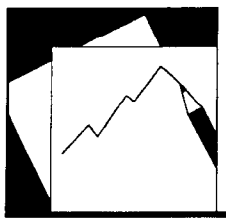
WP/03/49



IMF Working Paper

Would "Cold Turkey" Work in Turkey?

Oya Celasun, R. Gaston Gelos, and
Alessandro Prati

INTERNATIONAL MONETARY FUND

 WP/03/49

IMF Working Paper

Research Department

Would "Cold Turkey" Work in Turkey?

Prepared by Oya Celasun, R. Gaston Gelos, and Alessandro Prati[1]

Authorized for distribution by Ratna Sahay

March 2003

Abstract

Persistently high inflation rates have led many to believe that inflation in Turkey has become "inertial," posing an obstacle to disinflation. We assess the empirical validity of this argument. We find that the current degree of inflation persistence in Turkey is lower than in Brazil and Uruguay prior to their successful stabilization programs. More significantly, expectations of future inflation are more important than past inflation in shaping the inflation process, providing little evidence of "backward-looking" behavior. Using survey data, we find that inflation expectations, in turn, depend largely on the evolution of fiscal variables.

JEL Classification Numbers: E31, E52

Keywords: Inflation, inertia, price rigidities, stabilization

Authors E-Mail Addresses: ocelasun@imf.org, ggelos@imf.org, aprati@imf.org

---

[1] The authors wish to thank Richard Clarida, Mark Griffiths, Juha Kähkönen, Ratna Sahay, Antonio Spilimbergo, and Carlos Végh for helpful discussions, and the Research Department of the Central Bank of Turkey for useful comments and suggestions.

Contents Page

I. INTRODUCTION

Bringing down inflation from persistently high levels while avoiding economic disruption remains one of the most important challenges for policymakers in many developing countries. The critical question in a disinflation attempt is how quickly inflation will respond to a tightening in monetary policy. If agents are predominantly forward looking and the monetary tightening is credible, actual and expected inflation will quickly adjust to the new regime and the output costs will be small, even if disinflation is rapid—that is, if a "cold turkey" policy is adopted.[2] By contrast, if agents' price-setting behavior is backward looking because of wage and price indexation or adaptive expectations, disinflation will need to be more gradual to minimize output losses. For this reason, it is important to be able to assess the extent to which inflation has an "inertial" component. Methodological questions on how to address this problem have therefore received significant attention in the academic literature.[3]

Turkey is an ideal case study for these issues, because it has experienced persistently high inflation since the 1970s. In contrast to many other high-inflation countries, which at some point experienced hyperinflation, Turkey's inflation has never exploded, with annual inflation rates hovering around stable but gradually increasing plateaus ranging from 40 percent to 120 percent over the last decade. This persistence has led many to believe that inflation is largely driven by inertia, with entrenched inflation expectations posing an obstacle to any disinflation attempt. In fact, the failure of the 2000 stabilization program supported by the IMF has been attributed by many to the presence of inflation inertia.[4]

We find little empirical support for this argument. First, the univariate properties of inflation dynamics show that the current degree of inflation persistence in Turkey is lower than that of Brazil and Uruguay prior to their successful stabilization programs. Second, using a framework similar to that in Galí and Gertler (1999), and employing both price and survey data, we find that expectations of future inflation are more important than past inflation in shaping the inflation process. Third, an examination of the determinants of inflation expectations shows that expectations depend largely on the evolution of fiscal variables.

---

[2] The literature on stabilization is too large to be discussed here. See Sargent (1982) for a study of the process of ending hyperinflations and Calvo and Vegh (1999) for an extensive discussion of inflation stabilization in developing countries. Fischer, Sahay, and Vegh (2002) provide an overview of modern hyper- and high inflations, including disinflation episodes. Hamann and Prati (2002) study why many inflation stabilizations succeed only temporarily.

[3] See, among many others, the discussions in Chadha, Masson, and Meredith (1992), Celasun (2001), Dotsey (2002), and Galí and Gertler (1999).

[4] See the conference report of the 2001 NBER conference on Turkey under *http://www.nber.org/crisis/turkey_report.html*.

Contrary to a widely held view, these findings suggest that backward-looking contracts do not pose a serious constraint to the disinflation process. Indeed, authorities could effectively control the speed of the disinflation by adopting and maintaining policies that influence expectations of future inflation. Moreover, since inflation is determined to a large extent by forward-looking behavior, output costs associated with a rapid disinflation program are likely to be relatively low. A credible fiscal consolidation is probably the key to reducing inflation, since inflation expectations will decline only if the public perceives that the need to monetize fiscal deficits or inflate away the debt stock has come to an end.

On methodological grounds, our paper innovates by making extensive use of survey data. While survey data have previously been used in the literature, we go one step further by attempting to explain the formation of expectations, explicitly distinguishing between fiscal and monetary factors.[5]

The main aim of this paper, however, is to answer a policy question; for this reason, we do not restrict ourselves to a single empirical approach, but present the results from various alternative methods, hoping to assemble a body of convincing evidence supporting our conclusion.

