

Reply to the Referee Report 2 on *“The endogeneity of the natural rate of growth: an alternative approach”*

**We appreciate our referee for his/her kind support and for bringing up main concern regarding the contents of the manuscript.**

**The bold and blue explanations belong to the authors. The rest is the original comments of the second referee.**

Authors claim that their contributions are following:

i) In order to test for the endogeneity of the natural rate of growth, the balance-of payments consistent rate of growth should be used instead of the actual rate of growth.

ii) Labor force and productivity do not have to increase in order to indicate endogeneity since they might also decrease.

According to their results for the U.S. economy:

i) Thirlwall’s Law is supported.

ii) Endogeneity of the natural rate of growth is supported.

For the authors, as a final result their approach is theoretically compatible with that proposed in Thirlwall (2001).

Although their empirical results robust my objection is to the theoretical explanations which are the main concern of the study.

At page 3, the authors state that “although boom periods are defined by periods in which actual rate of growth is greater than warranted rate of growth (Thirlwall, 2002, p. 84), endogeneity is tested when the actual rate is greater than the natural rate”. Following, at page 4 they explain the relation between the warranted growth rate, the natural rate of growth and the balance-of payments consistent rate of growth based on Thirlwall (2001). Then at page 5 they say “the discussion above shows that there are problems in testing the endogeneity of the natural rate of growth. To solve these problems and to be compatible with the theory, we offer to use the growth rate to be consistent with the balance-of-payments as a dependent variable instead of the actual rate of growth”. However it is not really clear that why there is a problem and why it should be used the balance-of payments consistent rate of growth instead of the actual rate of growth. Apart from Thirlwall (2001) why there is such a problem? The authors should make a clear explanation for this question.

This is a nicely written paper, which deals with a very relevant topic, uses appropriate analytical tools to answer the research questions at hand and provide interesting new results. I therefore recommend publication in Economics.

*Main comment of our second referee is similar with the main concern of the invited reader of our manuscript. Below, we address in detail the main concern of the second referee which is why there is a problem when the actual growth rate is used for testing the endogeneity of the natural rate of growth. Please let us repeat our relevant reply to the invited reader.*

By definition “...the natural rate of growth must also be that rate which keeps the percentage level of unemployment (%U) constant...” Thirlwall (2013: 60). Thus the fundamental intuition in equation (1') is  $\Delta\%U = 0$ .

$$g = \gamma - \lambda(\Delta\%U)$$

Therefore when  $\Delta\%U = 0$  it becomes  $g = \gamma$  and  $g$  must equal to the natural rate of growth.

However, the question to be asked is: Is  $g$  whether the actual rate of growth or balance-of-payments-constrained rate of growth?

According to Thirlwall (2013: 60):“the natural rate of growth must also be that rate which keeps the percentage level of unemployment (%U) constant *because if actual growth is greater than the natural rate, %U will fall, and if the actual growth rate is less than the natural rate, %U will rise.*”

The italicized phrase above is the main concern of our study. Simply, when actual growth is greater than the natural rate, if %U will not have to fall, then  $g$  does not have to be the actual rate of growth.

As we had based on Thirlwall (2001), the cases of i, ii and v are as follows, respectively, which explain recession periods:  $g_w > g_n > g_b$  ;  $g_w > g_n < g_b$ ;  $g_w > g_b > g_n$  . According to Thirlwall (2001: 86) when  $g_w > g_n < g_b$  or  $g_w > g_b > g_n$  economy will be in *recession period*, but the actual rate can exceed the natural rate without balance of payments difficulties arising since  $g_b > g_n$  . More importantly since  $g_w > g_n$  is the “case of over-saving with plans to save exceeding plans to invest, and demand-deficient unemployment” Thirlwall (2001: 85), %U will rise. Thus, the main point is that the actual rate of growth is determined by balance-of payments growth; if balance-of

payments growth does not constrain the actual rate of growth, the actual rate of growth can exceed the natural rate, however %U may rise.

As a critical result, when actual growth is greater than the natural rate, %U will not have to fall, it may rise, so,  $g$  does not have to be the actual rate of growth. This is our main concern.

Note that, when  $g_n > g_b$  even if  $g_w = g_n$  there will be unemployment since the actual rate of growth is constrained by balance-of payments and the economy cannot grow at its capacity rate (Thirlwall, 2001: 85). Thus, again, the main point is that the behavior of the actual rate of growth is influenced by balance-of payments growth.

Therefore, the natural rate of growth must also be that rate which keeps the percentage level of unemployment (%U) constant because if balance-of-payments-constrained rate of growth is less than the natural rate, %U will rise. Note that, if balance-of-payments-constrained rate of growth is greater than the natural rate, we cannot say %U will fall, it may rise.

Consequently, our claims are that

(1) Since the behavior of the actual rate of growth is mainly influenced by balance-of payments growth, we *suggest* to use balance-of payments growth rather than actual rate of growth when examining endogeneity.

(2) Using the case which points out balance-of-payments-constrained rate of growth is *less* than the natural rate is compatible with the definition of the natural rate of growth, which emphasizes growth that keeps the percentage level of unemployment (%U) constant.

Indeed, since the U.S. economy is characterized by increasing balance of payments deficit in the relevant period, we focused on the periods in which the balance-of-payments consistent rate of growth is *below* the natural rate ( $g_n > g_b$ ). We test the endogeneity of the natural rate of growth using the balance-of-payments-constrained rate of growth. However, we define the periods in which the balance-of-payments consistent rate of growth below the natural rate, indicating endogeneity.

## References

Thirlwall, A. P. (2001), 'The relation between the warranted growth rate, the natural rate, and the balance of payments equilibrium growth rate', *Journal of Post Keynesian Economics*, 24 (1), 81–88.

Thirlwall, A.P. (2013), *Economic Growth in an Open Developing Economy*, UK: Edward Elgar.