A note on real short-term interest rates

It is frequently claimed that real interest rates are now historically high. But comparing recent levels with those for just the 1970s is likely to be misleading. This note, therefore, gives longer runs of various series. It presents estimates of pre-tax and post-tax real short-term interest rates facing different categories of lenders and borrowers in the United Kingdom, the United States and Germany.

Real interest rates are of concern because they are thought to be particularly relevant to saving and investment decisions. The relevant real interest rate is a forward-looking concept reflecting market expectations about nominal interest rates and inflation.[1] Because of the difficulties of measuring these expectations over a long time horizon, this note concentrates upon short-term interest rates, typically with a term of three months or less. Over such a period, (average) inflation expectations may be easier to assess, on the basis of survey responses, published short-term macroeconomic forecasts or simple formulae relating expected to actual inflation.

In addition, the real rate appropriate to private saving and investment decisions is one which takes account of the tax treatment of interest. In principle, the pre-tax real rate is relevant only to borrowers whose interest payments cannot be offset against tax, and to lenders whose interest income is not taxable.

There is no single real interest rate which adequately reflects the cost of borrowing. Rather, there are various real interest rates which could be relevant, depending not only on the interaction of a tax system with many marginal tax rates and a financial system in which nominal interest rates differ between markets and types of instrument, but also on differing expectations, particularly of inflation. The range of measures presented are derived from alternative combinations of nominal rate, inflation expectation proxy and tax treatment, each of which in turn can only be an average measure, in that the money and capital markets encompass a wide range of individual expectations and thus individual real rates.

The rest of this note sets out in a taxonomic fashion various considerations affecting the real rate measures presented in the charts.

Nominal interest rates

There are a number of nominal interest rates in each country to select from. The rates chosen which are thought relevant to a (large) corporate borrower are:—

United Kingdom: base rate[2] plus 1 percentage point.

This has generally been the rate charged by the London clearing banks on overdrafts for large credit-worthy corporate borrowers. There is some doubt about the precise rate charged to such customers before the mid-1950s during the period when nominal rates were exceptionally low, and when by common agreement the London clearers imposed a minimum rate irrespective of Bank rate, which for most of the time appears to have been set at around 5 per cent. Where relevant, this has been used in the calculations.

United States: three-month commercial paper rate.

Prime rate is not used as in recent years large borrowers have been charged a rate well below prime rate.

Germany: the rate charged for bank loans of between 1 and 5 million deutschemarks.

The rates chosen for private lenders are:—

United Kingdom: base rate[2] minus 2 percentage points.

This reflects nominal returns to small short-term deposits.

United States: ceiling rate on small bank deposits.

This is the rate appropriate to the small private lender, but the growth of money market mutual funds reflects moves to avoid these regulations. In addition, therefore, the three-month Treasury bill rate is used.

Germany: rate on bank deposits with no restrictions on withdrawals.

