IS THERE INFLATION-GROWTH TRADEOFF IN THE TURKISH ECONOMY?

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0. Introduction

One of the underlying reasons of having inflation as an important subject in economics, is the general belief that inflation has harmful effects. A possible undesirable consequence of high inflation rate is to increase inflation uncertainty that causes a drop in investment and ultimately in economic growth. Inflation may not only affect the economy through uncertainty. Inflation causes higher tax payments in certain tax systems and distorts the optimal level of cash holdings by consumers (shoe-leather cost). Also frequent changes in prices may be costly to firms (menu cost).

There is a large literature that focuses on the inflation-growth relation. Using panel data a significant negative relation is a well-established result, especially for higher inflation episodes. Controlling for other possible growth determinants, Barro (1996) shows that a negative relation exists for inflation rates above 15%. Judson and Orphanides (1996) use a 10% threshold. Bruno and Easterly (1996) argue in favour of a 40% threshold. Ghosh and Phillips (1998) find a positive affect of low inflation, but for inflation rates above 5% there is a non-linear negative effect.

There are fewer studies on inflation volatility and the results are not consistent. Barro (1996) finds that volatility, which is measured by the standard deviation of 10 yearly

inflation values, has an insignificant coefficient. However, the results of Judson and Orphanides (1996) show a significant negative effect. Their measure of volatility is the standard deviation of four quarters of inflation values.

Andres and Hernando (1998) examine the effect of inflation on investment. They find that inflation lowers the level of investment. Furthermore, they show that even low levels and moderate inflation rates have a negative temporary impact on growth.

In general the impact of inflation on growth is established through the use of panel data. Ma (1998) investigates the relationship between inflation, inflation uncertainty and economic growth for Colombia. He finds that high inflation negatively affects investment and economic growth. Like Ma, Berument and Guner (1997) measure uncertainty as the fitted values from a GARCH (1,1) equation of inflation. They show that the level of inflation and inflation uncertainty increases 3-months time deposit rate in Turkey. In this paper, we investigate whether such a negative relationship between inflation and economic growth holds for Turkey.

The organisation of the paper is as follows. The first part overviews the Turkish economy for the period 1964-2000. In the second part, we estimate an Unrestricted Vector Auto-Regression (UVAR) model that bases on the theoretical framework adopted in Henry Ma's paper and we discuss the empirical results. The third part concludes.

I. An Overview of the Turkish Economy

One can divide the entire period 1964-2000 into five sub-periods: 1964-1972, 1973-1980, 1981-1988, 1989-1994 and 1995-2000 respectively, each sub-period corresponding to a different economic policy implementation.

The 1964-1972 sub-period is characterised by the import substitution and the beginning of the implementation of the 5-year economic development plans. Besides the import substitution strategy and the implementation of the 5-year economic development plans, the main feature of the 1973-1980 sub-period is the populist economic policies implemented especially during 1975-1977. The 1981-1988 sub-period is the structural adjustment policy period that follows the economic crisis years 1978-1980. 1989-1994 sub-period corresponds to another populist economic policies period that ends up with the 1994 crisis. Finally, a series of stabilisation measures that were introduced in 1994 and the introduction of the 1999 Disinflation and Fiscal Adjustment Program and the three-year stand-by agreement signed with the International Monetary Fund (IMF) characterise the 1995-2000 sub-period.

The highest average growth rate of economic growth is attained in the 1964-1972 sub-period where the average inflation rate is at its minimum level (see Figure 1).

Figure 1. Turkish Inflation and Economic Growth 1964-2000
p: Wholesale price index growth rate (1987=100),
y: Gross Domestic Product at 1987 prices growth rate.

