REAL INTEREST RATE AND MONETARY POLICY

There are various approaches to the question of what is a desirable long-term level for monetary policy's instrumental rate. The matter is discussed here with reference to the intellectual framework the Riksbank uses for monetary policy in an inflation target regime.

Monetary policy influences inflation mainly through effects on total demand. When the central bank raises the interest rate, demand for consumption and investment is subdued and this tends to restrain the rate of price increases. Matters are complicated by the circumstance that it is primarily the very short-term nominal interest rates that respond to monetary policy, while consumption and investment are presumably more sensitive to real long-term rates. But as the real interest rate over a given time horizon is equivalent to the nominal rate less inflation's expected rate over the same horizon, monetary policy is capable of influencing the real rate provided changes induced by monetary policy in the nominal rate lead to changes of the same magnitude in the expected rate of inflation.

The relationship between the real interest rate, inflation and monetary policy is sometimes discussed with reference to identities of roughly the following appearance:

$$i_t = r_t^* + \pi_t^e + a(\pi_t^e - \pi^*) + b(y_t - y_t^p), \qquad (1)$$

where a and b are coefficients greater than zero. Here, i_i denotes the nominal interest rate set by the central bank, π^* the central bank's inflation target and y_t real output (GDP). This variables can be observed, at least retrospectively, but that is not the case for either expected inflation (measured over the same period as the interest rate), π_t^e, or the notional 'equilibrium levels' for the real interest rate, (r_t^*), and production, y_t^p.

Relationships of this type are often referred to as Taylor rules.[14] The notion is that when expected inflation exceeds the target, the nominal interest rate ought to be above the 'nominal equilibrium interest rate'. However, the appropriate size of this difference from the equilibrium level also depends on the cyclical situation $(y_t - y_t^p)$. When the economy is in equilibrium, in the sense that expected inflation equals π^* and

14. See Taylor, J.B. (1993), Discretion versus policy rules in practice, *Carnegie-Rochester Conference Series on Public Policy 39*.

production is in equilibrium ($y_t = y_t^p$), then the real interest rate ($i_t - \pi_t^e$) is also at its equilibrium level (r_t^*). If inflation is above the target, on the other hand, the central bank will aim to keep the real interest rate above its equilibrium level (for the given cyclical situation) and vice versa.

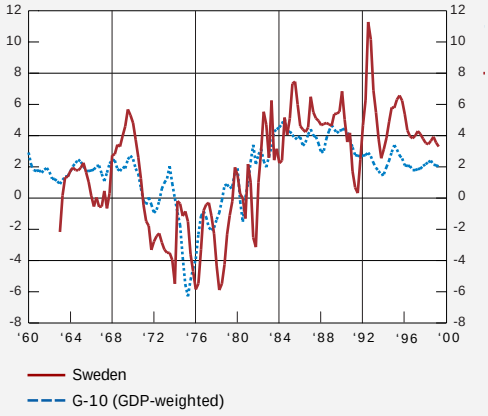
While no central bank conducts monetary policy exactly in accordance with this rule, it (or similar rules) has proved serviceable for describing approximately both how policy is actually implemented in many countries and how policy could be constructed. An import insight conveyed by the rule is that in the event of a positive difference between expected and targeted inflation, the nominal interest rate has to be raised by more than the expected acceleration of inflation. This is necessary to make the nominal interest rate increase equivalent to an increase in the real interest rate.

A central bank that wishes to apply the rule above needs to supplement its inflation forecast with an assessment of the equilibrium levels for the real interest rate and production (potential output). Potential output clearly has no particular given or constant *level*. Over the last hundred years, annual GDP growth has averaged around 2–3 per cent, which gives some idea of the rate of increase in potential output. But this variable parameter has to be estimated as reliably as possible.[15] Neither can the other important parameter, the equilibrium level of the real interest rate, be observed directly and the current state of empirical knowledge is hardly better than for the level of potential output.

A measure of a short-term real interest rate in Sweden and the G-10 countries[16] since 1960 is presented in Fig. B4. This measure represents the difference between a nominal three-month rate and *actual* inflation in the preceding twelve months (rather than expected inflation in the coming three months, which is what we would like to use to arrive at the real interest rate that is theoretically relevant); unfortunately there is no self-evident measure of expected inflation. For present purposes, however, this measurement problem is a secondary concern because expected and actual inflation can be assumed to follow the same path.

From Fig. B4 we can conclude that the real interest rate in Sweden has broadly followed developments elsewhere. The level fell from the mid 1970s, then rose

Figure B4. Short-term real interest rate in Sweden and the G-10 countries. Per cent



Sources: OECD, IMF and the Riksbank.

15. See e.g. Apel , M. & Jansson, P. (1999), System estimates of potential output and the NAIRU, *Empirical Economics 24*.
16. Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, United Kingdom, United States.

up to the end of the ’80s (possibly the early ’90s) and seems to have tended downwards again since then.

Table B2. Short-term real interest rates for selected countries in different decades.
Per cent

Period	G-10	Germany	Japan	Sweden	United States
1960-69	1.8	1.3	3.1	1.6	1.8
1970-1979	-0.8	1.5	-1.9	-2.0	-0.5
1980-1989	3.3	3.0	3.5	3.7	3.0
1990-1999 Q2	2.5	2.7	1.4	4.6	1.7
1960-1999 Q2	1.7	2.1	1.5	2.0	1.5

Note. The short-term real interest rate is defined as a nominal three-month rate less the average 12-month rate of CPI inflation over the preceding four quarters.

