

## Recent trends in real interest rates

An article in the December 1983 Bulletin<sup>(1)</sup> showed how real short-term rates of interest had changed since the mid-1950s in the United Kingdom, Germany and the United States. This note updates and enlarges on that article: the first section discusses the measurement of real interest rates; the second considers how real short-term rates of interest have changed in the three countries mentioned since 1983; the final section presents estimates of recent trends in real medium-term rates of interest.

### Introduction

Real rates of interest measure the return on investments or the cost of borrowing after allowance has been made for changes in price levels. Forward-looking real rates, which incorporate expectations of price inflation and of the tax structure, are thought to influence decisions on saving and investment and are relevant for understanding the stance of monetary policy. They may be computed using the following formula:<sup>(2)</sup>

$$r = \frac{i(1-t) - P}{1+P}$$

where

$r$  is a post-tax real interest rate

$i$  is the corresponding nominal pre-tax interest rate

$t$  is the relevant expected tax rate

$P$  is the expected inflation rate over the period of the contemplated financial transaction.

Because explicit information on price expectations is not available, many published estimates of real interest rates are backward looking, reflecting levels of inflation in the immediate past. These are misleading indicators of future rates to the extent that expectations differ from past inflation. Other more ambitious estimates incorporate measures of price expectations based on economic forecasts or on various kinds of survey information in an attempt to be genuinely forward looking. The December 1983 article focussed on estimates of forward-looking real rates: it used *inter alia* a series for price expectations in the United Kingdom that was based on published short-term forecasts for inflation and, in the case of the United States, a series based on economists' short-run inflation expectations.

A further complication in constructing estimates of real rates of interest is the choice of price thought to be most relevant. The real rate of return for an investor, for example, should take into account how the money invested might eventually be used. If somebody were saving to finance future consumption, the relevant price for calculating the real rate of return on the investment would be a consumer price index. Alternatively, if the

intention were to estimate the real cost to a company of borrowing funds to increase working capital, the relevant price might be a wholesale price index. An index of the price of fixed capital goods might be more relevant, however, if the funds were to be used for investment in plant and machinery. In this note, nominal rates earned by personal investors are adjusted by consumer prices and those payable by corporate borrowers by wholesale prices.

### Estimates of real short-term interest rates

Charts 1-3 update most of the series in the December 1983 article: they show various estimates of forward-looking real short-term rates of interest which might be relevant for commercial borrowers and to private lenders in the United Kingdom, the United States and Germany.<sup>(3)</sup> Focussing on the last three years, the following developments stand out:

- Real short-term rates in the United Kingdom increased in 1984 and early 1985, but have been broadly unchanged since then. Prime corporate borrowers have faced positive real rates not just before but also after tax. Indeed, post-tax corporate borrowing rates have risen relative to pre-tax rates in recent years because of the staged reductions in corporation tax rates that were announced in the 1984 Budget. A counterpart to positive real borrowing rates is that personal investors paying income tax at the basic rate have been able to obtain positive real returns on short-term deposits after, as well as before, tax. It is estimated that post-tax, real short-term rates for both corporate borrowers and personal lenders were higher in 1985 than for more than twenty-five years.
- In the United States, real short-term interest rates rose to historically high levels in the early 1980s. They fell sharply in late 1984 and early 1985, and have been broadly unchanged since then.
- In Germany, real short-term rates have followed a similar path to that in the United Kingdom, rising

(1) 'A note on real short-term interest rates': December 1983 *Bulletin*, page 471.

(2) In practice, the simplified approximation  $r = i(1-t) - P$  is often used.

(3) Details of how these series are derived are given in the December 1983 article.

