Appendix 2. Comment from Lars E.O. Svensson

The views expressed in this comment are Lars E.O. Svensson's own and are not necessarily shared by the other members of the Riksbank's Executive Board or staff.

Correcting the Riksbank's estimate of the long-run sustainable rate of unemployment

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The Riksbank's new (mid)point estimate of the long-run sustainable rate of unemployment, 6.25 per cent, has an upward bias of about 0.75 percentage points. Corrected, the point estimate is hence about 5.5 per cent.

Sveriges Riksbank (2012) presents an estimate of the long-run sustainable rate of unemployment (LSRU), defined as the rate of unemployment in a steady state where inflation expectations are equal to actual inflation. The method used to estimate the LSRU consists of two steps. In the first step, the LSRU that prevailed in 2006 before the government's reforms were begun is estimated to be in the interval of 6.5–7.5 per cent, that is, with a midpoint of 7 per cent. In the second step, the effect on the LSRU of the government's reforms and changes in the composition of the labour force since 2006 is estimated to be a decrease of the LSRU in the interval of 0–1.5 percentage points (pp), that is, with a midpoint of 0.75 pp. Subtracting the latter from the former results in an interval of 5–7.5 per cent with a midpoint of 6.25 per cent. Thus, the midpoint 6.25 per cent can be seen as the Riksbank's new point estimate of the LSRU.

This comment focuses on the first step, the (mid)point estimate of 7 per cent for the LSRU, and argues that it has an upward bias of about 0.75 pp. That is, a corrected point estimate of the LSRU in 2006 is about 6.25 per cent. In the second step, subtracting the Riksbank's estimate of 0.75 pp of the effect of the government reforms and changes in the composition of the labour force then results in a corrected Riksbank point estimate of the new LSRU of about 5.5 percent.

In this comment I derive the bias of 0.75 pp in two different ways. The first way relies on an estimated long-run expectations-augmented Phillips curve for CPI inflation and unemployment. It calculates the bias from the observation that average inflation has fallen below average inflation expectations, which together with the estimated long-run Phillips curve implies that average unemployment exceeds the LSRU. The second way

relies on an estimated long-run Phillips curve that uses the Riksbank's previous estimate of the unemployment gap (Sveriges Riksbank 2010) instead of the rate of unemployment. It calculates the bias from the observation that the average unemployment gap, conditional on average inflation being equal to average inflation expectations, is not zero but negative, about 0.75 pp below zero.

The Riksbank's method for estimating the LSRU in 2006 is to start from the average of the rate of unemployment over 1999-2006, which is 7 per cent, and then to make this the midpoint of the estimated interval of 6.5–7.5. As summarized in Sveriges Riksbank (2012, p. 47, italics added): "Seen across the whole period 1999-2006, actual unemployment has varied between 6 and 8 per cent, with *an average of around* 7 *per cent*. Indicators of resource utilisation in the labour market give reason to believe that the long-run unemployment rate during this period was somewhat higher than 6 per cent and somewhat lower than 8 per cent. This entails a narrower interval for long-run unemployment than for actual unemployment. The Riksbank's overall assessment is that long-run unemployment was between 6.5 and 7.5 per cent during the period 1999-2006."

However, the average rate of unemployment is an unbiased estimate of the LSRU only if average inflation expectations have been equal to average inflation. Furthermore, the indicators of resource utilization referred to are indicators of labour-market tightness that indicate above- and below-normal tightness, but that does not prevent the "normal" tightness depending on the deviation between average inflation and average inflation expectations.

As documented in Svensson (2012), during the last 15 years average inflation expectations have been close to 2 per cent but average CPI inflation has been 1.4 per cent. The systematic difference between inflation expectations and CPI inflation is illustrated in Figure 1 (from Svensson 2012), which shows moving 5-year averages of CPI inflation and expectations of inflation one and two years ahead from the TNS Sifo Prospera survey.[8]

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[8] Sveriges Riksbank (2012, Figure A5) also refers to several econometric models that estimate different concepts of short-run and long-run equilibrium rates of unemployment. But these models implicitly or explicitly assume rational expectations, so their estimates would be subject to the same bias as discussed here.

