

## What is a normal level for the repo rate?

**Interest rates in general are currently at historically low levels, both in Sweden and, for example, the euro area. As inflationary pressure rises, interest rates are expected to rise. It is difficult to determine what should be regarded as normal levels for interest rates. The results of this box indicate that a normal level for the repo rate would probably be somewhere in the range 3 ½–5 per cent. However, past experiences show that the repo rate can even fall outside of this rather broad range for fairly long periods of time.**

It is difficult to determine exactly what should be regarded as more normal levels for interest rates compared to current levels, but at the same time both interest rate forecasts and inflation forecasts are affected by the assumptions made regarding reasonable long-term levels for nominal and real interest rates. The financial markets tend to look ahead and expectations of the conditions that will apply in the long run also affect the short term. Inversely, long-term interest rates are affected by expectations of how central banks will change their short-term key rates.

One means of determining what might constitute a normal interest rate level is to look at the average over long periods of time. The level of interest rates can be expected to vary over the business cycle, but by examining a sufficiently long period of time that has been characterised by more or less equal periods of economic boom and recession, it should be possible to form an opinion on a normal interest rate level (in a normal economic climate). The nominal interest rate is the equivalent of the real interest rate plus expected inflation. This means that there may be changes in what might be regarded as a normal level of interest rates if long-term changes not related to cyclical activity occur in areas that affect real interest rates or inflation. Changes in monetary policy worldwide have, for example, led to sustainable lower

inflation and accordingly lower nominal interest rates compared with 20-30 years ago.

According to economic theory, real interest rates are determined to some extent by growth in the economy and households' time preferences. These time preferences refer to how households value consumption at different points in their life cycle. It is usually assumed that individuals strive for a relatively smooth consumption over time, but also that they have a certain amount of impatience which means they prefer not to postpone their consumption. Thus, an expected future increase in income will lead to an increased demand for loans, which will enable at least part of the future income to be consumed now. The rate of interest the household is willing to pay for the loan depends on the time preference and how rapid growth is expected to be. The higher the growth rate, the more households want to consume now instead of waiting.<sup>10</sup> Economic theory thus indicates that there will be a relatively high real interest rate if growth is high.

In a world with free movement of capital, the nominal interest rate in each country is not determined independently of the rates in other countries. Capital tends to flow to where interest rates are highest, which limits the differences in nominal rates. One means of determining what might constitute a normal nominal interest rate level could be to study how interest rates vary across countries and calculate the average nominal level. However, some differences can persist over a long period of time as a result of different risk and liquidity premiums. While the credit risks for government borrowing within the OECD sphere are small, those related to exchange rate fluctuations can be considerable, at least in the perspective of a few years. In the slightly longer term, however, exchange rate fluctuations and inflation differences tend to offset one another and nominal interest rates in Sweden probably cannot deviate very much from international interest rates after taking

<sup>10</sup> For a theoretical discussion of long-term real interest rates, see the box "The concept of a real long-term equilibrium interest rate" in Inflation Report 2000:3 and also Jonsson, M., "The real interest rate and monetary policy", *Economic Review* No. 1, 2002, Sveriges Riksbank.

into account inflation rate differences (that is, real interest rates can be expected to be fairly similar).<sup>11</sup> Given this, interest rate levels that have been common historically may provide an indication of what a normal nominal level should be.

Calculations of a long-term normal interest rate (real and nominal) are made difficult by the fact that major changes in the economy in recent decades have led to long-term relations between various economic variables changing over time. Countries have gradually become more dependent on one another, both as a result of economic growth per se and because of fewer regulations governing international flows of capital, goods and services. In addition, Sweden and many other countries experienced extensive deregulation of their domestic financial markets during the 1980s. Nominal interest rates have also fallen since monetary policy has been aimed at creating a low, stable inflation rate. The extensive changes that have taken place have probably affected the level of what can be regarded as a long-term normal interest rate (both real and nominal) and mean that historical averages of interest rates can be misleading.