Adjustment for inflation

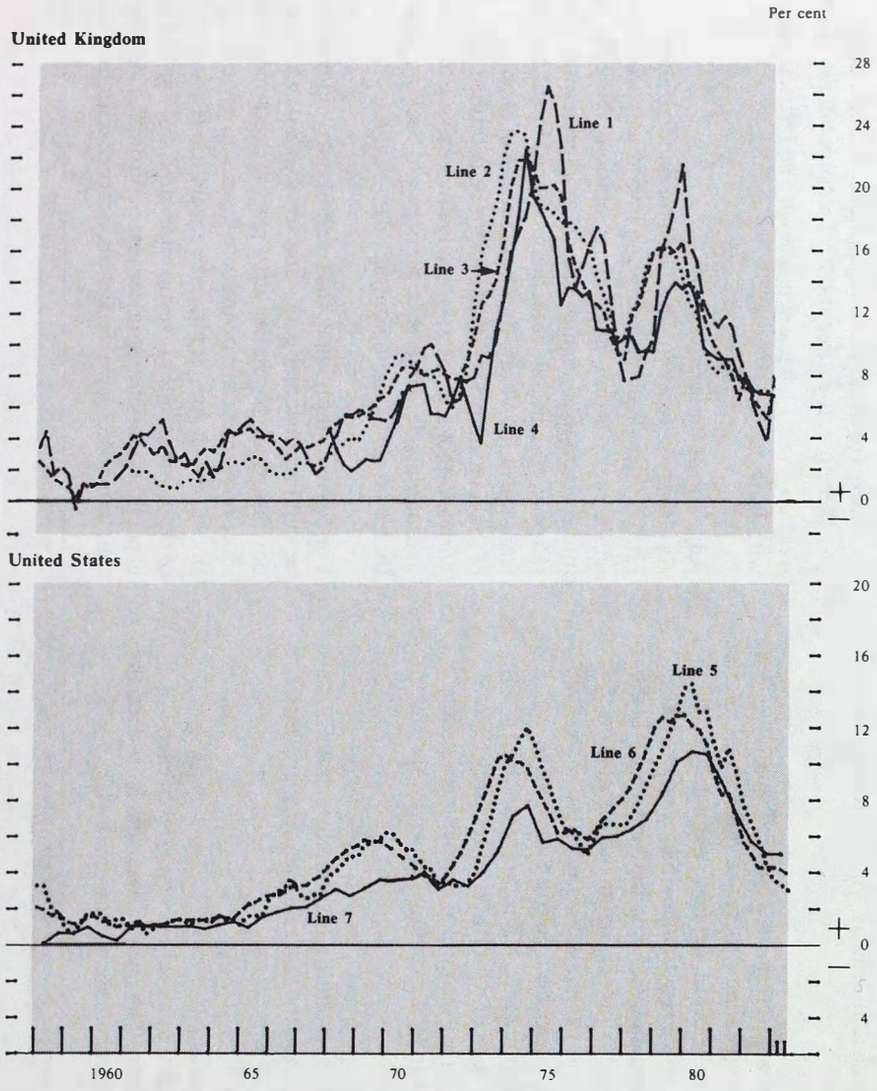
As already noted, a major reason for concern about interest rates is their effect on saving and investment decisions, which suggests that inflation expectations should be taken into account in assessing the level of interest rates. For this purpose, real interest rates are measured by subtracting from the nominal rate the expected rate of change of the relevant prices. These might be described as 'forward-looking' rates, which are more likely to be relevant to economic decisions than a 'backward-looking' rate (based on past inflation only).

For a private individual, the relevant price index is likely to be that for consumer goods and services. For a firm, it is less obvious which particular set of price expectations will be most relevant: if borrowing is to finance investment in stocks of materials, it might be expectations about the price of these goods; if for investment in stocks of finished goods, expectations about producer prices. From the viewpoint of the shareholders, who may be concerned with the disposal

(1) Backward-looking real rates based on current interest and inflation rates, may be useful for other purposes such as the assessment of the actual burden imposed by interest payments.

(2) Bank rate prior to 1971.