Figure 1. CPI inflation expectations one and two years ahead (all interviewees) and CPI inflation, five-year moving averages

Per cent
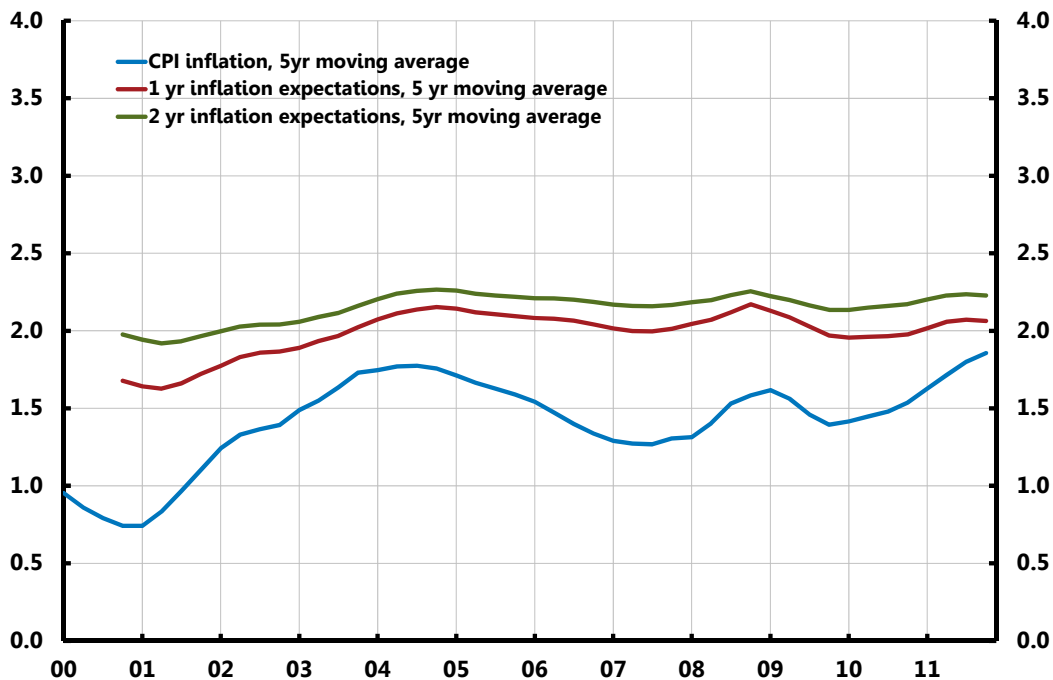
Sources: Statistics Sweden and TNS Sifo Prospera. CPI inflation from real-time data.

The first way to estimate the bias relies on one of the most basic and established relationships in monetary macroeconomics and in monetary policy, the so-called expectations-augmented Phillips curve, the relation between inflation, inflation expectations, the rate of unemployment, and the LSRU. The *long-run* expectations-augmented Phillips curve represents the relation between the *long-run averages* of these variables and can be written

$$\pi - \pi^e = -\gamma\,(u - u^*),$$

where π denotes average inflation, π^e denotes average inflation expectations, u denotes the average rate of unemployment, u^* denotes the LSRU, and γ is a positive constant. Svensson (2012) estimates a long-run Phillips curve for Sweden using data for CPI inflation and unemployment for 1997-2011. The coefficient gamma is estimated to equal 0.76. It follows that

$$u - u^* = -1.32\,(\pi - \pi^e),$$

where I have used that $1/\gamma = 1/0.76 = 1.32$.

If average inflation and average inflation expectations are equal, that is, if $\pi = \pi^e$, it follows that the average rate of unemployment and the LSRU are equal, $u = u^*$. Then the observed average rate of unemployment is an unbiased estimate of the LSRU. This is the

conventional case of a vertical long-run Phillips curve, where equality between inflation expectations and inflation implies that average unemployment is independent of average inflation.