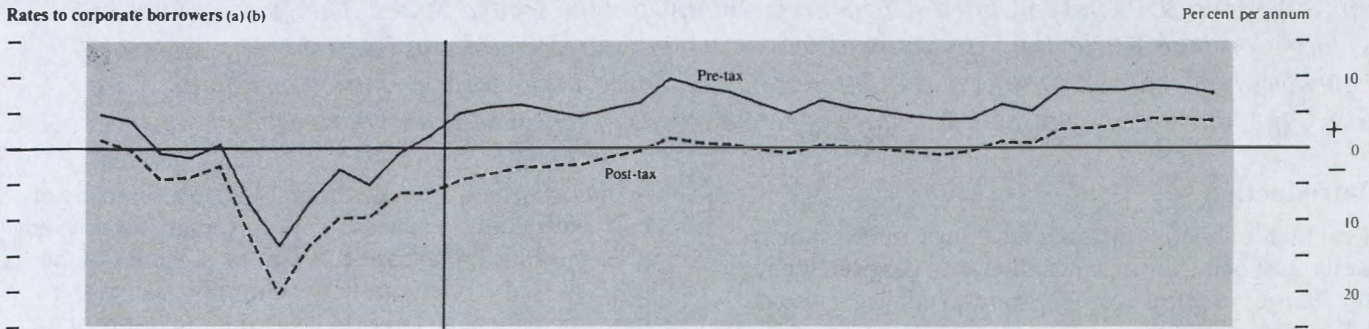
sharply during 1984 but showing little overall change since early 1985.

Taking a longer-term view, real short-term interest rates in the United Kingdom have risen from the trough of the mid-1970s, and since 1980 have been mainly positive,

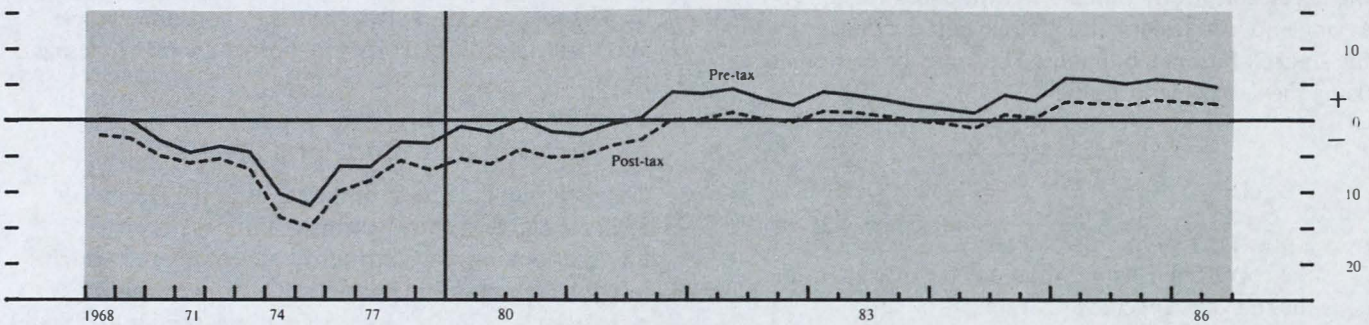
with a slight upward trend in the last few years. Corporate borrowing rates, for example, were negative both before and after tax for most of the 1970s, but they have been generally positive in the last five years, as they were for much of the 1960s. In the United States and Germany, real short-term interest rates reached a cyclical peak in

**Chart 1**  
Real interest rates in the United Kingdom

Rates to corporate borrowers (a) (b)



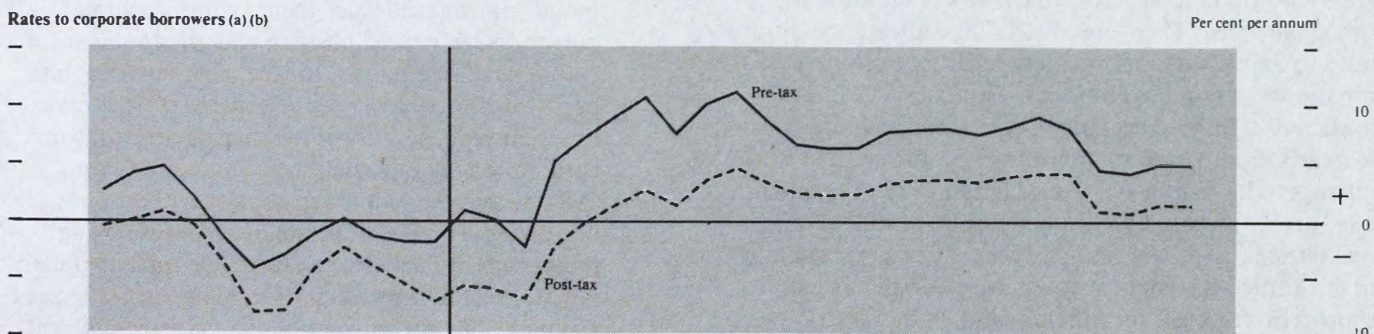
Rates to lenders (a) (c)