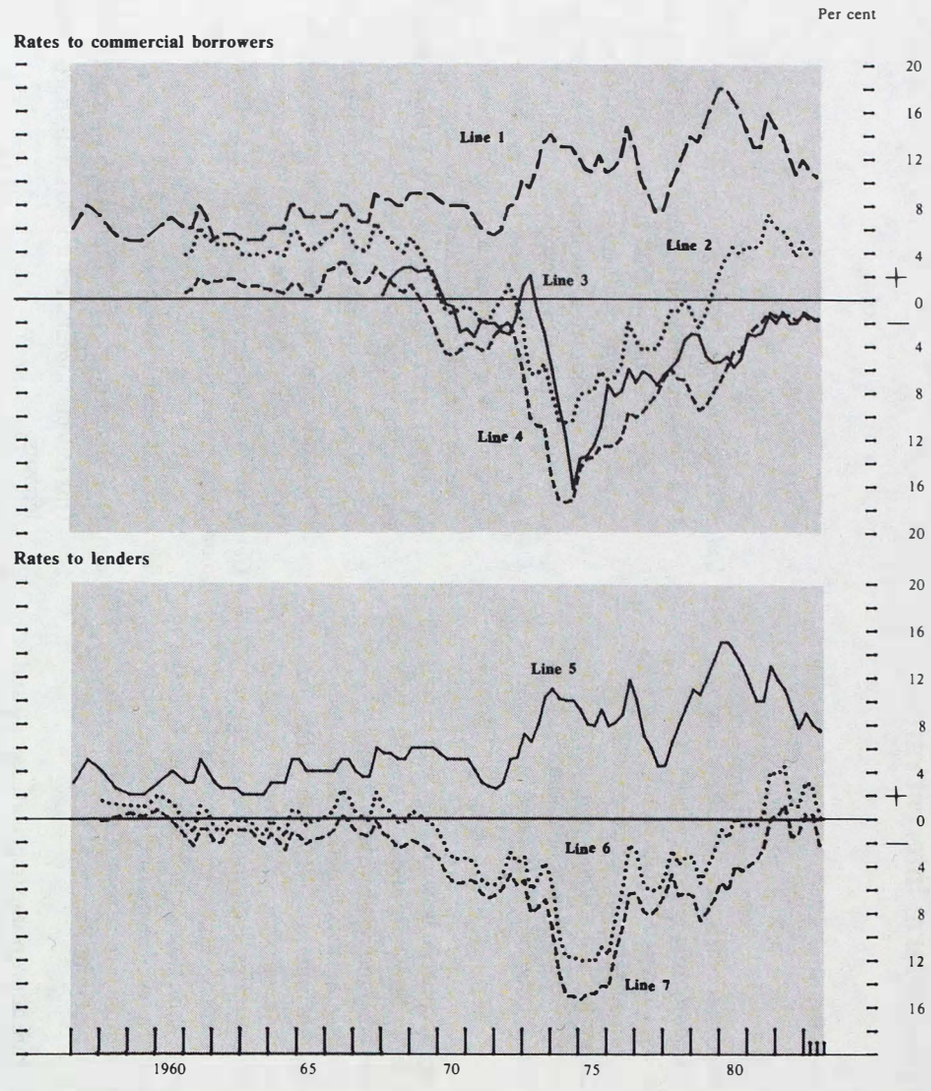
Chart 1
Measures of inflation expectations



Line 1 Actual UK consumer price inflation over previous year
Line 2 Expectations of UK wholesale price inflation(a)
Line 3 Expectations of UK consumer price inflation(a)
Line 4 Holden and Peel series
Line 5 Actual US consumer price inflation over previous year
Line 6 Expectations of US consumer price inflation(a)
Line 7 Livingston series

(a) Calculated according to footnote (4) on page 473.

Chart 2
Interest rates in the United Kingdom



Line 1 Base rate plus 1%
Line 2 Line 1 *less* expected wholesale price inflation(a)
Line 3 Line 1 × (1 − corporation tax rate) *less* expected inflation (Holden and Peel Series)
Line 4 Line 1 × (1 − corporation tax rate) *less* expected wholesale price inflation(a)
Line 5 Nominal rate to lenders
Line 6 Line 5 *less* expected consumer price inflation(a)
Line 7 Line 5 × (1 − basic rate of income tax) *less* expected consumer price inflation(a)

(a) Calculated according to footnote (4) on page 473.

value of the company, expectations about consumer prices may be more appropriate.

In practice, only very limited data on price expectations are available. Estimating what expectations of inflation have been over the past thirty years is a hazardous procedure, even when the relevant horizon is short. This note in principle confines itself to estimates of price expectations three months ahead, although to smooth erratic or seasonal fluctuations in prices, forecasts used to measure these expectations relate to periods of up to a year. The real interest rates calculated therefore relate only to short-term assets or liabilities.[1]

For the United Kingdom and United States, forecasts of the rate of change of consumer prices looking four quarters ahead are available. For the United Kingdom, Holden and Peel have constructed a quarterly series, starting in 1968, taking the average of the forecasts of consumer price inflation over the coming year published by five main forecasting groups.[2] This series has been updated by the Bank to 1983.