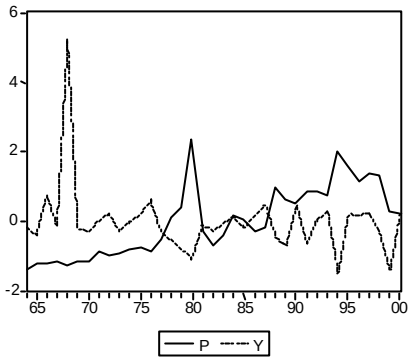
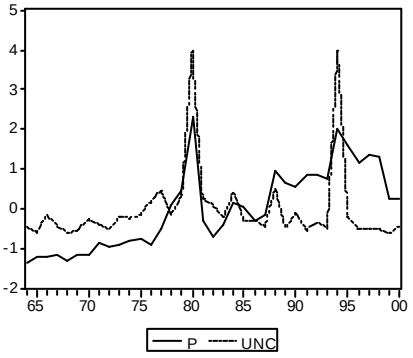


Figure 1 clearly shows the negative effects of inflation on real economic growth. In general, the periods of high inflation are associated with declining growth rates of GDP.

Inflation uncertainty, calculated by the conditional variance of inflation using GARCH techniques, shows a similar picture. It has the minimum value in the 1964-1972 sub-period (see Figure 2).

Figure 2 Inflation and Inflation Uncertainty
UNC: Inflation uncertainty.

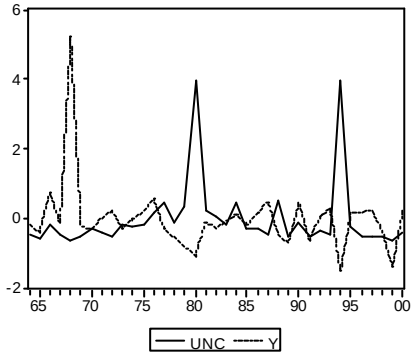


We observe that the average inflation rate has its maximum value at the 1989-1994 sub-period where economic growth is at its minimum level compared to those of the

other sub-periods. Figure 2 reveals that inflation uncertainty rose significantly during the periods of high inflation, leading to a close link between the inflation rate and uncertainty about future inflation.

As shown in Figure 3, in the sub-periods where inflation uncertainty was at its highest levels, GDP growth rates were also at their lowest levels and negative.

Figure 3. Uncertainty and Economic Growth



The main conclusion that can be drawn from this quick overview is that it seems to be a negative relationship between the inflation rate and the economic growth rate in the Turkish economy. The following part of this paper tests empirically this observation.

II. Empirical Study[1]

Okun (1971) and Friedman (1977) were among the first to postulate the relationship between high inflation and inflation uncertainty. Ball (1992) gives a theoretical explanation of this relationship. In the case of an increase in inflation, economic decision-makers could become more uncertain about the central bank's attitude toward inflation. In the case of high inflation, central banks that are committed to low

[1] Theoretical explanations are summarised from Henry Ma (1998).

inflation would try to reduce it, whereas the lower growth and higher unemployment may deter those with a weaker commitment. Therefore, in the case of high inflation the central bank's response to inflation becomes less certain. Putting it differently, high inflation creates uncertainty vis-à-vis the outcomes of major changes in the economic policy.

But, efficient decision making in a market economy depends on clear price signals since many decisions concerning consumption and investment are closely related to the formation of expectations regarding prices. However, in the case of an uncertainty about future prices, the real value of future payments and earnings become uncertain. Consequently, to avoid the risks arising from inflation uncertainty, economic agents could modify their decisions. For instance, firms could postpone capital formation; households could put off housing investment.

Therefore, uncertainty created by high inflation would decrease investment expenditures and, in turn the rate of economic growth.[2]

Using Unrestricted Vector Auto-Regression (UVAR) technique, we are going to estimate a four-variable system that bases on the above analysis. The variables are p, unc, pri, and y respectively, where, p: the log of wholesale price index growth rate (1987=100), unc: the conditional variance of inflation generated from a GARCH (1, 1) specification of inflation used as a time-series measure of inflation uncertainty, pri: private investment expenditures at 1987 prices and y: the log of GDP at 1987 prices,

[2] See Aizenman and Marion (1993a, 1993b and 1998), Pindyck and Solimano (1993) and Ramey and Ramey (1995).