Another problem when calculating what might be considered a normal interest rate is that there is no unique, relevant interest rate for each country and each point in time; there is a whole spectrum of interest rates at different levels that depend on the borrower's credit risk, the duration of the loan and the liquidity of the securities (with regard to standardised contracts that can be transferred and traded on the market). The yield curve describes how interest rates on loans are due to the respective duration of the loans. From a monetary policy perspective, the entire yield curve is of interest. Central banks' monetary policy directly governs

short-term nominal rates, but the effects of monetary policy on inflation, through for instance consumption and investment, are often assumed to be largely through the more long-term nominal interest rates.

The remainder of this box will give an account of data that can be used to estimate a range for a normal short-term nominal interest rate.<sup>12</sup> As pointed out above, there are many problems with these estimates. The figures must be interpreted with caution and do not provide any clear-cut conclusion.

#### *Empirical estimates*

One indicator that gives a rough estimate of a normal real interest rate is the long-term real growth in the economy.<sup>13</sup> Table B1 shows how real GDP growth has varied between different countries and different periods in time.<sup>14</sup> In all countries, growth was higher during the 1960s than it has been since. In the United States, growth in the decades that followed has remained stable at around 3 per cent per year, which is also the unweighted average for all the countries in the table over the entire period since 1960. Table B2 shows that the average growth in consumption across all of the countries in the sample has remained close to the average GDP growth, that is around 3 per cent, during the different decades. However, the differences between the countries are at times substantial and growth in both GDP and private consumption has on average been higher in the United States than, for example, in Germany, the United Kingdom and Sweden.

Table B3 shows that the international interest rate level was relatively low during the 1960s. During this decade inflation was also relatively low, as it has been recently, which

11 For a more detailed discussion of a normal interest rate in an international perspective, see for instance Archibald, J. and L. Hunter, "What is the neutral real interest rate, and how can we use it?", *Reserve Bank of New Zealand Bulletin*, Vol 64, No 3, 2001.

12 For a discussion of the long-term real interest rate, see the box "Real interest rate and monetary policy", in the Inflation Report 2000:1.

13 Standard theories involve growth and the real interest rate normally being fairly similar, but the exact relationship depends on which more specific assumptions are made in the different theories regarding the functioning of the economy. Some theories suggest that what is relevant for real interest rates is not GDP growth as in Tables B1 and B2, but growth per capita. Growth in GDP and per capita consumption are normally 0.5-1.0 percentage points lower than in the Tables B1 and B2.

14 The countries have been chosen arbitrarily but are all market-based OECD economies belonging either to the major countries (the United States, Germany, the United Kingdom) or are countries which introduced inflation targets around the same time as Sweden (Australia, New Zealand). The countries have been chosen to give examples of the state of the economy (and periods of time) characterised by different degrees of dependency on foreign trade, different monetary policy regimes, etc.

contributed to keeping down nominal interest rates. At the same time, the credit markets were strictly regulated then, which means that data from the 1960s cannot be used to determine what might be a normal interest rate level today. The 1970s and 1980s were periods of high inflation, which pushed up nominal interest rates around the world. During the 1980s, credit markets were deregulated and interest rates became more market-based. At the same time, public saving was negative in several countries, which may have contributed to higher real interest rates than in the 1960s and 1970s (see Table B4). In the 1990s the low-inflation policy was established and nominal interest rates returned to lower levels. Initial problems with confidence in the low-inflation policy probably contributed to keeping interest rates up for a period, particularly in Sweden. Since 1998, confidence in the new monetary policy regime can be regarded as having been established in full, making the period from 1998 onwards an interesting one to study from a Swedish perspective.<sup>15</sup> The average short-term nominal interest rate in Sweden has been around 3.3 per cent in recent years. This is marginally higher than in the United States and Germany, but lower than in the United Kingdom, Canada, Australia and New Zealand.<sup>16</sup> The short-term real interest rate in Sweden has in recent years been around the average for the countries in the sample: 2.2 per cent.

Differences in short-term interest rates between different countries during short periods may be justified on the grounds that the economies are in different phases of the economic cycle. A calculation of normal interest rate levels should therefore attempt to include cyclical factors. One simple means of adjusting for cyclical effects is to assume that interest

rates are determined by a Taylor rule.<sup>17</sup> This assumes that the central banks will change their instrumental rates with regard to developments in inflation and GDP. The rule states that the central bank should set its rate at the long-term or normal level when inflation is in line with the target level and GDP is at its potential level.