Sources: IMF, OECD and the Riksbank.

Table B3. Long-term real interest rates for selected countries in different decades.
Per cent

Period	G-10	Germany	Japan	Sweden	United States
1960-69	2.8	4.3	1.7	2.1	2.8
1970-1979	1.2	3.5	-1.3	1.4	1.4
1980-1989	3.4	4.1	2.9	3.2	4.0
1990-1999 Q2	3.5	3.8	2.2	4.1	3.2
1960-1999 Q2	2.7	3.9	1.3	2.7	2.9

Note. The long-term real interest rate is defined as a nominal long T-bond rate (ten years or the closest approximation) less the average 12-month rate of CPI inflation over the preceding four quarters.

Sources: IMF, OECD and the Riksbank.

Table B2 presents the average level of the short-term real interest rate in different countries and decades, as well as for the whole observation period since 1960. For the G-10 countries the average for the whole period is below 2 per cent but this figure conceals considerable differences between decades; the average level in the 1970s was clearly negative, whereas in the ’80s and ’90s it was well above 2 per cent. This suggests that the equilibrium level of the real interest rate is something that, like the level of potential output, is liable to vary markedly over time. The picture of long-term real interest rates in Table B3 warrants the same conclusion. To a fairly large extent, therefore, the path of the average real interest rate in Sweden seems to depend on the average international development of real interest rates. The latter in turn has varied fairly considerably over different periods.

So what are the factors that might underlie the marked shifts in the level of Swedish and international real interest rates? In general terms, the development of these rates in different countries can be said to

depend on the global relationship between saving and investment. The relative cross-border mobility of capital means that the real return on savings and investment is unlikely to differ all that much across countries. This explains why the average level tends to be fairly similar in different countries (Tables B2 and B3). The fact that real interest rates are still not completely uniform across countries implies that their short-term path is also sensitive to various country-specific factors, even in a small economy such as Sweden. One example of such factors is pronounced cyclical differences between countries.

It should be noted, however, that comparisons between the decades that are covered in the chart and the tables are complicated by the fact that capital markets were strictly regulated in the 1960s and '70s. The prevalent perception of the real interest rate as a mechanism for balancing saving and investment is not applicable in a regulated economy. The upward shift in real rates during the 1980s is possibly an indication that regulations had previously resulted in levels that were artificially low but it may also have to do with other factors.

From the argument above it follows that certain fluctuations in real interest rates may also be deliberate expressions of monetary policy. Changes in the principles for monetary policy in many countries also make it hazardous to attempt comparisons between, for example, the 1960s and '90s.

What does all this tell us about the present situation in Sweden? As defined in Fig. B4, the short-term real interest rate at present in Sweden is not particularly low, either historically or internationally. On the other hand, we know that for some years the actual rate of inflation has been lower than expected, which means that the recent level of the real interest rate is presumably overestimated in Fig. B4. Moreover, as mentioned above, comparisons over time are hazardous, partly due to changes in the regulations for internal and cross-border capital movements, the structure of tax systems and the development of exchange rates. Furthermore, the rule (1) states that the real interest rate should be relatively high when forecast inflation is above the inflation target and/or economic activity is high.

Simple arithmetical examples may be illustrative. Assume that the forecast for inflation two years ahead is exactly on the target, 2 per cent, and that the economy is in a neutral cyclical position. The nominal two-year interest rate should then represent the equilibrium level

of the real interest rate plus expected inflation. In this example the latter is 2 per cent and as an approximation of the former we can take the average of the average short and long real interests in Germany in the period 1960-99 (Tables B2 and 3), that is, (2.1 + 3.9)/2 = 3.0 per cent. The nominal two-year interest rate should then be about 5 per cent, which is fairly close to the present level in Sweden. The reason why the level of German interest rates can serve as a benchmark is that monetary policy there has been constructed for a considerable time as it is today in Sweden, with a flexible exchange rate and a focus on low inflation.

Basing the calculations instead on the corresponding data for Swedish interest rates, the hypothetical equilibrium level of the nominal interest rate works out at somewhat below the present level: (2.0 + 2.7)/2 + 2.0 = 4.35 per cent. Starting alternatively with Swedish interest rates in the 1990s, the result is higher than the present level: (4.6 + 4.1)/2 + 2.0 = 6.35 per cent. However, neither period is particularly relevant: the 1960s because the capital market was regulated and the 1990s because the outcome has so much to do with the economic crisis that Sweden experienced.

These examples illustrate the difficulties, using historical data, of forming an opinion about what might be an appropriate long-term level for real interest rates with a maturity of approximately two years. For monetary policy, however, the difficulties are not confined to the assessment of an appropriate average level from which to start. The repo rate applies to very short maturities and we do not have any detailed knowledge about the slope of the yield curve—in the interval from two weeks to two years—that is suitable when the economy is in long-term equilibrium. Moreover, the current level of somewhat longer interest rates incorporates expectations that the repo rate will be raised.

It is up to the Riksbank to adjust the repo rate so that the inflation target is fulfilled. Interest rates will then vary with the business cycle, for example. Arguments, such as those above, about what may be an appropriate long-term level of the real interest rate, are weighted into the foundation for monetary policy decisions and influence the Riksbank's assessment of inflation. However, it is the perception of inflation one to two years ahead that normally determines how monetary policy is formulated.