For the United States, Livingston has collected data on economists' expectations of the consumer price level six months ahead since 1947.[3] For Germany estimates of inflation expectations are not quite so readily available.

These expectations series for both the United States and the United Kingdom underpredicted inflation when it rose very sharply in the mid-1970s. A simple but arbitrary proxy for expectations over the next year sharing this characteristic can be obtained by averaging the actual rate of inflation over the past four quarters and the actual rate of inflation over the next four quarters.[4] This proxy has been used for Germany throughout, but has also been used (to complement the other expectations series) for the United States and the United Kingdom, in the latter case to permit calculations of inflation expectations over the whole post-war period. Chart 1 compares the Holden and Peel series, where available, with this proxy series for UK consumer and wholesale price inflation. It also shows the Livingston series and the expected consumer price inflation series for the United States constructed in the same way. The constructed series for the United Kingdom is fairly similar to the Holden and Peel measure. For the United States, the Livingston series is fairly consistently below both the constructed series and the actual rate of inflation. How well it captures the relevant expectations of inflation is unclear. (The contributors to Livingston's series are not a typical cross section of borrowers or lenders.) If the Livingston series acurately reflects expectations, it suggests that people were slow in becoming used to high inflation in the 1960s and 1970s.

Adjustment for tax, according to type of taxpayer

Adjusting interest rates for tax effects presents a different range of problems. The number of marginal tax rates makes it difficult to present a representative picture of post-tax interest rates. For example, the UK marginal rate of tax on taxable interest receipts for individuals ranged, in the 1970s, from 25 per cent to 98 per cent. In the United States, the lowest marginal tax rate was 14 per cent and the highest was 70 per cent. In Germany, for private individuals, marginal rates vary continuously over a range from 22 per cent to 56 per cent. For UK corporations, the rate of tax is in principle less variable than for individuals; but, in practice, the effective marginal rate of tax bearing on a company is influenced by the delay between income accruing and its tax payments being effected. In the case of a currently 'tax exhausted' company the delay may be many years.

One approach to the problem of a multiplicity of formal tax rates would be to average the marginal tax rates faced by companies or by private lenders—for example, by weighting tax rates by the proportion of potential tax paying units for which that rate applies and summing the results (or by weighting each marginal rate by the proportion of gross income falling within the relevant bracket). Instead, post-tax real rates of interest for groups of borrowers and lenders facing different, but common, marginal tax rates are presented here. This tends to emphasise the diversity of experience rather than to draw attention to some, not necessarily very representative, average post-tax real rate.

Some examples of real interest rates

Charts 2 to 4 show for each country the selected nominal rate(s), the pre-tax real rates for these using various inflation expectations measures, and corresponding post-tax real rates. Real interest rates for companies paying zero corporation tax and for those paying full corporation tax are shown for all three countries.[5]

Real rates are also shown for UK private lenders paying no tax and for those paying income tax at the basic rate[6] (Chart 2 lower panel). These two post-tax real interest rates are of considerable relevance, since these are the marginal rates for many investors. In the United States, the position of personal lenders is more complex for two reasons. First, there are many more marginal tax rates than in the United Kingdom. Second, interest rate ceilings on small deposits with US banks have only recently been relaxed, and interest

(1) The return on indexed gilts in the United Kingdom might be used as an estimate of a longer-term real rate more relevant to investors (see page 481). Unfortunately from the viewpoint of historical comparisons, indexed gilts have only been available in the last few years.

(2) The forecasts used were those of the Cambridge Economic Policy Group, The London Business School, HM Treasury, the OECD and the National Institute of Economic and Social Research. See K Holden and D A Peel, 'Forecasts and expectations: some evidence for the UK' *Journal of Forecasting*, Vol. 2, 51–58 1983.

(3) Published in the *Philadelphia Inquirer* since 1947.