More formally, the Taylor rule states:

$$i_t = i^* + 1.5(\pi_t - \pi^*) + 0.5(y_t - y_t^*) + \varepsilon_t$$

where  $i$  is the nominal instrumental rate,  $i^*$  is the nominal long-term rate,  $\pi$  is inflation,  $\pi^*$  is the inflation target,  $y$  is output,  $y^*$  is potential output and  $\varepsilon$  is a deviation taking into account the fact that the rule does not apply exactly.<sup>18</sup> By putting historical data over nominal instrumental rates ( $i$ ), deviations from the inflation target ( $\pi - \pi^*$ ) and the output gap ( $y - y^*$ ) in this equation, the normal rate of interest,  $i^*$ , can be calculated. The calculation will be an estimate of the central bank's view of the normal rate  $i^*$ , given the assumption that the Taylor rule provides a good description of monetary policy.

There are both advantages and disadvantages with using this relatively simple specification for calculating the normal interest rate  $i^*$ . On the one hand it is easy to make comparisons when the calculation is made in the same way and using the same simple formula for all countries. On the other hand, the Taylor rule makes too rough an estimate of monetary policy to give a precise measure of the normal instrumental rate, not least because of the major changes in the formulation of monetary policy in recent decades. The relative significance of inflation and real output have probably changed over time, for example. Moreover, the monetary policy conducted now is to a great

15 Surveys indicate that confidence in the new regime was established in autumn 1996 to the extent that inflation expectations one year ahead were close to 2 per cent. However, pricing in the money market indicates that confidence was first established during early 1998 in that the spread between a Swedish and a German 10-year treasury bond was down to the level that has applied since then, i.e. less than 0.5 percentage points (see Figure B1).

16 The real interest rate calculated ex post, that is, nominal interest rate adjusted for actual inflation rather than expected inflation, gives largely the same picture relative to other countries during 1998-2005. However, Canada's real interest rate was lower than the Swedish rate, which was 2.2 per cent (see Table 4). During the period 1996-2005 the average for the Swedish short-term nominal interest rate was slightly higher than in 1998-2005 (3.6 per cent).

17 See Taylor, J., "Discretion versus policy rules in practice", *Carnegie-Rochester Conference Series on Public Policy* 39, 1993.

18 Taylor's original study used the long-term real interest rate. In the disposition above, a long-term nominal interest rate and a long-term inflation target replace Taylor's long-term real interest rate. Output gaps are calculated using an HP filter on seasonally adjusted real GDP series. The problem of the end-point in the HP estimates is reduced by ensuring that logged GDP series are first forecast using an AR(4) process.

Source: The Riksbank

**Figure B1. Yield spread between Swedish and German 10-year nominal government bonds**  
Percentage points



extent forward-looking and based on forecasts rather than actual observations of the output gap. Despite these objections, the results of the estimates of the normal instrumental rate based on the Taylor rule are interesting. On the whole, the estimates paint the same picture as the nominal rate itself; interest rates have fallen since the 1980s in all countries (see Table B6). In both the United States and Sweden the Taylor rule gives a normal instrumental rate during 1998–2005 that is higher than the average value of the short-term rate according to Table B3. This reflects the fact that both inflation and resource utilisation have been relatively low in the United States and Sweden during this period, and that monetary policy has therefore been more expansionary than the Taylor rule deems normal. The Taylor estimate gives a normal, cyclically-adjusted instrumental rate of 4.6 per cent for the period 1998–2005 in Sweden.<sup>19</sup> This is in the middle of the range for the countries in Table B5

during the period 1998–2005 (3.7–5.7 per cent).

#### *Conclusion and some final observations*

The assessments of what is a normal interest rate are uncertain for several reasons. There have been extensive changes in the economy in recent years and it is still difficult to distinguish which changes are long-term or structural changes and which have a more cyclical or temporary nature. The figures reported above can therefore only provide an indication of what is a normal interest rate. The results of this box indicate that the average level of the nominal short-term interest rate in Sweden during 1998–2005, i.e. 3.3 per cent, has been lower than normal, both from a historical perspective and taking account of cyclical effects.