This four-variable UVAR will be the basis of the Impulse Response (IR) analysis that investigates the effect of a shock to p on unc, pri, and y respectively. Estimation will be done using monthly data set. Estimation covers the 1988.05-2000.12 period.

II.1. UVAR and IR Analysis

The Augmented Dickey-Fuller (ADF) unit root test results, not reported here, show that unc is stationary, whereas p, pri and y are trend non-stationary, their order of integration being equal to one. The first difference of these variables, denoted by dp, dpri, dy, are used in UVAR estimation.

Using standard Box-Jenkins techniques, we determine that the best fitting time-series model is a GARCH (1, 1) model with a first order moving average [MA(1)] and a twelfth order seasonal moving average term [SMA(12)]. unc is the GARCH variance series of this model whose estimates are reported in Table 1.

Table 1

Dependent Variable: DP
Method: ML - ARCH

Sample(adjusted): 1961:03 2000:12
Included observations: 478 after adjusting endpoints
Convergence achieved after 30 iterations
Backcast: 1960:02 1961:02

	Coefficient	Std. Error	z-Statistic	Prob.
C	-2.94E-06	8.01E-05	-0.036709	0.9707
MA(1)	-0.717718	0.043131	-16.64032	0.0000
SMA(12)	-0.769147	0.026046	-29.53077	0.0000
Variance Equation				
C	0.000186	5.93E-05	3.137070	0.0017
ARCH(1)	0.161752	0.038055	4.250516	0.0000
GARCH(1)	0.456719	0.151069	3.023244	0.0025

R-squared	0.581981	Mean dependent var	-4.07E-05
Adjusted R-squared	0.577553	S.D. dependent var	0.033621
S.E. of regression	0.021852	Akaike info criterion	-4.852919
Sum squared resid	0.225391	Schwarz criterion	-4.800580
Log likelihood	1165.848	F-statistic	131.4271
Durbin-Watson stat	1.933194	Prob(F-statistic)	0.000000

Compatible with the above analysis, we adopt the following ordering for the four-variable UVAR: dp, unc, dpri, and dy.[3]

Following our theoretical framework, an increase (decrease) in dp increases (decreases) unc decreasing (increasing) dpri that, in turn, falls (rises) dy. Therefore, we expect increase in unc, and fall in both pri and y respectively, due to a positive shock to pi.

The following diagrams confirm our a priori expectations. Diagram 1 shows that the response of unc to a positive shock to dp is positive. On the other hand, positive shock to dp leads to a fall both in dpri and dy. All the results are statistically significant.

Diagram 1

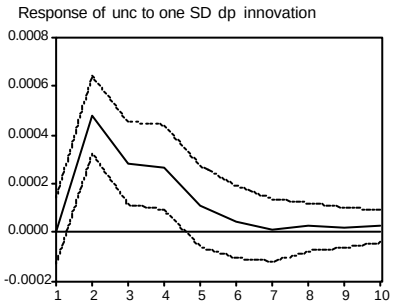


Diagram 2

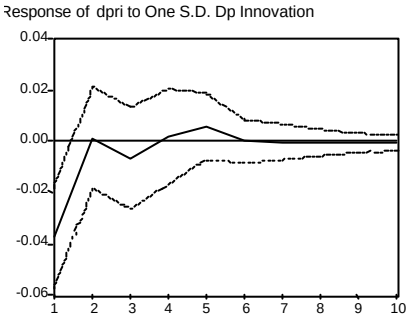
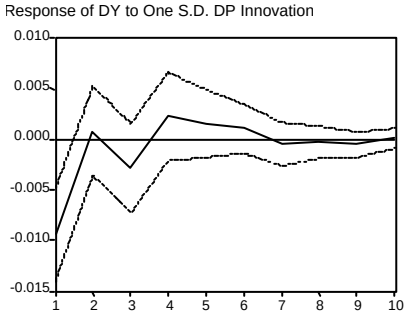


Diagram 3



[3] The diagrams presented below are based on UVAR estimates whose order is of 3 months. We got similar results, not reported here, for different orders of UVAR, such as 6, 9 and 12 months.