For Sweden, survey data indicate that average inflation expectations have been anchored at the inflation target of 2 per cent during the last 15-16 years, that is, π^e = 2. But average CPI inflation has consistently fallen below 2 per cent. During 1997-2011, average CPI inflation was 1.4 per cent, 0.6 pp below 2 per cent. The fact that average inflation expectations and average inflation are not equal for Sweden means that the long-run Phillips curve is no longer vertical but downward sloping – at least for moderate deviations of average inflation from 2 per cent. Using this in the equation above gives $u - u^*$ = 1.32*0.6 = 0.8 pp. During the shorter sample 2000-2006, average CPI inflation was about 1.5 per cent, 0.5 pp below 2 per cent. This gives $u - u^*$ = 1.32*0.5 = 0.7 pp. Taking the average of these two estimates, the result is a bias of about 0.75 pp. That is, the corrected LSRU is about 0.75 pp below the average rate of unemployment of 7 per cent and hence equal to about 6.25 per cent.

The second way to estimate the bias is to estimate a long-run Phillips curve using the gap between the rate of unemployment and the Riksbank's previous estimate of "long-term" unemployment in Sveriges Riksbank (2010, Figure B23). This long-term rate of unemployment is shown as the black line in Figure 2 (from Svensson 2012); the rate of unemployment is shown as the green line. Svensson (2012) estimates a Phillips curve for CPI inflation and this unemployment gap for the period 1998-2011.[9] The resulting long-run Phillips curve is shown in Figure 3 (from Svensson 2012). The red circles are the quarterly observations of CPI inflation and the unemployment gap and the black line shows the estimated long-run Phillips curve.

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[9] Thus, this long-run Phillips curve allows a trend in unemployment and the LRSU, which presumes a trend in the parameters determining the LRSU.