The nominal interest rate is the equivalent of the real interest rate plus expected inflation. Both historically and in international terms, the real interest rate has tended to be close to the trend growth rate of the economy. For Sweden, this means around 3 per cent in the recent past. With a target of 2 per cent inflation, a normal level for the nominal interest rate should thus be around 5 per cent. However, this rough rule of thumb disregards differences between interest rates with different durations. Central banks' instrumental rates are by no means the same as market rates and moreover apply to very short-term loans. They are generally lower than short-term market rates, which in turn have in

**Table B1. Average real GDP growth during different periods of time**  
Per cent

	1960–1969	1970–1979	1980–1989	1990–1999	1998–2005	1960–2005
United States	4.5	3.2	3.0	3.0	3.1	3.3
Germany	4.3	3.1	1.8	1.5	1.3	2.5
United Kingdom	3.0	2.4	2.3	2.1	2.7	2.5
<b>Sweden</b>	<b>4.4</b>	<b>2.4</b>	<b>2.3</b>	<b>1.7</b>	<b>2.9</b>	<b>2.6</b>
Canada	5.4	4.1	3.0	2.4	3.4	3.5
Australia	4.7	3.2	3.3	3.2	3.5	3.5
New Zealand	n.a.	n.a.	n.a.	2.6	3.3	2.7
Unweighted average	4.4	3.1	2.6	2.4	2.9	2.9

Note. For New Zealand, the sample covers 1988–2005.

Sources: US Department of Commerce, UK Office for National Statistics (ONS), Statistics Canada, Australian Statistician, Statistics New Zealand, Statistics Sweden, Federal Statistical Office Germany

<sup>19</sup> Calculated using quarterly data, the inflation gap in 1998–2005 averaged -1.0 percentage points. During the same period the repo rate averaged 3.2 per cent. If the Taylor approach is based on the period 1996–2005, the estimate of the equilibrium interest rate will be 5.3 per cent.

recent times often been below 5 per cent (see Table B3). Estimates of Taylor rules normally yield instrumental rates of 3.7-5.7 per cent (see Table B5), which should, however, be interpreted with some caution given that both central banks' inflation targets and the output gap can be difficult to measure. All in all, the figures

reported in this box indicate that a normal level for the repo rate is estimated to be in the range 3½–5 per cent, but as can be seen from the present circumstances and past experiences in Sweden and other countries, the repo rate can fall outside of this rather broad range for fairly long periods of time.

**Table B2. Average real consumption growth during different periods of time**  
Per cent

	1960–1969	1970–1979	1980–1989	1990–1999	1998–2005	1960–2005
United States	4.5	3.4	3.2	3.2	3.7	3.5
Germany	n.a.	n.a.	n.a.	1.7	1.0	1.3
United Kingdom	2.3	2.6	3.3	2.2	3.4	2.7
<b>Sweden</b>	<b>3.6</b>	<b>2.1</b>	<b>1.7</b>	<b>1.0</b>	<b>2.4</b>	<b>2.1</b>
Canada	4.6	4.2	2.7	2.1	3.3	3.3
Australia	4.5	3.5	3.1	3.2	4.0	3.6
New Zealand	n.a.	n.a.	n.a.	2.5	3.8	2.9
Unweighted average	3.9	3.2	2.8	2.3	3.1	2.8

Note. For New Zealand, the sample covers 1988 onwards and for Germany, 1992 onwards.

