

## REFEREE REPORT ON "PRODUCTION CONSTRAINTS AND THE NAIRU"

The paper "Production Constraints and the NAIRU" by Driver and Hall studied the effects of the labour constraint and capital constraint on the NAIRU. Whereas the literature largely focuses on the first constraint, the capital constraint has been less debated. After a discussion about the rationale that motivates the attention (and the possible break) on the capital constraints, in Section 2 the authors develop a model in which both constraints affect the output gap. In particular, a crucial role has been played by the ratio between plant capacity slack and unemployment.

As presented in Section 3, the central point of the paper is to test whether the relation between capacity utilization and either the labour constraints or the capital constraints has experienced a structural break. Since this section is the core of the paper, and since its findings motivate the theoretical implication on the NAIRU, the following comments regards mainly the methodology followed in the estimation.

The authors follow a sequential test approach as in Andrews (1993) to test the stability of the dummies' parameters in equation (6). They use the sequential absolute t-statistics as the base of the inference. The main finding is that the coefficient  $\beta_2$  and  $\beta_4$  of equation (6) have experienced a structural break in two different times. In fact, the absolute t-statistics for the coefficient of dummy of the labour constraint ( $\beta_3$ ) is slightly greater than the critical value at 5% (2.97) in 1982, and the absolute t-statistics for the coefficient of dummy of the capital constraint ( $\beta_5$ ) is slightly greater than the critical value at 5% (2.97) in 1985. Although in theory these results would lead to a conclusion

in favor of the structural breaks, some facts might indicate that some robustness checks are needed to reinforce this statement. First, as pointed out by Driver and Hall, the high t-statistics on the dummy for capital in the early years might be treated with caution, because of the small numbers of observations prior to 1982. Second, the two t-statistics are only marginally significant at 5%. These two facts might suggest that the small sample uncertainty plays a relevant role on the results. Third, as stated in section 5, one of the most important findings is that the ratio of the capital coefficients to the labour coefficients more than doubled from the mid to the late 1980s to the late 1990s, thus implying an increase on the NAIRU, given the model in Section 2.

In order to reinforce the results of the paper, I suggest two types of robustness checks. First, to clear any doubts about the significance of the tests as described in the previous paragraph, an additional simple test could be run: since the findings of the paper show that the breaks of  $\beta_2$  and  $\beta_4$  appear in two different years, and since the significance of the break on capital might be misled by the small sample, one might run a joint test on the structural break on  $\beta_2$  and  $\beta_4$  as in Andrews (1993), which is testing the null hypothesis:

$$\begin{aligned}
 H_o & : \quad \beta_{2t} = \beta_2 \text{ for all } t \geq 1 \\
 & : \quad \beta_{4t} = \beta_4 \text{ for all } t \geq 1
 \end{aligned}$$

against the alternative

$$H_1 : \begin{cases} \beta_{2t} = \beta_2'(\tau) & \text{for } t = 1, \dots, \tau \\ \beta_{2t} = \beta_2^*(\tau) & \text{for } t = 1, \dots, \tau \end{cases}$$
$$: \begin{cases} \beta_{4t} = \beta_4'(\tau) & \text{for } t = 1, \dots, \tau \\ \beta_{4t} = \beta_4^*(\tau) & \text{for } t = 1, \dots, \tau \end{cases}$$

where  $\tau$  is unknown. In other words we test whether there is a break on the coefficient of the labour constraint and of the capital constraint at the same date. A rejection of the null hypothesis would reinforce the claim about the presence of a break on both parameters.

Second, since actually the ratio of the capital coefficients to the labour coefficients is the statistics that crucially affect the NAIRU, I suggest to apply a transformation of equation (6) in order to test directly whether there is directly a break on this parameter.