Figure 2. CPI inflation and the Riksbank's previous and revised estimate of long-term unemployment
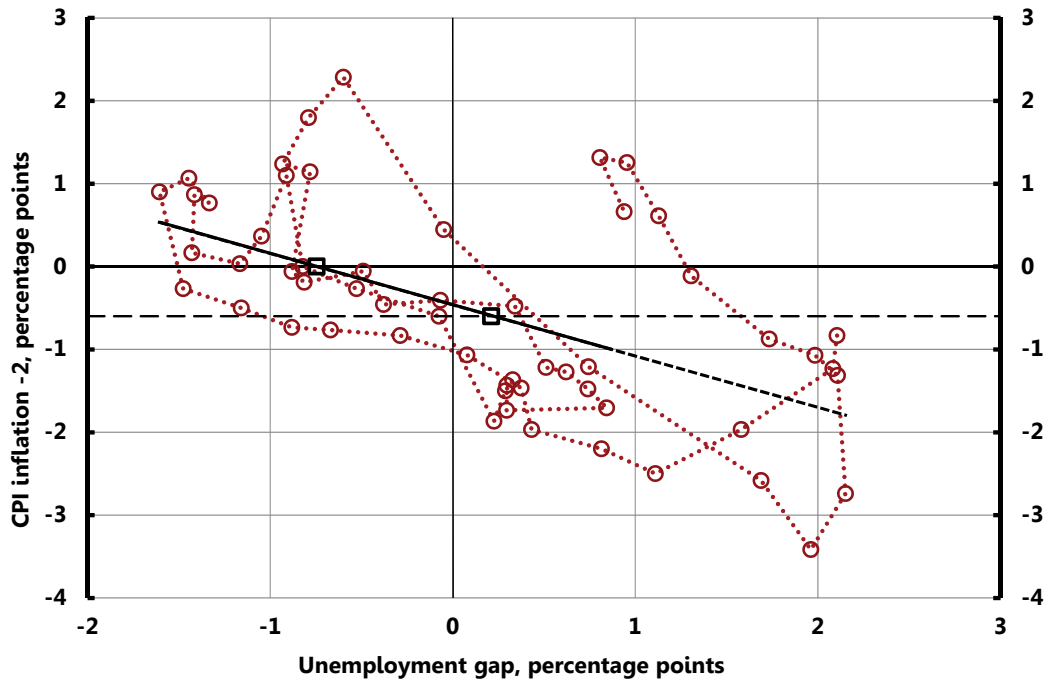
Per cent
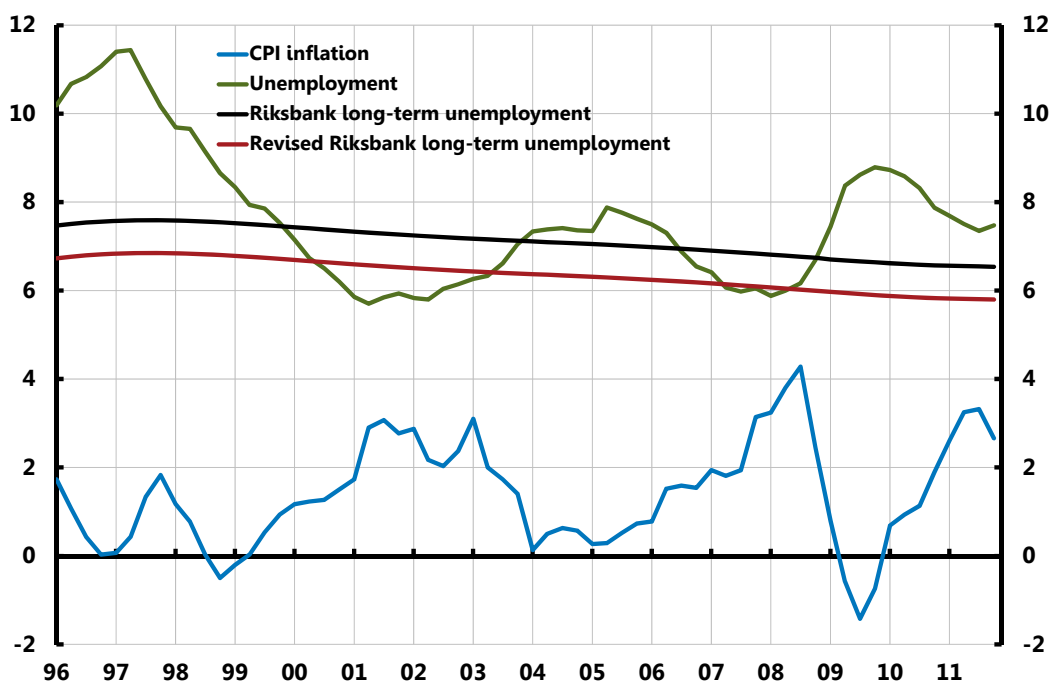
Sources: The Riksbank, Statistics Sweden, and own calculations. CPI inflation is from real-time data.

The average unemployment gap associated with average inflation equal to 2 per cent is – 0.74 pp rather than zero (the leftmost square in Figure 3). This indicates that the Riksbank's estimate of the long-term rate of unemployment is biased upwards by about 0.75 pp.

Figure 3. The long-run Phillips curve with CPI inflation and the Riksbank's unemployment gap, 1998Q1-2011Q4

Sources: The Riksbank, Statistics Sweden, and own calculations. CPI inflation is from real-time data.

The red line in Figure 2 shows a revised Riksbank estimate, constructed by subtracting 0.74 from the Riksbank's estimate of the long-term rate of unemployment. For 2006, according to Figure 2 the Riksbank's previous estimate of long-term rate of unemployment is about 7 per cent (consistent with the new (mid)point estimate of 7 per cent), so the revised previous estimate of the long-term rate of unemployment in 2006 is about 6.25 per cent.

In summary, both ways of deriving the bias result in the same bias, about 0.75 pp. The corrected (mid)point estimate of the LRSU in 2006 is hence 6.25 per cent, not 7 per cent. Subtracting the estimated effects of government reforms and changes in the composition of the labour force then results in a corrected (mid)point estimate of the LRSU of 5.5 per cent, not 6.25 per cent.

References

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