II. What Do We Know About Wage and Price Indexation?

While there is a perception that a significant share of wage and price contracts in Turkey are indexed to past inflation, there is little comprehensive documentation of the nature of indexation in various sectors of the economy. The contract length in the small fraction of the private sector covered by collective bargaining (about 350,000 workers) is typically two years with six-month backward indexation. The wages of the vast majority of workers are negotiated on a firm-by-firm basis and little is known about their nature, except that their length is usually six months. The 2000 program agreed with the IMF included a shift in the inflation adjustment of *civil service* sector wages and pensions from a backward-looking mechanism to a forward-looking adjustment in line with projected inflation rates, with catch-up clauses. Currently, civil servant salaries and blue-collar workers in the public sector are adjusted twice a year. Little is documented about other indexation mechanisms in the economy. Interestingly, Shiller (1997) cites Turkey as a puzzling example of a country with high and variable inflation without substantial indexing.

There is some inertia in public sector price adjustments, possibly contributing to inflation persistence. The government budget uses a backward-looking revaluation coefficient based on the average annual increase in the WPI to determine many taxes and

[5] For an example of the use of survey data in the estimation of the Phillips curve, see Roberts (1995).

user fees. Prices of utilities, medical supplies, and many food items are controlled by the government, the exact extent to which inflation adjustments in these areas are characterized by systematic inertial (i.e. backward-looking) behavior is not fully clear.

The time-series behavior of CPI subindices suggests that, in important nontradable sectors of the economy, prices tend to be adjusted with several month lags. We find that housing, health, and education prices appear to be the most sluggish, while prices of food, clothing, and housewares are the most flexible.[6] The nontradable sector price increases seem to be set largely based on past inflation. The left-hand panels in Figure 1 show, as we would expect in such a case, that the ratio of the index of slowly-adjusting prices (housing, health, education) to the overall CPI increases as inflation declines from end-1997 to end-2000 and diminish when inflation accelerates in 2001. The right-hand panels in Figure 1 show that the ratios of those price categories that are more flexible than the average move in the same direction as the inflation rate.

III. Persistence: A Univariate Analysis

How important is inflation persistence in the aggregate? A univariate analysis of inflation dynamics indicates that inflation persistence in Turkey during 1994–2002 was small in both relative and absolute terms. We first estimated a simple regression of monthly CPI inflation on its lag and a linear trend for the period January 1994–February 2002. We then computed Andrews' (1993) median unbiased estimator of the first order autoregressive parameter and obtained the half-life estimates shown in Figure 2 by replicating this procedure on rolling samples of 60 observations.[7] The estimated half-life of a unit shock to CPI inflation (the length of time needed to halve the magnitude of the original shock) is only about one month and has been relatively stable over time, remaining between 0.8 and 1.3 months over the last three years (top panel of Figure 2).[8]

