

DOES THE NAIRU HAVE THE RIGHT DYNAMICS?

BY

RAY C. FAIR

COWLES FOUNDATION PAPER NO. 982



**COWLES FOUNDATION FOR RESEARCH IN ECONOMICS
AT YALE UNIVERSITY**

Box 208281
New Haven, Connecticut 06520-8281
1999

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By RAY C. FAIR*

The ‘NAIRU’ view of the relationship between inflation and the unemployment rate is that there is a value of the unemployment rate (the NAIRU) below which the price level forever accelerates and above which the price level forever decelerates.¹ This view imposes two important restrictions on the dynamics of the price process. This can be seen by examining a simple version of the NAIRU equation:

$$(1) \quad \pi_t - \pi_{t-1} = \beta(u_t - u^*) + \gamma s_t + \varepsilon_t$$

$$\beta < 0 \quad \gamma > 0$$

where t is the time period, π_t is the rate of inflation, u_t is the unemployment rate, s_t is a cost shock variable, ε_t is an error term, and u^* is the NAIRU. If u_t equals u^* for all t , the rate of inflation will not change over time aside from the short-run effects of s_t and ε_t (assuming s_t and ε_t have zero means). Otherwise, the rate of inflation will increase over time (the price level will accelerate) if u_t is less than u^* for all t and will decrease over time (the price level will decelerate) if u_t is greater than u^* for all t .

Let p_t be the log of the price level for period t , and let π_t be measured as $p_t - p_{t-1}$. Using this notation, equation (1) can be written in terms of p rather than π :

$$(2) \quad p_t = 2p_{t-1} - p_{t-2} + \beta(u_t - u^*) + \gamma s_t + \varepsilon_t$$

In other words, equation (1) can be written in terms of the current and past two price levels,

with restrictions on the coefficients of the past two price levels. (‘Price level’ will be used to describe p even though p is actually the log of the price level.)

If equation (1) is correctly specified, adding p_{t-1} and p_{t-2} to it should not result in a significant increase in fit. Put another way, in equation (2) the joint hypothesis that the coefficient of p_{t-1} is 2 and the coefficient of p_{t-2} is -1 should not be rejected. In previous work (Fair, 1999) I have performed this test for a variety of specifications, and the results are generally not supportive of the NAIRU dynamics. The results of some of these tests are discussed in the following section.

I. Tests of the NAIRU Dynamics

To give the NAIRU specification the benefit of the doubt, a more general version than (1) is used as the base equation. This version is

$$(3) \quad \pi_t = \alpha + \sum_{i=1}^{12} \delta_i \pi_{t-i} + \sum_{i=0}^3 \beta_i u_{t-i} + \sum_{i=0}^3 \gamma_i s_{t-i} + \varepsilon_t \quad \sum_{i=1}^{12} \delta_i = 1$$

For the above specification, the NAIRU is $-\alpha / \sum_{i=0}^3 \beta_i$. If the unemployment rate is always equal to this value, the inflation rate will be constant in the long run, aside from the short-run effects of s_t and ε_t . Using more than one lag for the variables lessens the chance that the results depend on a particular choice of lags.

Many estimates of equations like (3) use the GDP deflator as the measure of the price level. Other popular measures are the consumer price index (CPI) and the personal consumption deflator (PCD). Robert J. Gordon (1997), for example, uses all three. If, however, the aim is to measure prices set by U.S. firms, none of these measures seems very good. The GDP deflator includes prices of

* Cowles Foundation, Yale University, New Haven, CT 06520-8281 (e-mail: ray.fair@yale.edu; website: <http://fairmodel.econ.yale.edu>). All the data used in this paper can be downloaded from the website.

¹ Recent studies using the NAIRU specification include Jeffrey C. Fuhrer (1995), George A. Akerlof et al. (1996), Robert J. Gordon (1997), and Douglas Staiger et al. (1997a, b).

II. Properties

How much difference does it make if p_{t-1} and p_{t-2} are added to equation (4)? If, say, the unemployment rate were permanently lowered by one percentage point, what would the two equations say are the price consequences?

TABLE 1—EFFECTS OF A ONE-PERCENTAGE-POINT FALL IN u

Quarter	Equation (4)		Equation (4), π_{t-1} added		Equation (4), p_{t-1} and p_{t-2} added	
	$\frac{p^{new}}{p^{base}}$	$\pi_{t-1}^{new} - \pi_{t-1}^{base}$	$\frac{p^{new}}{p^{base}}$	$\pi_{t-1}^{new} - \pi_{t-1}^{base}$	$\frac{p^{new}}{p^{base}}$	$\pi_{t-1}^{new} - \pi_{t-1}^{base}$