(4) More specifically, the proxy for expected inflation over the next year at period t is:

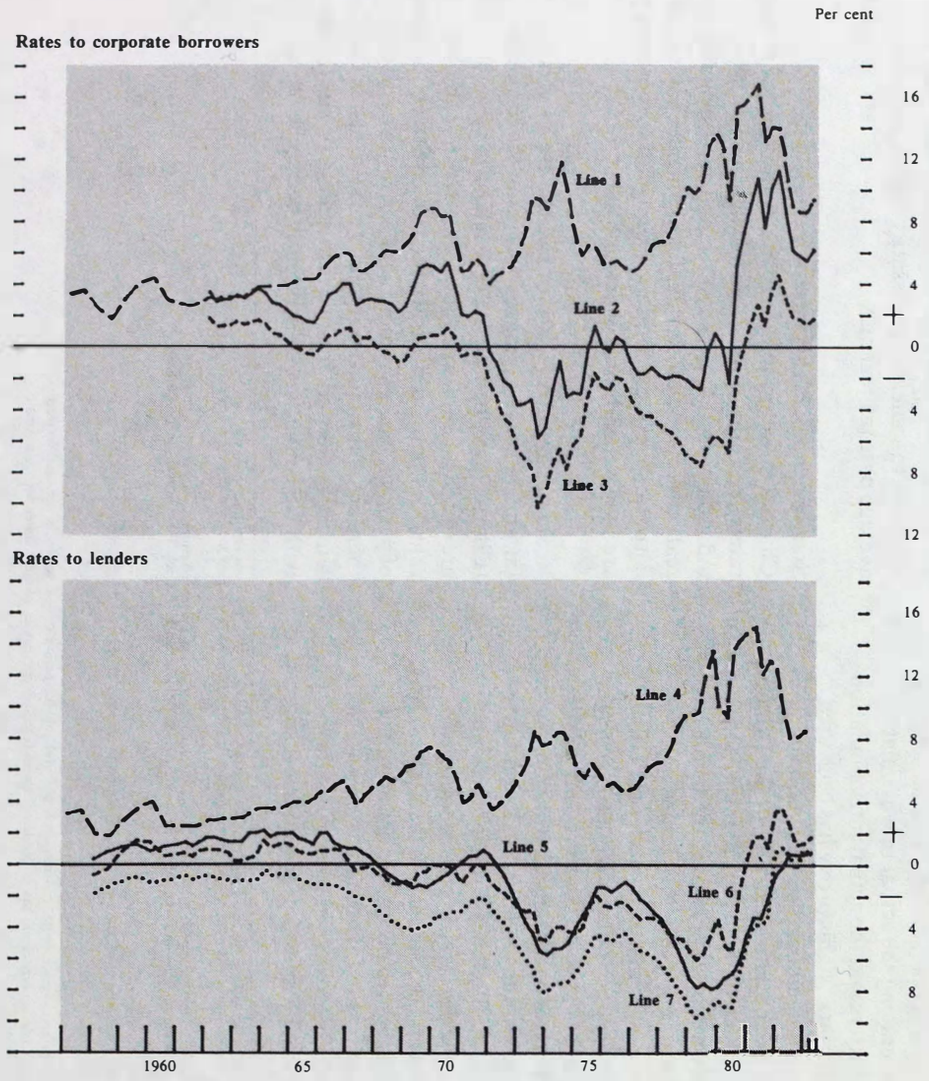
$$\left(\frac{\text{price index at t}}{\text{price index at t}-4}-1\right)\times 50+\left(\frac{\text{price index at t}+4}{\text{price index at t}}-1\right)\times 50$$

Over the final year, for which actual price index information is not available for period t + 4, forecasts are used instead.

(5) For the United States, only Federal corporation tax is deducted. Local taxes on companies in most states are quite small.

(6) Standard rate before 1973/74.