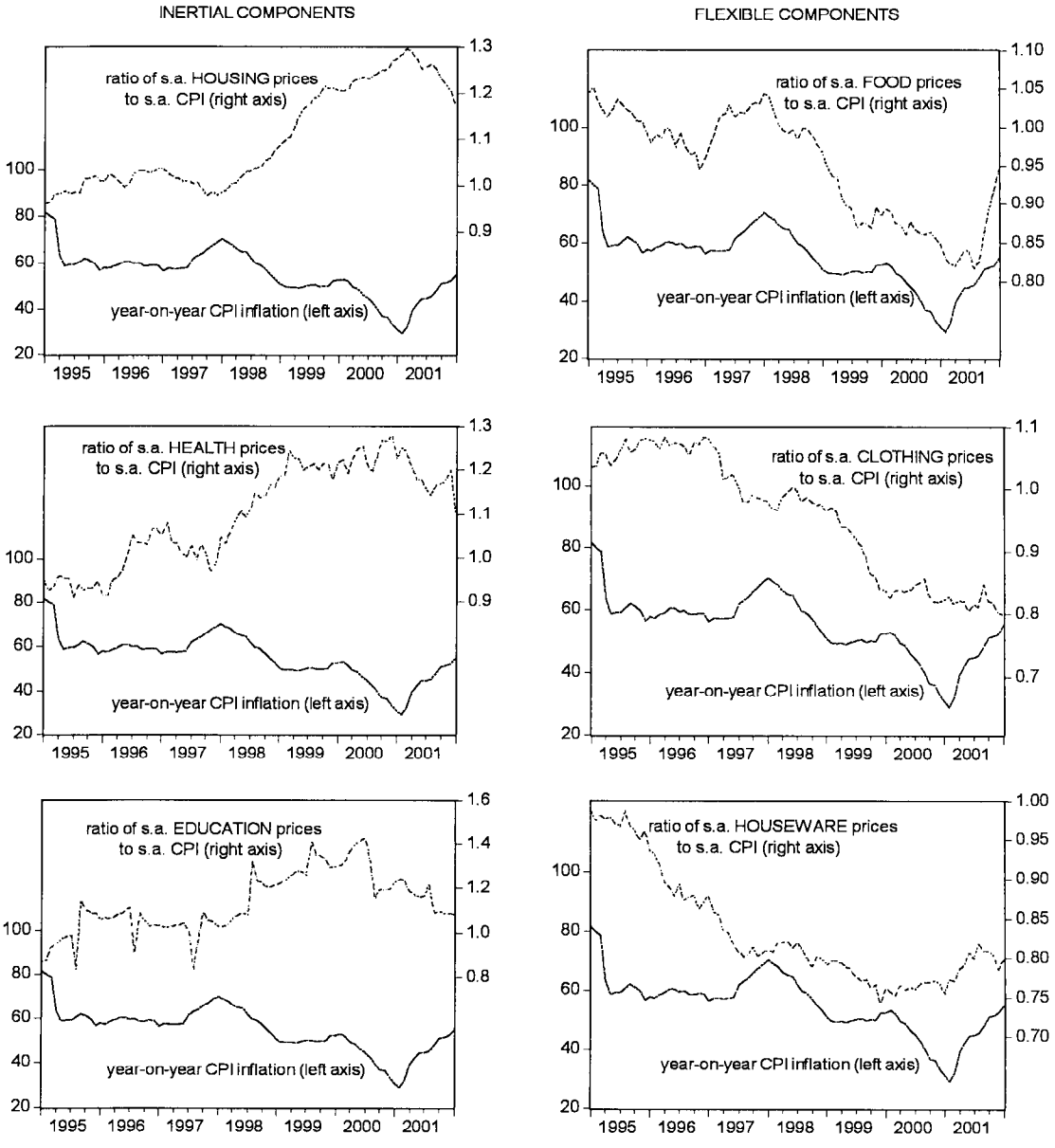
---

[6] Food prices carry the largest weight in the CPI (31 percent), followed by housing (26 percent), clothing (9.8 percent), transportation (9.3 percent), housewares (9 percent), health (2.9 percent), entertainment (2.9 percent), hotels and restaurants (2.8 percent), education (1.6 percent), and miscellaneous (4.5 percent.)

[7] Stock (2001), in a comment on Cogley and Sargent (2001) notes: "There are a variety of ways to measure persistence, none perfect." He then goes on to use a median-unbiased estimation method similar to the one employed here.

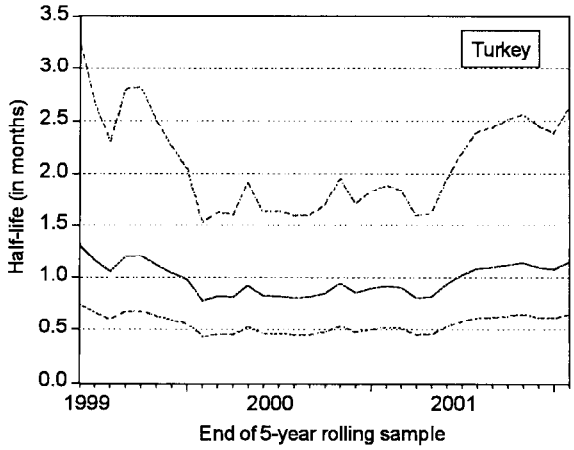
[8] We also repeated the analysis on quarterly data obtaining analogous results. For all these calculations, we modified a program that was originally written by Antonio Spilimbergo.

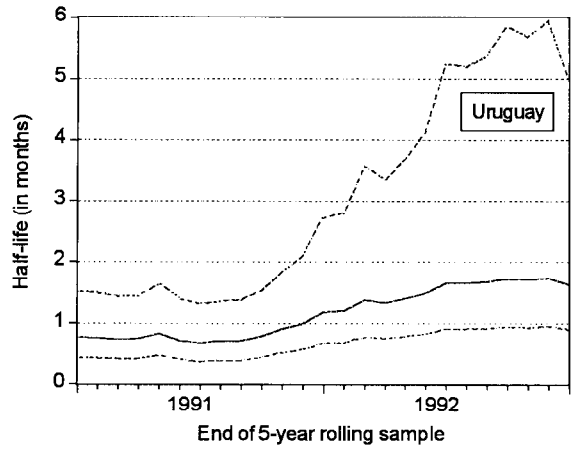
Figure 1. Inflation Inertia and the Components of the CPI Index

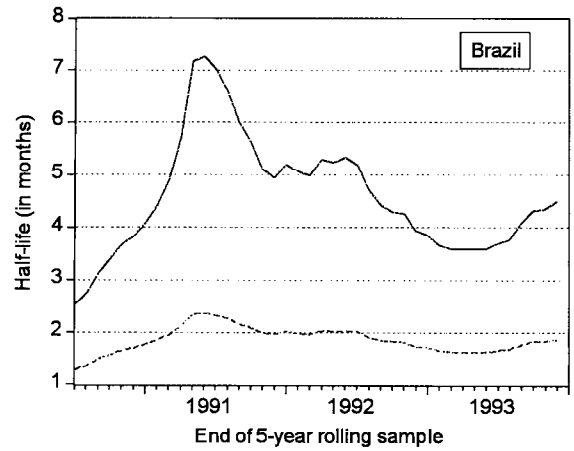


Note: The abbreviation "s.a." denotes seasonally adjusted.