Sources: US Department of Commerce, UK Office for National Statistics (ONS), Statistics Canada, Australian Statistician, Statistics New Zealand, Statistics Sweden, Federal Statistical Office Germany

**Table B3. Average nominal yield on a 3-month treasury bill during different periods of time**  
Per cent

	1960–1969	1970–1979	1980–1989	1990–1999	1998–2005	1960–2005
United States	4.0	6.3	8.8	4.9	3.1	5.0
Germany	n.a.	4.8	6.0	5.4	3.2	5.6
United Kingdom	6.2	8.9	11.4	7.9	5.0	8.3
<b>Sweden</b>	<b>5.5</b>	<b>6.4</b>	<b>11.7</b>	<b>8.0</b>	<b>3.3</b>	<b>7.4</b>
Canada	4.4	7.0	11.3	6.2	3.6	6.7
Australia	n.a.	8.7	14.5	7.2	5.2	9.3
New Zealand	n.a.	n.a.	14.6	8.1	6.0	8.2
Unweighted average	5.0	7.0	11.2	6.8	4.2	7.2

Note. The series of 3-month yields are often incomplete. For Germany the series starts in July 1975, for the United Kingdom in January 1964, for Sweden in December 1962. For Australia the 3-month yield is a bank bill and the series begins in June 1969. For New Zealand the 3-month yield is a deposit rate that begins in December 1987.

Sources: OECD, Federal Reserve, Statistics Sweden, Reserve Bank of Australia, Bank of Canada, Reserve Bank of New Zealand

**Table B4. Average ex post real yield on a 3-month treasury bill during different periods of time**  
Per cent

	1960–1969	1970–1979	1980–1989	1990–1999	1998–2005	1960–2005
United States	1.7	-0.5	3.5	1.9	0.8	1.4
Germany	n.a.	0.9	3.2	2.9	1.8	2.4
United Kingdom	2.2	-2.9	4.3	4.3	2.6	2.0
<b>Sweden</b>	<b>1.7</b>	<b>-1.8</b>	<b>4.0</b>	<b>4.8</b>	<b>2.2</b>	<b>2.2</b>
Canada	1.9	0.0	5.0	4.1	1.5	2.5
Australia	n.a.	-0.5	6.5	4.7	2.6	3.3
New Zealand	n.a.	n.a.	8.5	6.0	4.1	5.5
Unweighted average	1.9	-0.7	5.0	4.1	2.2	2.8

Note. Short-term real interest rate is defined as the yield on a 3-month treasury bill minus the average annual inflation over the past 12 months. The series of 3-month yields are often incomplete. For Germany the series starts in July 1975, for the United Kingdom in January 1964, for Sweden in December 1962. For Australia the 3-month yield is a bank bill and the series begins in June 1969. For New Zealand the 3-month yield is a deposit rate that begins in December 1987.

Sources: OECD, Federal Reserve, SCB, Reserve Bank of Australia, Bank of Canada, Reserve Bank of New Zealand, Statistics Canada, Australian Bureau of Statistics, Statistics New Zealand, OECD, UK Office for National Statistics (ONS)

**Table B5. Calculated nominal long-term key rate based on a Taylor rule during different periods of time**  
Per cent

	1960–1969	1970–1979	1980–1989	1990–1999	1998–2005	1960–2005
United States	4.2	7.1	10.0	5.0	4.3	6.2
Germany	4.1	5.3	5.7	5.7	4.4	5.1
United Kingdom	6.0	9.4	11.4	8.2	5.3	8.4
<b>Sweden</b>	<b>5.1</b>	<b>6.3</b>	<b>9.3</b>	<b>5.8</b>	<b>4.6</b>	<b>7.4</b>
Canada	n.a.	n.a.	n.a.	5.8	3.7	4.6
Australia	n.a.	n.a.	11.8	9.6	4.7	9.3
New Zealand	n.a.	n.a.	18.8	11.4	5.7	10.8
Unweighted average	4.9	7.0	11.2	7.4	4.7	7.4

Note. Inflation targets prior to the introduction of quantitative targets are defined as the current decade's inflation average in the respective country. For instance, the inflation target during the 1960s is set at 2.3 per cent in the United States, which is the average for US inflation measured as a 4-quarter change in CPI during the period Q1, 1960 – Q4, 1969. For Canada the sample covers 1992 onwards, for Australia 1980 onwards and for New Zealand 1987 onwards.

Sources: OECD, Federal Reserve, Statistics Sweden, Reserve Bank of Australia, Bank of Canada, Reserve Bank of New Zealand