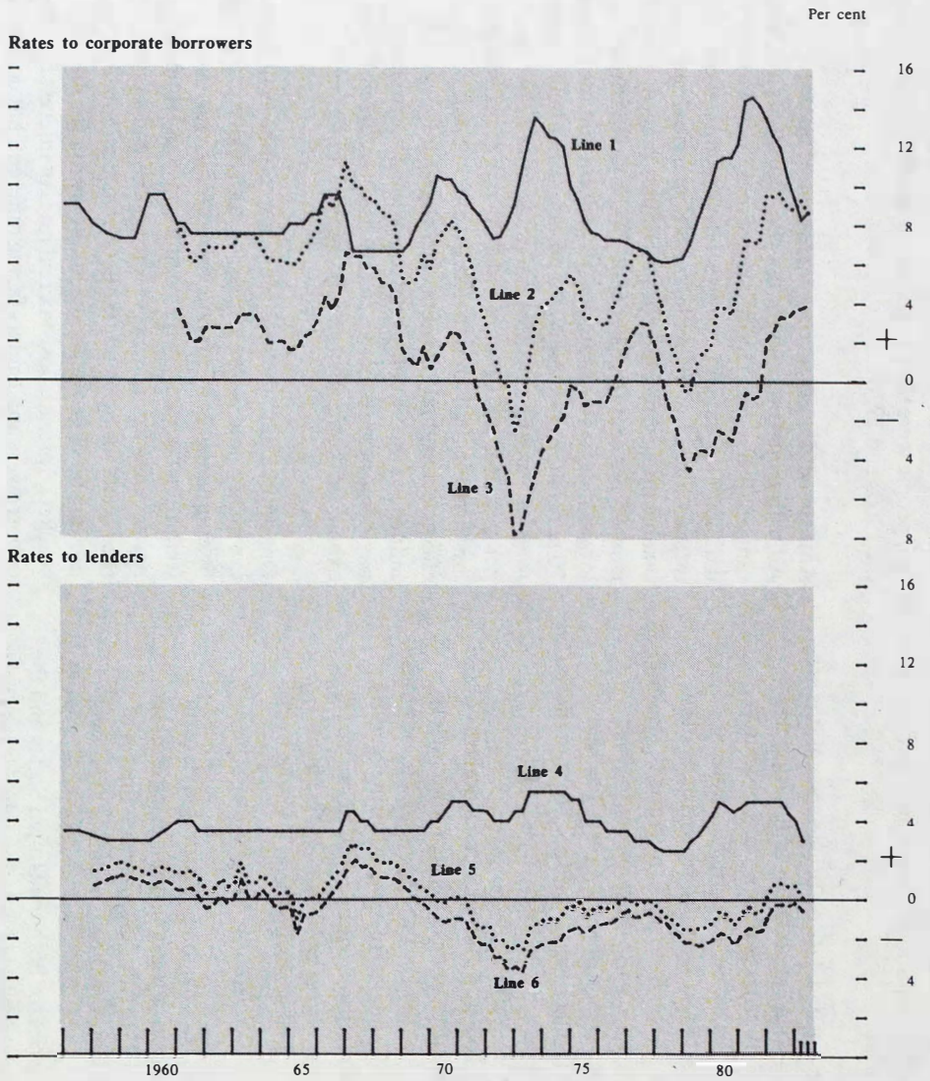
Chart 3
Interest rates in the United States



Line 1 Three-month commercial paper rate
Line 2 Line 1 *less* expected wholesale price inflation(a)
Line 3 Line 1 × (1 − Federal corporation tax rate) *less* expected wholesale price inflation(a)
Line 4 US Treasury bill rate
Line 5 Ceiling rate on small deposits (1 − lowest rate of income tax) *less* expected consumer price inflation(a)
Line 6 Line 4 × (1 − average marginal rate of income tax) *less* expected consumer price inflation(a)
Line 7 Line 4 × (1 − top rate of income tax) *less* expected consumer price inflation(a)

(a) Calculated according to footnote (4) on page 473.