Figure 2. Inflation Persistence in Turkey, Uruguay, and Brazil
(median unbiased half-life estimates of a unit shock and 90 percent confidence band)







CPI inflation in Turkey is also less persistent than in Uruguay and Brazil prior to their successful inflation stabilizations. Uruguay like Turkey had a history of high but relatively stable inflation before embarking on a successful stabilization program at the beginning of the 1990s after inflation reached a peak of 140 percent. The middle panel in Figure 2 shows that in Uruguay the half-life of a unit shock prior to stabilization was similar or marginally higher than that of Turkey in February 2002. The case of Brazil is also of interest because it was a country with extensive backward wage and price indexation before the 1994 stabilization. This is reflected in half-life estimates between four and seven months (bottom panel in Figure 2).[9]

While inflation persistence in Turkey is small, half-life estimates are always significantly different from zero (top panel in Figure 2), suggesting that further analysis is warranted. Univariate persistence may be due to backward-looking price setting, , but it is also consistent with forward-looking behavior. Serial correlation in the variables that drive inflation, such as exchange rate depreciation or money growth, would reconcile univariate persistence and forward-looking behavior. The next section assesses the relative importance of backward and forward-looking behavior by estimating a multivariate regression that nests both hypotheses.

IV. The Relative Importance of Backward Versus Forward-Looking Behavior

The distinction between backward- and forward-looking price setting behaviors is important from a policy point of view because the output costs of a rapid disinflation would tend to be higher with backward-looking behavior.[10] By contrast, forward-looking price setters would quickly take into account the implications for inflation of a credible change in the monetary regime, thus making the costs of disinflation relatively small. In this section, after describing the empirical model, we use two alternative measures of inflation expectations, actual future inflation and survey inflation forecasts, to assess the degree of forward-looking pricing behavior in Turkey. We find that, while past inflation contributes to explain current inflation dynamics, expectations of future inflation play a much more important role.

---

[9] The bottom panel of Figure 2 does not show the upper bound of the confidence interval for the half-life of a shock to inflation in Brazil because the corresponding median unbiased estimator of the autoregressive parameter was 1, suggesting that the Brazilian CPI inflation series could be nonstationary, as shown in other studies (see, for example, Durevall (1999)).

[10] See, for example, the discussions in Ball (1994), Celasun (2001), or Buiter and Grafe (2001).

A. Empirical Model

We estimate an empirical model that nests the possibility of both backward- and forward-looking price-setting behavior. Traditional models of price stickiness with purely forward-looking agents do not generate inflation persistence. The Calvo (1983) model can be modified by assuming that only a fraction of the firms in the economy is forward looking, while the rest is backward looking.[11] As in the original Calvo (1983) model, only a fraction of firms are assumed to change prices every period while the rest keep prices constant. Forward-looking firms have rational expectations, and backward-looking price setters use a rule of thumb: they update the average new price in the most recent round of price adjustments by the most recently observed inflation rate. The resulting inflation rate in period t, π_t equals:

$$\pi_t = (1-\delta)\pi_{t-1} + \delta E_t \pi_{t+1} + \lambda(V_t^* - P_t) \qquad (1)$$

where V_t^* corresponds to the logarithm of the price a forward looking firm would select for period t, if it were able to reset its price in each period, and P_t is the logarithm of the aggregate price level. The firms are assumed to be monopolistically competitive, and therefore choose V_t^* as the (logarithm) of a markup over nominal marginal costs, in deviation from steady state. The term $V_t^* - P_t$ then corresponds to the level of real marginal cost, and is often proxied by the level of excess demand.[12] We extend Celasun's (2001) specification for the nontradables component of the Turkish CPI to the overall CPI, and include in the equation terms proxying for marginal costs for tradable goods as well as the excess demand for nontradable goods and services. The degree of inflation inertia is governed by the parameter $1-\delta$. The higher is the share of backward-looking price setters the larger is the weight $1-\delta$ on the lagged inflation term. Similar equations can be motivated by other models that explain inflation persistence, such as Chadha, Masson, and Meredith (1992), Fuhrer and Moore (1995), Jadresic (2000), Driscoll and Holden (2001).[13]

---

[11] Similar specifications have been used by Obstfeld (1995), Galí and Gertler (1999), Ghezzi (2001), and Celasun (2001).

[12] Galí and Gertler (1999) argue that proxies for marginal costs should be used instead of an excess demand/output gap variable. See also the discussion in Celasun (2001). We will use both approaches below.

[13] Chadha, Masson, and Meredith (1992) show that when δ is greater than 0.5 there is a money growth rate that keeps the output gap at zero along the disinflation path.

