

## Neutral Real Interest Rate

Neutral Real Interest Rate (NRIR), motivated by the thinking of Prof. Knut Wicksell (1851-1926), is the level of interest rate that would keep the economy at its potential growth rate and maintain price stability over the long run.

When the current real interest rate<sup>1</sup> is lower than NRIR, the monetary policy stance is considered to be accommodative, resulting in accelerated economic expansion and increasing inflation. On the other hand, when the current real interest rate is higher than NRIR, the monetary policy stance is considered to be restrictive, resulting in slower economic growth and decreasing inflation. Therefore, NRIR is a useful tool for policy-makers in gauging the stance of monetary policy at a certain period of time.

However, there are several approaches to NRIR estimation. Different assumptions and specifications can generate large differences in the estimated values, and there is no single most reliable approach. In addition, NRIR is subject to change over time in accordance with changes in the economic environment. Thus, NRIR is usually quoted as a broad range and used as a broad reference to gauge the stance of existing monetary policy.

### Examples of NRIR estimation for the US

Since June 2004, the Federal Open Market Committee (FOMC) has raised the fed funds rate 15 times by 25 basis points each time, totaling 3.75 per cent per annum. Most recently, at the FOMC meeting on 28 March 2006, the fed funds rate was brought to stand at 4.75 per cent per annum. This accumulative rate hike has been the largest since the rate hike during 1988-1990 which rose by a total of 3.25 per cent per annum.

Due to the large continuous increment in the fed funds rate, the market expects the Fed to stop its rate hike cycle after 1 or 2 more 25-basis point hikes as the current fed funds rate is approaching the neutral level. According to Janet Yellen, President of the Federal Reserve Bank of San Francisco and a member of the FOMC, the US neutral interest rate zone is around 3.5-5.5 per cent per annum<sup>2</sup>. In other words, this is the level of fed funds rate which is consistent with a neutral stance of monetary policy that is supportive of US economic growth in the long run.

Three estimations of NRIR for the US economy are given below:

**1. Simple statistical approach<sup>3</sup>.** This approach assumes that NRIR is equivalent to the real interest rate trend. After the year 2000, this trend has been declining, leaving NRIR close to zero at present. Adjusted with the Personal Consumption Expenditure (PCE) Deflator (about 3 per cent per annum), this implies the neutral nominal interest rate of around 3 per cent per annum.

This estimation is, however, appropriate for a period of stable real interest rate. During a period of volatile output growth and inflation, however, the neutral rate obtained from this method can be highly biased. In fact, after 2004,

<sup>1</sup> The real interest rate is generally referred to the nominal interest rate adjusted for inflation in order to reflect the real rate of returns.

<sup>2</sup> The speech by Janet L. Yellen, President and CEO of the Federal Reserve Bank of San Francisco at the Salt Lake City Community Leaders Luncheon, Salt Lake City, Utah, on 18 October 2005.

<sup>3</sup> Wu, T. (2005), "Estimating the 'Neutral' Real Interest Rate in Real Time", Federal Reserve Bank of San Francisco *Economic Letter*, No. 2005-27.

the US inflation rate has been on an upward trend; thus, the neutral nominal fed funds rate at 3 per cent per annum could be an underestimation. In addition, this estimation method does not take into account the correlation between NRIR and economic conditions as reflected by the output gap (the deviation of actual output from its potential level), inflation and unemployment rates, which are important elements in the definition of NRIR.

**2. Estimation of NRIR using yields on inflation-indexed government securities<sup>4</sup>.** This approach estimates NRIR as the long-term (10-30 years) forward real interest rate, calculated by using the yields on inflation-indexed government securities. These yields reflect investors' view on the equilibrium level of the real interest rate in the long run. NRIR obtained from this approach is around 3.86 per cent per annum for the year 2000. Adjusted with an inflation rate of 3.4 per cent per annum at the time, this implies the neutral nominal interest rate of around 7.3 per cent per annum (the actual fed funds rate at end-2000 was 6.5 per cent per annum). However, there has yet to be an estimation of the present NRIR using this approach. The main defect of this approach is that the long-term forward real interest rate includes both risk premium and liquidity premium. Therefore, the result is likely to be higher than the economic fundamental value that is truly consistent with the definition of NRIR.

**3. Structural macroeconomic modelling techniques<sup>5</sup>.** Laubach and Williams (2003) employed a structural macroeconomic model with 3 equations: (1) an "IS equation" relating the output gap to NRIR, (2) a "Phillips curve" relating inflation to the output gap, and (3) an equation describing the positive correlation between NRIR and trend output growth. Based on time-series data for the past 40 years, the estimated NRIR is about 2-4 per cent per annum.

For early 2005, the estimated NRIR is around 2.25 per cent per annum. Adjusted for the PCE Deflator average of 2.75 per cent in 2005, this implies a neutral nominal interest rate of about 5.0 per cent per annum. The main advantage of this approach is the utilization of a macroeconomic model and economic variables in the calculation of NRIR. However, the estimation is rather complex and sensitive to the assumptions made.

### **Cautions in using NRIR**

The major problems in estimating NRIR come from: (1) changes in data, both from new information and revisions of the time-series macroeconomic data, which can affect the estimated value of NRIR; (2) uncertainties of model specification depending on the assumptions and method employed, which can lead to significant differences in results.

In summary, the theoretical concept of NRIR is useful as a reference for policy-makers to gauge the monetary policy stance in the medium-term. However, in practice, consensus on the standard definition and how to estimate NRIR has not been reached. Therefore, policy-makers have to be cautious in using NRIR, taking into consideration other related economic factors, especially the current economic condition, the economic outlook and future risks.

<sup>4</sup> Bomfirm, A.N. (2001), "Measuring Equilibrium Real Interest Rates: What Can We Learn from Yields on Indexed Bonds?", Federal Reserve Board *Finance and Economics Discussion Series*, No. 2001-53.

<sup>5</sup> Laubach, T. and J.C. Williams (2003), "Measuring the Natural Rate of Interest", *The Review of Economics and Statistics*, Vol. 85(4), pp. 1063-1070.