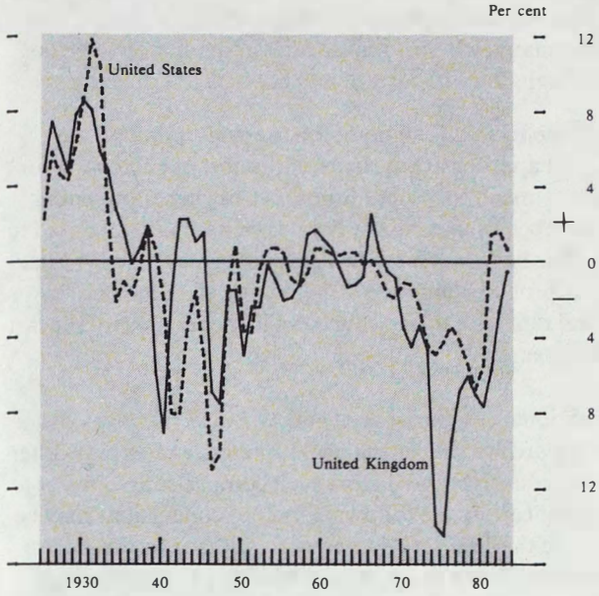
Chart 4
Interest rates in Germany



Line 1 Nominal rate charged to large corporate borrowers
Line 2 Line 1 *less* expected wholesale price inflation (a)
Line 3 Line 1 × (1 − company tax rate) *less* expected wholesale price inflation (a)
Line 4 Nominal rate on small deposits
Line 5 Line 4 *less* expected consumer price inflation (a)
Line 6 Line 4 × (1 − lowest marginal tax rate) *less* expected consumer price inflation (a)

(a) Calculated according to footnote (4) on page 473.

Chart 5
Post-tax real rates[a] to UK and US corporate borrowers



(a) Backward-looking; ie nominal rates less actual inflation over the previous year.

rates to small depositors may have been quite different from those on larger deposits.[1] Three post-tax real rates are therefore shown in Chart 3 (lower panel): a rate for those receiving the restricted nominal interest rate; a rate for those investing in Treasury bills and paying the average marginal tax rate;[2] and a post-tax real rate for those investing in Treasury bills and facing the top marginal income tax rate.

Chart 4 (upper panel) shows before and after tax real rates to German corporations and (lower panel) the pre-tax and post-tax real rates on small bank deposits for a private individual facing the lowest marginal income tax rate.

Chart 5 shows for the United Kingdom and the United States a run of annual post-tax real interest rates from 1925. Nominal interest rates are measured as annual averages and, in contrast with the other charts, the actual rate of inflation between the previous and current year is used to calculate the real interest rate. This can either be rationalised as a very simple expectations proxy, or as representing a 'backward-looking' measure. As such, it probably does not capture well the rate appropriate to decisions to save and invest, but it does give an indication of the real cost of (short-term) borrowing in the period.

Other considerations

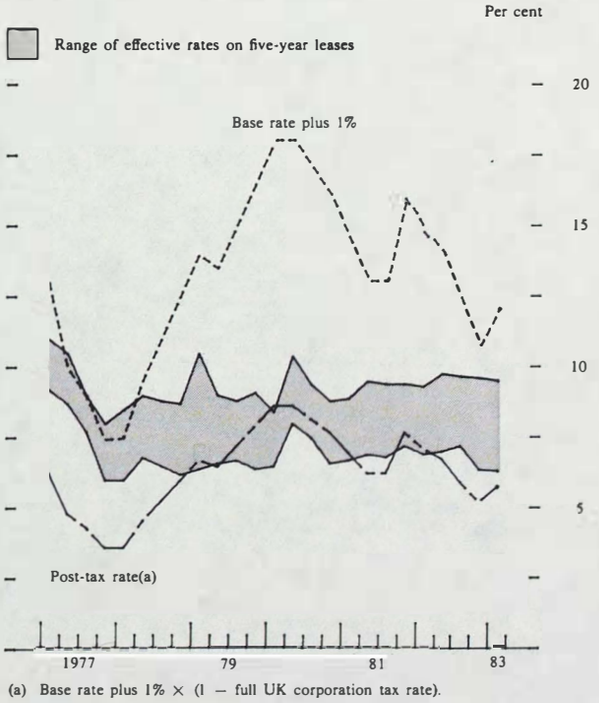
Real interest rates are not the same thing as the cost of capital to companies[3] which may be affected also by capital allowances as well as reflecting the return required on equity capital. Institutional arrangements tend to adapt to changes in the tax system; measures of real after-tax interest rates which do not take account of them may exaggerate the cost of borrowing and understate the return to lenders. Leasing is an outstanding example. Leasing arrangements are a means for tax-paying companies (often banks) to postpone[4] corporation tax by buying equipment, claiming tax relief on the purchase, and leasing it to other companies with insufficient current taxable income to use the capital allowance. Both lessor and lessee can gain from the transaction since the rate charged to the lessee can be below the market rate for borrowed funds, to the extent that (some of) the benefit to the lessor of postponing tax payments is passed on, while the net return to the lessor is above the market rate.[5] Chart 6 compares a range of nominal leasing rates from 1977, with the nominal rate to prime UK corporate borrowers (base rate plus 1 per cent) before and after corporation tax.