B. Estimates with Actual Future Inflation

We first estimate equations for Turkish CPI inflation, proxying expected future inflation rates by actual future inflation rates. Given that the measurement error introduced by using such a proxy is not orthogonal to the actual future realization of the inflation rate, the appropriate estimation technique involves using instrumental variables that are orthogonal to the expectational error. Moreover, the error term in this case follows a MA(1) process and is not necessarily homoskedastic, so we use the generalized method of moments (GMM) to take into account the structure of the error term. In addition to the lagged and future inflation terms, we include terms proxying for the marginal costs and the excess demand of the tradable and nontradable components of the CPI, respectively: the real wage (*rwage*) and the real exchange rate (*rer*), and, as a proxy for nontradables excess demand, the relative price of tradables with respect to nontradables in the CPI index (*trntr*) and the imports-to-GDP ratio (*imp*).[14] [15] We do not impose any restrictions on the coefficients of these terms, letting them to be determined by the data.[16] Our set of instruments include three lags of inflation and all the other variables in the equation, three lags of the nominal interest rate, and a dummy variable for the second quarter of 1994 to account for the effect of the April 1994 crisis. The constant term in the equation is allowed to vary in the two subsamples 1990:Q1–1994:Q1 and 1994:Q2–1998:Q1. The equation estimated for 1990:Q1–1998:Q1 is as follows, with standard errors in parentheses:[17]

$$\pi_t = 0.38\pi_{t-1} + \underset{(0.08^{**})}{0.62}\, E_t\pi_{t+1} + \underset{(0.11^{**})}{0.44}\, rer_t + \underset{(0.09^{**})}{0.34}\, rwage_t + \underset{(0.17^{**})}{0.62}\, trntr_t + \underset{(0.05^{**})}{0.39}\, imp_t \qquad (1.1)$$

The weight on expected future inflation is significant and positive but below one, and not statistically distinct from 0.5. All the four driving variables also enter the equation in a statistically significant manner, with the expected sign. Hansen's *J*-statistic has a p-value of 0.378, implying that the instruments and the model are valid. To examine whether the degree

---

[14] See Celasun (2001) on the motivation for the measure used to proxy nontradables excess demand.

[15] All variables are in logarithms, and except for the real wage, in deviation from a linear trend. For the logarithm of the real wage, the quadratic trend was also statistically significant, and therefore was used along with the linear one in detrending.

[16] The presence of the real exchange rate term accounts for the possibility that a share of firms, most likely in the tradables sector, "index" their prices to the current and expected future domestic level of foreign prices (i.e. the exchange rate multiplied by foreign prices). We plan to test in future work whether some price setters index to the exchange rate in a backward-looking manner.

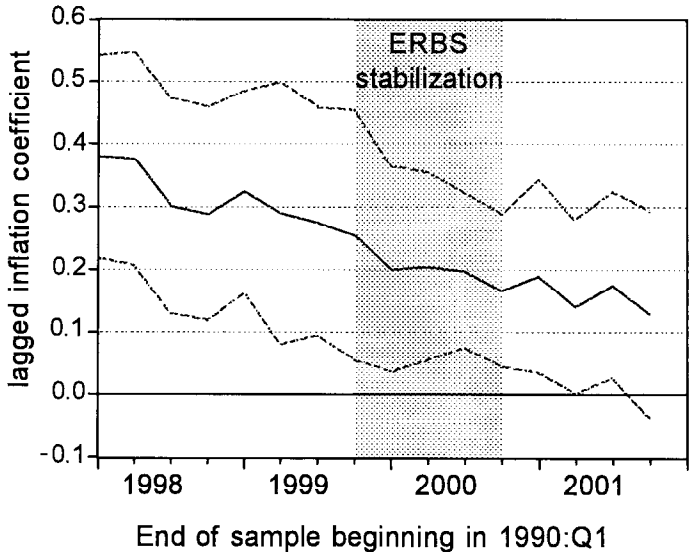
[17] ** Denotes significance at the 1 percent level.

of inflation inertia changed over time as a result of the recent disinflation efforts, we extend the sample by adding recursively one quarter of observations at a time through 2001:Q4.

Figure 3 presents the estimates of the backward-looking coefficient 1-δ for CPI inflation obtained by gradually extending the sample period.[18] The estimates show some evidence of inflation inertia, but the weight on lagged inflation falls from about 40 percent in the 1990:Q1–1998:Q1 sample to less than 15 percent in the full sample, suggesting that price setters' behavior has become increasingly forward-looking. Possibly, this is the result of the disinflation strategy followed in recent years, in particular the switch to forward-looking wage setting in the public sector mentioned above.[19]

Figure 3. Turkey: Backward-Looking Behavior in CPI

(recursive GMM estimates of lagged inflation coefficient and 95 percent confidence band)



[18] The estimated coefficient on the relative price of tradables with respect to nontradables (trntr) is statistically indistinguishable from zero in samples that end after 1999:Q3, but all other variables in the equation remain statistically significant in driving inflation.

[19] The results are broadly in line with findings by Dibooglu (2001) based on the GDP deflator.

C. Estimates with Survey Inflation Forecasts

We obtain broadly similar results when estimating equations in which survey CPI inflation expectations from Consensus Forecasts are used in lieu of expected inflation.[20] Survey data allow us to depart from the rational expectations assumption made above and bypass the need to use the GMM. For Turkey, Consensus forecasts for average inflation in the current year and the following year are available on a monthly basis for the period 1995:1–1998:05 and bimonthly since then. In addition, since 1998:05, Consensus has been providing expectations data for the six individual months ahead, on a bimonthly basis. We estimate regressions for seasonally adjusted monthly and bimonthly inflation for 1998:05-2002:02 and semiannual and annual inflation for 1995:01–2002:02.[21] For the inflation regressions for monthly or bimonthly inflation, Consensus data exist only for two years at a bimonthly frequency, reducing the number of observations. For those regressions that assume either six-month or one-year contracts, we have over seven years of data at a monthly frequency. [22] As a measure of excess demand, we use a seasonally adjusted series of capacity utilization, which is available on a monthly basis.

