public sector prices.
Dibooglu and Kibritcioglu (2004)	Quarterly data from 1980 to 2002	VAR models	Terms of trade shocks have a significant effect on inflation in the short-run. In the long-run, monetary, and balance of payments shocks dominate. Budget deficits play a limited role in the inflationary process.
Us (2004)	Monthly data from 1990 to 2002	VAR models, Variance Decomposition (VDC) and IRF	High prices have not been a result of an expansionary monetary policy. Inertial inflation is not a monetary phenomenon in Turkey

Arbatli (2003)	Monthly data from 1994 to 2004	VAR and Threshold VAR (TVAR) models	Models imply significant asymmetries in the relationship between exchange rate and inflation. Pass-through to prices is lower during significant economic contractions, periods with higher exchange rate depreciation and periods with lower inflation.
Aysoy and Kipici (2005)	Quarterly data from 1987-2002	Ordinary Squares models (OLS)	Inflation expectations and exchange rate play an essential role in the inflationary process.
Ozdemir and Saygili (2008)	Quarterly data over 1990 to 2007	P-star models	Money is important in determining the equilibrium price level.
Karacal and Bahmani-Oskooee (2008)	Monthly data over 1987 to 2004	ARDL models and the bounds testing approach to cointegration analysis	The dollarization, the monetary growth and the exchange rate depreciation are important indicators in explaining the behavior of inflation both in the short-run and in the long-run. The budget deficit is insignificant in the long-run, but it positively affects inflation in the current period. The significant one lagged inflation shows inertial effects of inflation.
Yilmaz (2010)	Quarterly data from 1988-2007	VAR and VEC models	No long-run response of output to a permanent inflation shock in the context of a high inflation. Inflation and output growth are reliably related in the long run. This could also be considered as evidence in favor of the superneutrality of money hypothesis.
Kia (2010)	Quarterly data over 1970 to 2003	VAR models with Gaussian errors and Error correction models (ECM)	An increase in the real government expenditures creates an inflationary environment over the short-run, but it leads to a deflationary environment over the long-run. An increase in the interest rate, while over the long run leads to a higher price level, will reduce the inflation rate over the short-run. The accumulation of debt raises the inflation rate. A weaker currency can help to lower inflation. Only over the short-run the change in the world interest rate leads to higher inflation.
Baskaya, Gulsen and Kara (2012)	Monthly data over 2006 to 2012	Forecast models and random effect estimation method	Forecasts, targets, and past inflation are important determinants of inflation expectations. Expectations are more sensitive to inflation realizations at higher levels of inflation

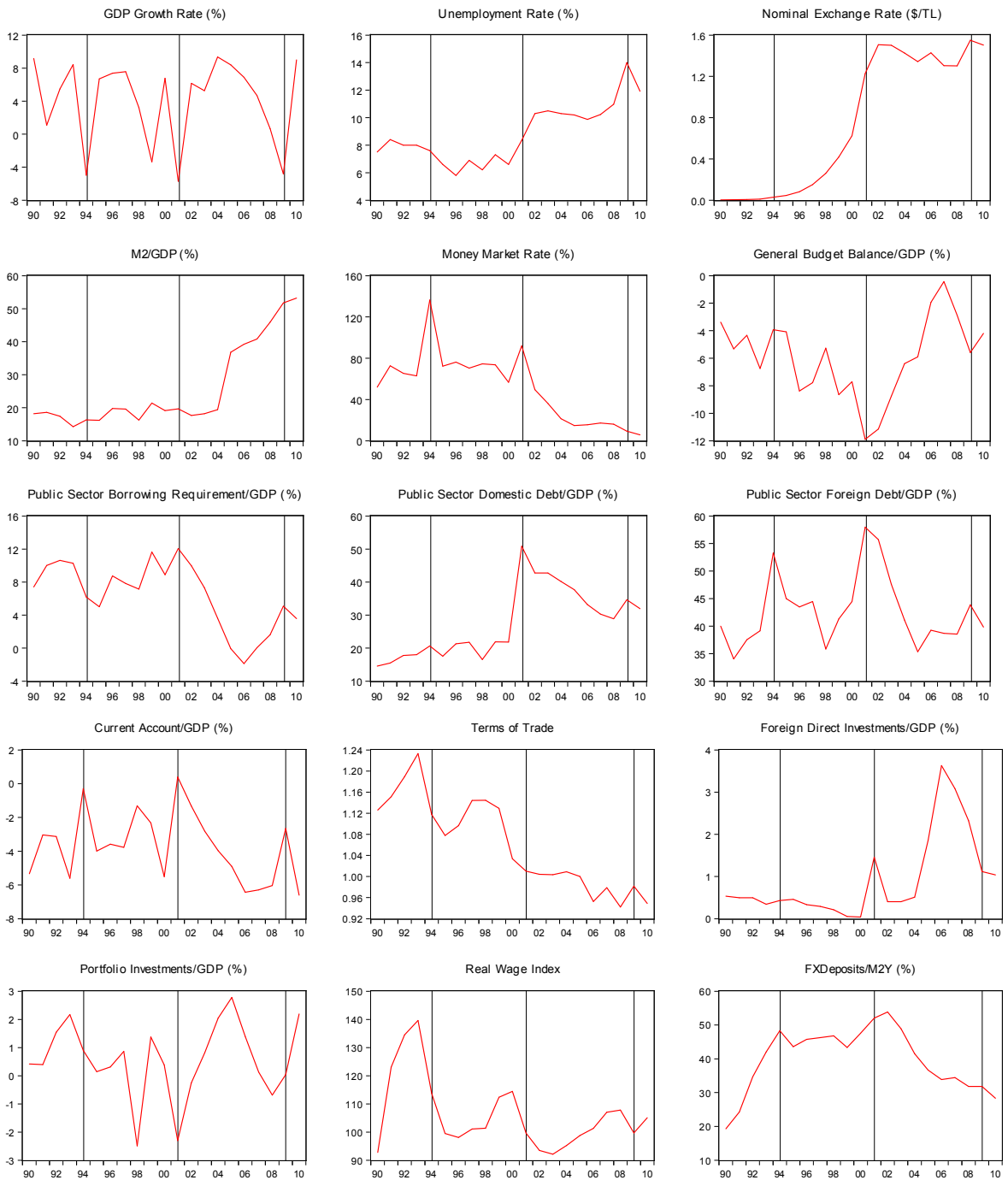


Figure A1

Selected indicators of the Turkish economy (1990–2011)

Source: Authors' calculations with the data obtained from the IFS and the CBRT

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