Conclusions

After looking at a number of estimates of real interest rates, movements in which are not entirely parallel, certain broad conclusions emerge:

- For Germany and the United Kingdom, real interest rates—particularly post-tax rates—to borrowers and lenders have not been significantly higher in the 1980s than in the late 1950s and 1960s. Indeed, for UK companies paying full corporation tax and for whom the wholesale price index is an appropriate deflator, real rates have been consistently negative during the 1980s. Real post-tax rates to UK corporate borrowers

Chart 6
Nominal interest rates to prime commercial borrowers and leasing rates



(a) Base rate plus 1% × (1 − full UK corporation tax rate).

(1) The maximum rates on time deposits in denominations of $100,000 or more, in maturities of 30–89 days, were suspended in 1970.
(2) Average calculated by weighting marginal tax rates by the proportion of income in the relevant tax bracket.
(3) See the June 1976 *Bulletin*, page 193.
(4) Continued (growth of) leasing business will tend to result in the effective avoidance of tax.
(5) See the September 1980 *Bulletin*, page 304.

in the post-war period have never reached the very high levels recorded in the 1920s and early 1930s.

- The claim that real interest rates in the 1980s are unusually high stands up better in the United States where real interest rates to both tax-paying and, especially, tax-exhausted corporations have been significantly higher since 1981 than at other times since 1960. However, during the 1920s and early 1930s real post-tax rates to corporate borrowers in the United States were significantly higher than post-war rates. Real interest rates paid to US lenders who are not subject to interest rate ceilings have been high relative to the 1960s or 1970s.
- For all three countries, the 1970s were a period of very low real interest rates; indeed, real rates were frequently negative, especially in the United Kingdom. This is true for estimates based on the Holden and Peel inflation expectations series, as well as on the proxy series used here. Because it is nominal interest payments, rather than the real payments, that are taxed (or offset against tax liability in the case of borrowers), the difference between pre-tax and post-tax real interest rates for tax payers is greatest when nominal rates are high. For the United Kingdom and the United States in the 1970s and 1980s, when nominal interest rates were extremely high by post-war standards, the gap between the real interest rates paid or received by non-tax payers and tax payers was relatively large. For Germany, where nominal rates and inflation were not so high, the widening of this gap was less marked.
- In the United Kingdom, leasing rates, perhaps the most appropriate measure of the cost of borrowing for investment purposes for non-tax-paying companies, have been substantially below nominal rates charged to prime borrowers. Indeed the average real leasing rate has probably not been much higher than the post-tax real rate for a tax-paying company over most of the last five years.

International comparisons of effective interest rates are more hazardous. The mark up on reference rates may differ between countries and distort such comparisons. Subject to this qualification, the following further conclusions may be drawn. In the 1980s, real interest rates faced by tax-paying companies have been lower in the United Kingdom than in the United States and Germany. Non-tax-paying companies in the United Kingdom also face lower real rates than non-tax-paying German and US companies.