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The NAIRU, Potential Output, and Okun’s Law: Postwar USA, UK, and Japan

5.1 Introduction

In the previous chapter we estimated the NAIRU (non-accelerating inflation rate of unemployment, which is synonymous with the natural rate of unemployment)\(^1\) and potential output for postwar Japan using annual data. In that chapter, we left the following three points for future work. These are (i) to examine the relative merits of using, as a generator of inflation, either the GDP deflator, the consumer price index, or the wholesale price index; since potential output is a concept relating to GDP, a reasonable choice would be the first one, but one may need a formal criterion for comparing among the three indexes, (ii) to endogenously estimate error variances of an observation equation and a transition equation (or transition equations) of Kalman filter models,\(^2\) and (iii) to handle the quarterly data, which will facilitate the work mentioned in point (ii).

The purpose of this chapter has two components: The first is to estimate the NAIRU and potential output in postwar USA, UK, and Japan. The second task is to estimate Okun’s Law for the three countries. Okun’s Law has several versions, each having a slightly different interpretation. The original version says that a 1-percentage-point decrease (from a natural unemployment rate) in the observed unemployment rate raises a 3- (or 3.2-) percentage-point increase in the relative excess of actual output over potential output. This relationship can be written as

\[
\frac{po - yr}{yr} = 3\frac{ur - 0.04}{yr},
\]  

(5.1)
or alternatively,
\[
\frac{yr - po}{po} = -3(ur - 0.04)
\]  \hspace{1cm} (5.1')

where \(po\) is potential output (real potential GDP), \(yr\) is actual output (real GDP), \(ur\) is the actual unemployment rate (expressed as a fraction). A fraction 0.04 is a natural rate of unemployment (a NAIRU) assumed in (5.1), which is, actually, not constant over time as well as cross-sectionally. Number 3 in (5.1) is a hypothetical level and what is called the ‘Okun coefficient’, which will also be variable depending on the time and economy in question. Equation (5.1) is the original form that Okun proposed, while (5.1’) is a form put forward in Hall and Taylor (1997). In this chapter we use the second form because \(po\) would be a better base to measure the gap rate than actual \(yr\). However, the difference between (5.1) and (5.1’) is quite small because the left-hand side of (5.1) is nearly equal to \(\ln(po/yr)\) while that of (5.1’) is nearly equal to \(\ln(yr/po)\) (particularly when \(po\) and \(yr\) are close to each other), and \(\ln(po/yr) = -\ln(yr/po)\), where \(\ln\) stands for the natural logarithm.

Our estimation here targets the NAIRU and potential output, hence combining the two estimates will give the Okun coefficient (assumed to be 3 above) in the three countries for the postwar period. Also, we use annual data because of a new method of giving appropriate exogenous error variances while referring to a variant of Okun’s Law (which is given in annual terms) due to Blanchard (1997), who uses observable variables on both sides of the law. In other words, we use observable sample standard deviations in Blanchard’s Okun relation, as criteria for deciding error variances in our Okun relations, which are made up of unobservable variables.

The next section (Section 2) presents a general framework for estimating the NAIRU and potential output. Then, the estimating procedures and comparative interpretations follow, where use is made of the GDP deflator as the price index. Next, we use the results regarding the NAIRU and potential output to derive Okun’s Law for the three countries. Section 3 concludes, and is followed by an appendix that uses the consumer price index, and then a description of the data used.

5.2 The NAIRU, potential output, and Okun’s Law with US, UK, and Japanese evidence

We first present the two basic relationships for deriving the NAIRU and potential output, which are the variants of ‘expectation-augmented’