In most specifications, the estimates using survey forecast data reinforce the notion that inflation persistence does not have its main origin in backward looking behavior (Table 1). The coefficient of expected future inflation is statistically indistinguishable from quantitatively significant in the regressions using monthly and bimonthly data, these

---

[20] We used the mean forecast of 15 different economic forecasters, including 13 Turkish and foreign private financial institutions, Istanbul Bilgi University, and the Turkish Industrialists' and Businessmen's Association.

[21] The specification remains constant across the estimations. The equation for, say, n-monthly inflation includes n-months lagged (n-monthly) inflation, expected n-month ahead inflation, and the n-month average of capacity utilization, as well as a constant term. We restrict the sum of the coefficients of lagged and expected future inflation to one, as in the GMM regressions.

[22] Six-month and one-year average inflation expectations are computed using a weighted average of this year's and next year's expected inflation rate. In the case of six-month inflation, we assume that expected inflation was equal for the whole 12-month horizon. Given that these data are available only at a bimonthly frequency since May 1998, we interpolate data for the missing months.

Table 1. CPI Inflation Regressions with Survey Data
(Newey-West standard errors in parenthesis)

Forecast Horizon	One month	One month	Two months	Two months	Six months	Six months	One year	One year
Lagged inflation	0.529* (0.069)	0.655* (0.129)	0.527* (0.184)	0.868* (0.184)	0.016 (0.166)	-0.240 (0.148)	-0.128 (0.010)	-0.243 (0.136)
Inflation Forecast	0.471* (0.069)	0.345* (0.129)	0.473* (0.184)	0.132 (0.184)	0.984* (0.166)	1.240* (0.148)	1.128* (0.099)	1.243* (0.136)
Capacity utilization (seasonally adj.)	0.176* (0.046)	0.172* (0.046)	0.003 (0.145)	-0.067 (0.174)	-0.106 (0.305)	0.130 (0.296)	0.057 (0.679)	0.661 (0.831)
Constant	-13.55* (3.330)	-12.831* (3.332)	-0.246 (10.759)	4.962 (13.23)	12.257 (23.073)	-5.144 (22.25)	10.445 (53.24)	-36.961 (61.725)
Estimation frequency	bimonthly	bimonthly	bimonthly	bimonthly	Monthly	monthly	monthly	monthly
Instrumental Variables	no	yes	no	yes	No	yes	no	yes
Estimation Period	5:1998-2:2002	5:1998-2:2002	5:1998-2:2002	5:1998-2:2002	1:1995-2:2002	1:1995-2:2002	1:1995-2:2002	1:1995-2:2002
No. of obs.	23	23	23	23	86	75	86	51
R^2	0.31	0.24	0.00	0.00	0.55	0.58	0.60	0.70

Notes: *Denotes significance at the 5 percent confidence level. The set of instrumental variables include the constant term, inflation forecast, the current value, and three lags of the capacity utilization rate.

regressions have small sample size and low explanatory power relative to those with six-monthly and annual inflation, casting doubt on the reliability of the estimates.[23]

Granger-causality tests provide another indication that price setters are forward looking. Granger-causality tests are essentially tests of temporal precedence. If price setters were mainly backward-looking, then changes in inflation would Granger-cause changes in inflation expectations and not vice-versa. However, the pattern is the opposite: for all horizons, we cannot reject the hypothesis that inflation expectations Granger-cause actual inflation, while the hypothesis that actual inflation Granger-causes inflation expectations can be rejected at the usual confidence levels (not shown).

[23] The recursive estimates of the coefficient of lagged inflation (not shown) are quite stable since mid-1997.

V. What Determines Inflation Expectations?

As inflation expectations appear to play a dominant role in the price setting mechanism, we conduct an empirical investigation of their determinants. We run two types of regressions to explain consensus forecasts of average inflation over the following 12 months. In the first set of regressions (first two columns of Table 2), we try to explain inflation expectations with a set of standard variables: monetary growth, the difference between the overnight rate and the deposit rate (to measure the stance of monetary policy), capacity utilization (to proxy for excess demand), lagged inflation, and exchange rate changes. [24] [25] In addition, to assess whether inflation expectations are driven by expectations of monetization of fiscal deficits, we include the primary balance and the change in the nominal debt stock (both as ratios to GDP) as fiscal variables. In the second set of regressions (last two columns in Table 2), we relate inflation expectations to *expectations* about the size of the fiscal deficit. Since data on fiscal expectations are available only since May 1998 at a bimonthly frequency, the number of observations in this case is much smaller. Moreover, given that fiscal balance expectations might be endogenous (at a minimum because inflation expectations affect interest rates and, thus, expected fiscal balances), we also estimate this specification with instrumental variables.[26]

---

[24] We did not address the separate question of whether inflation expectations are rational. A quick examination suggests that survey forecasts are unbiased, but not efficient. The fact that lagged inflation helps explain expectations is not inconsistent with the earlier results in which expectations of future inflation drive current inflation. It suggests that a reduced form equation could express current inflation as a function of lagged inflation, an excess demand/marginal cost term, and other variables explaining expectation formation.

