

Inflation and Inflation Uncertainty in Turkey: Evidence from the Past Two Decades

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Abstract

This paper employs an autoregressive conditional heteroskedasticity (ARCH) model to measure inflation variability and to test the relationship between the level and variability of the inflation rate. We use the monthly wholesale price series between 1982:10 and 1999:12. The test results indicate that inflation and its variability has a significant positive correlation. The current study provides further evidence in support of the Friedman (1977) hypothesis that high inflation also leads to more variable inflation.

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I. Introduction

The literature on inflation suggests that inflation has welfare costs to society, even when it is predictable (see, for example, Bailey, 1957). As inflation rises, however, its predictability diminishes, adding to the costs of inflation via distorted relative prices and resource allocation; and increased risk in long-term contracts (see, for example, Friedman [1977]). The increased uncertainty in economic decisions, in turn, may lower investment and output. Berument and Guner (1997), Berument (1999) and Berument and Malatyali (2000) all analyze the positive association between both inflation and inflation uncertainty and interest rates. The literature also provides substantial evidence that inflation and inflation uncertainty are positively associated both across countries and over time for the US (see, for example, Holland [1984] for the review of earlier studies; and Ball and Cecchetti [1990], Evans [1991], Brunner and Hess [1993], and Caporale and McKiernan [1997]).

This paper is an application of the paper by Caporale and McKiernan (1997) that provides supportive evidence for the positive and significant relationship between the level and variability of inflation in the US, using monthly data for the period between 1947:01 and 1994:08. As Caporale and McKiernan do as different from the earlier studies, we also use the lagged level of inflation in the conditional variance equation to obtain a consistent parametric estimate of the effect of mean inflation on its conditional variance.

The current study uses the rate of change in the monthly Turkish wholesale price index ranging from 1982:10 till 1999:12. Our finding of the positive and significant association between

inflation and its variance provide further support for the earlier literature. An important implication of this study is that the positive association between the level and variability of inflation renders the credibility of the disinflation program even more important. As Berument (1999) points out, in the absence of credibility, the expected inflation rate would change more slowly than the actual inflation, leading to increased forecast errors that may, in turn, lead to a slow-down in investment and thus to output losses, in addition to the amount that a stabilization program would normally bring about.

2.Data and Results

We use the rate of growth of wholesale price index for the period between 1982:10 and 1999:12.¹ Based on final prediction error criteria (FPE), we employ up to seven lags of inflation in the inflation equation.² We also include monthly dummies to seasonally adjust the data. The following is the autoregressive conditional heteroskedasticity (ARCH) model estimate of inflation using its own lags, monthly dummies and a dummy for April 1994 (denoted by D94 below) to control for the major impact of the financial crisis.

¹ The reason why we use the wholesale prices rather than the consumer prices is that the Turkish consumer price series exhibit a long memory, mainly due to rent contracts and backward indexation in services (particularly in education and health care), and thus small variability, which may hinder the detection of a possible relationship between inflation and inflation uncertainty. Wholesale prices is therefore more suitable for the current analysis.

²FPE criteria sets the lag order so as to eliminate the autocorrelated error.

$$\check{\delta}_t = 0.013 + 0.52 \check{\delta}_{t-1} - 0.02 \check{\delta}_{t-2} - 0.05 \check{\delta}_{t-3} + 0.02 \check{\delta}_{t-4} + 0.02 \check{\delta}_{t-5} + 0.06 \check{\delta}_{t-6} + 0.11 \check{\delta}_{t-7} + 0.22 D94$$

(20.81) (33.46) (-0.94) (-2.01) (0.75) (2.30) (8.52) (12.83) (25.17)

$$\hat{\sigma}_t^2 = 0.0002 + 0.32 \hat{a}_{t-1}^2$$

(4.46) (1.17)

where Likelihood Function Value = 605.112 ; Ljung-Box Q(12) = 8.84 (p-value: 0.72); ARCH LM (Lagrange multiplier) test for 12 lags: 12.71 (p-value: 0.39). The coefficient estimates of monthly dummy variables, which are not reported here, are significant and positive for the first, second, third, tenth and the twelfth months; and significant and negative for the months between the forth and the eighth and also for the tenth months.

Based on the Ljung-Box Q test statistic, we can not reject the null hypothesis that there is no twelfth order serial correlation. Moreover, the ARCH LM test for 12 lags indicate that we also can not reject the hypothesis of no ARCH effects in the standardized residuals.

We next estimate the conditional variance equation by including a lag of the inflation rate. The following pair of equations reports those results:

$$\check{\delta}_t = 0.013 + 0.58 \check{\delta}_{t-1} - 0.05 \check{\delta}_{t-2} - 0.05 \check{\delta}_{t-3} + 0.02 \check{\delta}_{t-4} + 0.02 \check{\delta}_{t-5} + 0.05 \check{\delta}_{t-6} + 0.10 \check{\delta}_{t-7} + 0.22 D94$$

(5.48) (13.25) (-1.31) (3.27) (1.34) (1.21) (3.98) (8.56) (28.61)

$$\hat{\sigma}_t^2 = -0.000005 + 0.28 \hat{a}_{t-1}^2 + 0.05 \check{\delta}_{t-1}$$

(-0.09) (1.52) (2.95)

where Likelihood Number = 608.898 ; Ljung-Box Q(12) = 14.93 (p-value: 0.25); ARCH LM test

for 12 lags: 8.88 (p-value: 0.71). The coefficient estimates of monthly dummy variables, which are not reported here, are significant and positive for the first and the twelfth months; and significant and negative for the months between the fifth and the seventh months only.

As before, based on the Ljung-Box Q test and ARCH LM test, we can neither reject the null hypotheses that there is no twelfth order serial correlation nor that there is no ARCH effects in the standardized residuals. However, we observe that there is a positive and significant, at 1%, effect of inflation on the conditional variance of inflation. This result is consistent with the theoretical and empirical literature that argue for the positive association between inflation and inflation uncertainty.

As an alternative model, we also tried a generalized autoregressive conditional heteroskedasticity (GARCH) representation of inflation, by adding a lagged variance term in the conditional variance equation. However, the test results of the estimation do not support this representation.

3. Conclusion

This paper tests the association between the level and variability of inflation in Turkey using the monthly wholesale price index between 1982:10 and 1999:12. The results of a conditional variance equation estimation indicate that there is a positive and significant relationship between the two variables. We may thus conclude that the phenomenon of chronic Turkish inflation, which remained high during more than the past two decades, has been costly to the society and the economy not only via the commonly known channels of distorted prices and

income; but also via the channel of highly uncertain inflation. In light of the findings of the earlier studies on Turkey (see, for example, Berument and Guner [1997] and Berument and Malatyali [2000]) that suggested a positive association with the interest rates of high and variable inflation, it is therefore possible to argue that high inflation has constituted a serious impediment for growth, via its negative impact on investment. This argument certainly leaves a question to be further explored in a future study.

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