II.2. Block Non-Causality Tests

To check the robustness of these results and investigate the direction of causality we further performed Granger block non-causality test to our four-variable UVAR model.

The following tables report test results for different order of UVAR.

Table 2. Block Non-Causality Results

Order of UVAR: 3 months

Variable assumed to be "non-causal" under the null hypothesis: dp

LR test of block non-causality, CHSQ(9)= 39.1691[.000]

Variable assumed to be "non-causal" under the null hypothesis: unc

LR test of block non-causality, CHSQ(9)= 6.4643[.693]

Variable assumed to be "non-causal" under the null hypothesis: dpri

LR test of block non-causality, CHSQ(9)= 13.4572[.143]

Variable assumed to be "non-causal" under the null hypothesis: dy

LR test of block non-causality, CHSQ(9)= 16.1350[.064]

The results indicate that the only variables that block cause the system are dp and dy.

Table 3. Block Non-Causality Results

Order of UVAR: 6 months

Variable assumed to be "non-causal" under the null hypothesis: dp

LR test of block non-causality, CHSQ(18)= 63.9277[.000]

Variable assumed to be "non-causal" under the null hypothesis: unc

LR test of block non-causality, CHSQ(18)= 12.8532[.800]

Variable assumed to be "non-causal" under the null hypothesis: dpri

LR test of block non-causality, CHSQ(18)= 23.2515[.181]

Variable assumed to be "non-causal" under the null hypothesis: dy

LR test of block non-causality, CHSQ(18)= 32.0055[.022]

As in the case of third order UVAR, according to the sixth order UVAR's results, dp and block cause whereas unc and dpri do not.

Table 4. Block Non-Causality Results

Order of UVAR: 9 months

Variable assumed to be "non-causal" under the null hypothesis: dp

LR test of block non-causality, CHSQ(27)= 99.8385[.000]

Variable assumed to be "non-causal" under the null hypothesis: unc

LR test of block non-causality, CHSQ(27)= 42.6913[.028]

Variable assumed to be "non-causal" under the null hypothesis: dpri

LR test of block non-causality, CHSQ(27)= 52.8149[.002]

Variable assumed to be "non-causal" under the null hypothesis: dy

LR test of block non-causality, CHSQ(27)= 45.3102[.015]

In the case of ninth order UVAR, each variable block causes the system.

Table 5. Block Non-Causality Results

Order of UVAR: 12 months

Variable assumed to be "non-causal" under the null hypothesis: dp

LR test of block non-causality, CHSQ(36)= 182.1111[.000]

Variable assumed to be "non-causal" under the null hypothesis: unc

LR test of block non-causality, CHSQ(36)= 61.5939[.005]

Variable assumed to be "non-causal" under the null hypothesis: dpri

LR test of block non-causality, CHSQ(36)= 51.4773[.046]

Variable assumed to be "non-causal" under the null hypothesis: dy

LR test of block non-causality, CHSQ(36)= 64.6667[.002]

The results of the twelfth order UVAR are similar to those of the ninth order UVAR.

The results of IR analysis seem to be robust. Since, they coincide with those of block non-causality tests.

Conclusion

The effect of inflation is one of the most studied subject because of its importance. It is generally accepted that inflation negatively affects the economic growth. Turkey is suffering from high inflation for the past 25 years. This paper supports that Turkey also has faced the cost of high inflation in terms of lower economic growth. The results show that inflation adversely affects both private investments and the economic growth.

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