A Rational Expectations Model of Price and Wage Inflation for West Germany

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I. Introduction

In this article a rational expectations model of price and wage inflation is developed and tested using data for West Germany. The theoretical model, while maintaining monetary neutrality, combines a demand for money function, a natural rate type labor market, and a policy rule equation and yields hypotheses for price and wage inflation. In this rational expectations model, price and wage inflation, and anticipated inflation are determined simultaneously within the model.

It is shown that the predictions of the model are in general compatible with the data, and it can provide a fairly accurate description of price and wage inflation. These findings for the nominal variables complement those of Demery et al. [1984], which provide a rational expectations account of real variables for West Germany.

The theoretical model is detailed in Section II of the article. This is followed by a discussion of the method of estimation, Section III. The empirical concepts used and sources of data are explained in Section IV. Section V contains the discussion of the empirical results; and this is followed by an examination of the predictive performance of the model in Section VI. The final remarks are in Section VII.

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II. Theoretical Approach

1. Price Inflation Equation


Although there are doubts concerning the stability of the demand for money function the findings of Buscher [1984] suggest that a standard form of this function is likely to be an appropriate specification for West Germany.

The derivation of the price inflation equation starts with a demand for money function:

$$\log M_t - \log P_t = \mu_1 \log Y_t + \mu_2 \log R_t, \quad \mu_1 > 0, \, \mu_2 < 0$$ (1)

where $M$ is the money stock, $P$ is the price level, $Y$ is the real income and $R$ is the interest rate. Given the log of money supply, equating demand and supply, solving for the price level, and following the approach of Barro [1978; 1981, p. 161] by substituting the log of the interest rate in the previous period as an instrument for $R_t$ gives a price level equation where the log of the price level is a function of the log of money supply, the log of real income, and the log of interest rate lagged by one period. Differentiating this Barro-type price level equation with respect to time yields an inflation equation:

$$p_t = \beta_1 m_t + \beta_2 y_t + \beta_3 r_{t-1}, \quad \beta_1 = 1, \, \beta_2 < 0, \, \beta_3 > 0$$ (2)

where $p_t$, $y_t$, and $r_t$ are growth in the price level, money supply, and real income, respectively, and $r_{t-1}$ is the growth of interest rate lagged by one period.

The rate of growth in real income can be postulated as:

$$y_t = \varphi_0 + \varphi_1 (p_t - p_e), \quad \varphi_1 > 0$$ (3)

where $p_e$ is anticipated inflation and $\varphi_0$ is a measure for the trend in natural output. Equation (3) is derived from a natural rate type labor market model similar to that discussed by McCallum [1980]:

$$\log N^d_t = \alpha_0 + \alpha_1 (\log W_t - \log P_e), \quad \alpha_1 < 0$$ (4)

$$\log N^s_t = \alpha_2 + \alpha_3 (\log W_t - \log P_e), \quad \alpha_3 > 0$$ (5)

where $N^d$ and $N^s$ are the demand for and the supply of labor, $W$ is wages, $P_e$ is expected price level, and $t$ is a trend variable – a measure of secular changes. An aggregate supply function is obtained by equating $\log N^d_t$ and $\log N^s_t$ and solving for the log of employment, then substituting this solution into the production function:

$$\log Y_t = \Omega_1 \log N_t, \quad \Omega_1 > 0$$ (6)