OUTPUT INFLATION TRADEOFF:
EVIDENCE FROM TURKEY

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I. INTRODUCTION

In its original form the Phillips Curve summarized an inverse relationship between wage inflation (the dependent variable) and the unemployment rate (an explanatory variable); it was rationalized as reflecting the price movements of a commodity (labor) facing excess demand (low unemployment). The coincidence of high rates of unemployment and high rates of inflation has led to a rethinking of the Phillips Curve. One explanation for the appearence of a positive associaton between unemployment and inflation advanced by Friedman (1968) and Phelps (1968). They stated that the standard Phillips Curve ought to be augmented by price expectations; movements along a Phillips Curve should reflect only the effects of surprise inflation, not expected inflation.

In this paper an attempt is made to test the Lucas (1973) hypothesis on the Phillips Curve for the case of Turkey. That hypothesis implies that the existence of a trade-off between output and inflation is conditional on economic agents misinterpreting the price movements they observe.Cross country comparisons led Lucas to assert that in countries with stable price level, policies which increase nominal income tend to have a large initial effect on real output together with a small positive initial effect on the rate of inflation whereas in countries with high rates of inflation, changes in aggregate demand have relatively small effects on output but are reflected quickly in prices. In short, the output inflation trade-off deteriorates as the variance of inflation rate increases because inhabitants of high inflation country sharpen their instrumental to differantiate between real and nominal shocks. According to the

above hypothesis, we should expect that Turkey, as a high inflation country, has a more vertical Phillips Curve.

II. THE MODEL

The model's central assumptions are that cyclical fluctuations in real income are caused by the interaction between a volatile aggregate demand and a stable, upward sloping, aggregate supply which depends on the difference between the actual price and its expected value. The aggregate price quantity observations are viewed as intersection points of an aggregate demand and an aggregate supply schedule. Expectations are formed rationally by using all available information. Quantity supplied is viewed as the product of a normal component and a cyclical component:

$$y_t = y_{nt} + y_{ct} \tag{1}$$

where y_{nt} and y_{ct} denote logs of these components.

The normal component, reflecting capital accumulation and population change, follows the trend line:

$$y_{nt} = \beta_o + \beta_1 t \tag{2}$$

The cyclical component varies with perceived, relative prices and with its own lagged value:

$$y_{ct} = g [P_t - P_t^e] + \lambda y_{c,t-1} \tag{3}$$

where P_t is the actual price at t and P_t^e is the expected price level conditioned on information available at t. Since y_{ct} is a deviation from trend, $\lambda < 1$.

The model is completed by inclusion of an aggregate demand function, which is of the form:

$$y_t = Y_t - P_t \tag{4}$$

where Y_t is the log of nominal GNP.

In terms of detrended real output, y_{ct}, and inflation rate, DP_t, the solutions are:

$$y_{c,t} = -\pi\delta + \pi DY_t + \lambda y_{c,t} + u_t \tag{5}$$

$$DP_t = -\beta + (1-\pi)DY_t + \pi DY_{t-1} - \lambda y_{c,t-1} + v_t \tag{6}$$

where u_t and v_t are assumed to be white noise. The parameters π, δ, and λ relate to structural parameters as explained in Lucas (1973). The coefficient of the change in nominal income, tradeoff parameter, π, is the parameter of central interest. It tells us how much of a shock to nominal income shows up in real growth in the first year. If $\pi = 1$, then all of the change in nominal income shows up in real growth; if $\pi = 0$, then all the change in nominal GNP shows up in prices.

III. THE RESULTS

In Turkish economy the variances of inflation rate and the growth rate of nominal income are higher than those of low or moderate inflation countries. According to the above model, the greater the variance of the general price level the less economic agents will be fooled into responding to nominal aggregate demand changes. The theoritical model suggests that ã should be low in countries where the variability of aggregate demand is high and in countries where the average level of inflation is high. Our primary attention is on these two hypotheses. Therefore, we should expect to have a more vertical Phillips Curve (π should be low) for the case of high inflation Turkish economy.

For empirical implementation, equations (5) and (6) are estimated for the period of 1968-1994, t ratios are in parantheses.

$$y_{c,t} = 0.03 - 0.098\ DY_t + 0.781\ y_{c,t-1} \tag{7}$$
$$\quad\ (2.22)\ (-2.4) \qquad (5.6)$$

$R^2 = 0.59,\ \sigma \qquad\qquad = 0.024$

serial correlation $\qquad\qquad = 0.009$

functional form $\qquad\qquad = 0.108$

normality $\qquad\qquad = 0.539$

heteroscedasticity $\qquad\qquad = 2.59$

$$DP_t = -0.087 + 1.14\ DY_t - 0.035\ DY_{t-1} + 0.229\ y_{c,t-1} \tag{8}$$
$$\quad\ (-4.6)\quad (14.8)\qquad (-0.45)\qquad\quad (1.5)$$

$R^2 = 0.97,\ DW = 1.89,\ \sigma = 0.025$

serial correlation $\qquad\qquad = 0.123$

functional form $\qquad\qquad = 4.53$

normality $\qquad\qquad = 0.651$

heteroscedasticity $\qquad\qquad = 3.91$

The above results indicate that policies which increase nominal income tend to have a small negative effect on real growth, together with a large positive initial effect on the rate of inflation in Turkish economy.

The empirical findings confirm Grier and Tullock (1989) and Koray (1993). Grier and Tullock find no positive association between inflation and growth and a significant negative relationship between inflation variability and growth for OECD countries. Estimating a VAR system, Koray finds that inflation variability has a negative effect on the level of economic activity of Turkey. Testing the Lucas Hypothesis for the period of 1953- 1969, Alberro (1981) found π =

0.267 and λ = 0.562 for Turkey, π = 0.820 and λ = 0.778 for Germany, π = 0.906 and λ = 0.198 for United Kingdom, π = 0.869 and λ = 0.657 for United States.

In a volatile price country like Turkey nominal income changes are associated with equal price movements with negative effect on real growth rate. These results are, of course inconsistent with the existence of even moderately stable Phillips curves. Lucas and later authors show that countries with highly variable aggregate demand have a more vertical Phillips curves. That is nominal shocks in these countries have little effect on output. Lucas interprets this finding as evidence that highly variable demand reduces the percieved relative price changes resulting from nominal shocks. A Keynesian interpretation of Lucas's result can be provided as: more variable demand, like high average inflation, leads to more frequent price adjustment. Consequently, the evidence from Turkey supports the view that the output-inflation tradeoff deteriorates as the variance of inflation rate increases.

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