[25] Including the exchange rate, as an explanatory variable is problematic, since, at least in periods in which it is floating, the exchange rate is a jump variable that captures inflation expectations. The qualitative results presented below are not affected by the exclusion of the exchange-rate variable.

[26] We use past changes in the debt stock as instruments for the forecast of the fiscal balance.

Table 2. Determinants of CPI Inflation Expectations

(Dependent variable: mean Consensus forecast of average inflation over the following 12-months; Newey-West standard errors in parenthesis)

	Specification I	Specification II	Specification III	Specification IV
Inflation (lagged)	0.486* (0.095)	0.790* (0.196)	0.982* (0.112)	1.223* (0.260)
Capacity utilization (lagged, seasonally adjusted)	0.917* (0.212)	0.452 (0.515)	-1.133 (0.637)	-0.841 (0.880)
Expected consolidated fiscal balance (as % of GNP)	-	-	-2.687* (0.693)	-4.484* (1.617)
Change in debt stock (in % of GDP, seasonally adj., year-on-year, lagged one month)	0.022* (0.006)	0.030* (0.006)	-	-
Primary balance (as % of GDP, seasonally adj., lagged one month)	-0.104* (0.025)	-0.085* (0.022)	-	-
Overnight rate minus deposit rate (lagged)	0.005 (0.012)	0.017 (0.011)	-	-
Year-on-year **M1 growth** (lagged)	-0.003 (0.061)	-0.019 (0.093)	-	-
Year-on-year **exchange-rate change** (lagged)	0.629* (0.165)	0.758* (0.171)	-	-
Constant	-44.127* (17.575)	33.990 (31.455)	49.213 (50.895)	-5.775 (78.752)
Instrumental variables for lagged inflation?	No	Yes	No	Yes
R^2	0.79	0.69	0.80	0.71
Number of obs.	82	82	23	23
Estimation frequency	monthly	monthly	bimonthly	bimonthly
Breusch-Godfrey serial correlation test (p-value)	0.00	0.00	0.00	0.01

*Denotes significance at the 5 percent confidence level.

There is evidence that fiscal variables play an important role in determining inflation expectations. The results suggest that market participants closely follow fiscal developments when forming inflation expectations. In particular, in the first two columns of Table 2, the primary balance and changes in the debt (lagged one month) do have the expected sign (higher debt and deficits are associated with higher inflation expectations) and are significant at the 5 percent level, even after controlling for a broad set of variables.[27] [28] The two fiscal variables alone explain 43 percent of the variation in inflation expectations (not shown).

These results are confirmed by the second set of regressions (last two columns in Table 2), where the expectation about fiscal deficits significantly enters the regression even when instrumented. Moreover, expected fiscal deficits remain significant in regressions explaining survey expectations even when we include expected M2 growth and expected GDP growth over the next 12 months as explanatory variables (not shown). The latter finding suggests that fiscal deficits affect inflation expectations not only because higher fiscal deficits increase expected money growth over a 12-month horizon. In addition, they increase the probability of monetization over a longer horizon, thereby augmenting, with a sufficiently forward-looking money demand, expected inflation also in the short run.

VI. Conclusion

Backward-looking behavior does not seem to pose a major obstacle to reducing inflation in Turkey. Instead, credible fiscal consolidation appears to be crucial for a lasting disinflation. Inflation expectations are likely to decline only if the public perceives that the temptation to monetize fiscal deficits or inflate away the debt stock has come to an end. The fact that the recent improvements in the non-interest fiscal balance have coincided with a marked drop in inflation expectations lends support to this view, although the lack of demand pressures following the February 2001 crisis is also likely to have contributed to the disinflation and the downward adjustment of inflation expectations. Concurrently, the authorities could consider policies aimed at eliminating residual forms of backward indexation in wages and prices (such as housing rents and health and education prices), which are likely to account for the remaining role of past inflation found in the attached econometric analysis.

---

[27] Several studies have analyzed econometrically the relationship between public sector deficits and inflation in Turkey (see, for example, Metin (1998).) See also Alper and Ucer (1998) and Lim and Papi (1997).

[28] One might wonder whether the lagged inflation term is the regressor that explains most of the variation in inflation expectations. This does not seem to be the case. For example, in specification I, the R^2 excluding lagged inflation is 0.55.

References

Alper, Emre and Murat Ucer, 1998, "Some Observations on Turkish Inflation: A Random Walk Down the Past Decade," paper presented at the conference "Stabilization in an Emerging Market: The Case of Turkey" (Istanbul, Turkey: Bogazici University).

Andrews, Donald, 1993, "Exactly Median-Unbiased Estimation of First Order Autoregressive/Unit Root Models," *Econometrica*, Vol. 61, No. 1, pp. 139–65.

Ball, Lawrence, 1994, "What Determines the Sacrifice Ratio?" in *Monetary Policy*, ed. by G. Mankiw (Chicago: University of Chicago Press).

Buiter, Willem H., and Clemes Grafe, 2001, "No Pain, No Gain?: The Simple Analytics of Efficient Disinflation in Open Economies," CEPR Discussion Paper No. 3038, (London: Center for Economic Policy Research).

Calvo, Guillermo, 1983, "Staggered Prices in a Utility Maximizing Framework, "*Journal of Monetary Economics*, Vol. 12, No. 3, pp. 383-98.

———, and Carlos Végh, 1999, "Inflation Stabilization and BOP Crises in Developing Countries," in *Handbook of Macroeconomics*, ed. by John Taylor and Michael Woodford (Amsterdam: North-Holland), pp. 1531–614.

Celasun, Oya, 2001, "Price Setting and Inflation Dynamics in Small Open Economies," Ph. D. Dissertation, (College Park, Maryland: University of Maryland).

Chadha, Bankim, Paul Masson, and Guy Meredith, 1992, "Models of Inflation and Costs of Disinflation," *Staff Papers,* International Monetary Fund, Vol. 39 (June), pp. 395–431.

Cogley, Timothy, and Thomas J. Sargent, 2001, "Evolving Post-World War II U.S. Inflation Dynamics," in *NBER Macroeconomics Annual* (Cambridge, Massachusetts: MIT Press.)

Dibooğlu, Selahattin, 2001, "Inflationary Expectations and Costs of Disinflation: A Case for Costless Disinflation in Turkey?" in *Inflation and Disinflation in Turkey,* ed. by A. Kibritcioglu, L. Rittenberg, and F. Selcuk (Aldershot, England: Ashgate.)

Dotsey, Michael, 2002, "Pitfalls in Interpreting Tests of Backward-Looking Pricing in New Keynesian Models," *Economic Quarterly*, Federal Reserve Bank of Richmond, Vol. 88, No. 1 (Winter).

Durevall, Dick, 1999, "Inertial Inflation, Indexation, and Price Stickiness: Evidence from Brazil," *Journal of Development Economics*, Vol. 60, pp. 407-21.

Erlat, Haluk, 2001, "Long Memory in Turkish Inflation Rates," *Inflation and Disinflation in Turkey*, ed. by A. Kibritcioglu, L. Rittenberg, and F. Selcuk,(Aldershot, England: Ashgate).

Fischer, Stanley, Ratna Sahay, and Carlos Végh, 2002, "Modern Hyper- and High Inflations," *Journal of Economic Literature*, Vol. 40 (September), pp. 837-80.

Fuhrer, Jeffrey and Gerald Moore, 1995, "Inflation Persistence," *Quarterly Journal of Economics*, CX, pp. 127-60.

Galí, Jordi, and Mark Gertler, 1999, "Inflation Dynamics: A Structural Econometric Analysis," *Journal of Monetary Economics,* No. 44, pp. 195-222.

Ghezzi, Piero, 2001, "Backward-looking Indexation, Credibility and Inflation Persistence," *Journal of International Economics,* Vol. 53, No. 1, pp. 127-47.

Hamann, A. Javier, and Alessandro Prati, 2002, "Why Do Many Disinflations Fail?" *(forthcoming),* IMF Working Paper,

Holden, Steinar, and John C. Driscoll, 2001, "A Note on Inflation Persistence," NBER Working Paper No. 8690.

Jadresic, Esteban, 2000, "Can Staggered Price Setting Explain Short-Run Inflation Dynamics?" mimeo, (Washington: International Monetary Fund).

Kibritçioğlu, Aykut, 2001, "Causes of Inflation in Turkey: A Literature Survey with Special Reference to Theories of Inflation," in: Kibritcioglu, A., L. Rittenberg, and F. Selcuk (eds.), *Inflation and Disinflation in Turkey*, Aldershot: Ashgate.

Lim, Cheng Hoon, and Laura Papi, 1997, "An Econometric Analysis of the Determinants of Inflation in Turkey," IMF Working Paper 97/170 (Washington: International Monetary Fund).

Metin, Kivilcim, 1998, "The Relationship Between Inflation and the Budget Deficit in Turkey," *Journal of Business and Economic Statistics*, Vol. 16, No. 4, pp. 412-22.

Obstfeld, Maurice, 1995, "International Currency Experience: New Lessons and Lessons Relearned," *Brookings Papers on Economic Activity*, 1:1995, pp. 119-96.

Roberts, John M., 1995, "New Keynesian Economics and the Phillips Curve," *Journal of Money, Credit and Banking*, Vol. 27, No. 4, pp. 975-84.

———, 1997, "Is Inflation Sticky?," *Journal of Monetary Economics,* No. 39, pp. 173-96.

Sargent, Thomas J., 1982, "The Ends of Four Big Hyperinflations," *Inflation: Causes and Consequences*, ed. by Robert E. Hall, (Chicago: Chicago University Press), pp. 41-97.

Shiller, Robert, 1997, "Public Resistance to Indexation: A Puzzle," *Brookings Papers on Economic Activity*: 1, (Washington: The Brookings Institution), pp.159-228.

Stock, James H., 2001, Discussion of Cogley and Sargent "Evolving Post-World War II Inflation Dynamics," in NBER Macroeconomics Annual, (Cambridge, Massachusetts: MIT Press).