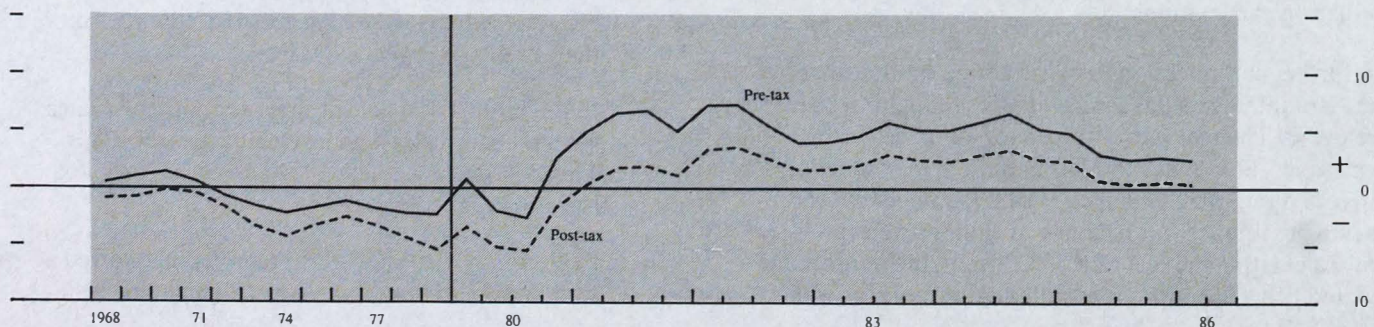
- (a) Annual data for 1968-79; quarterly thereafter.
- (b) Base rate + 1% less expected wholesale price inflation (see Chart 2, lines 2 and 4 of December 1983 article).
- (c) Nominal rate to lenders less expected consumer price inflation (see Chart 2, lines 6 and 7 of December 1983 article).

**Chart 2**  
Real interest rates in the United States

Rates to corporate borrowers (a) (b)



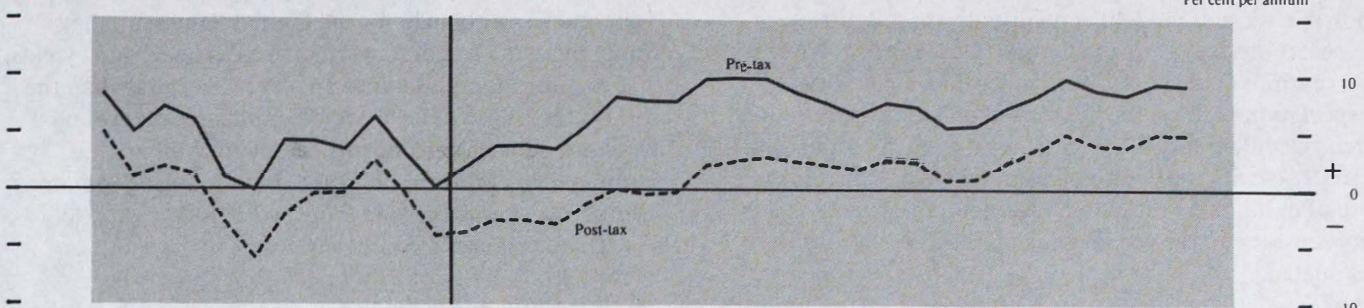
Rates to lenders (a) (c)



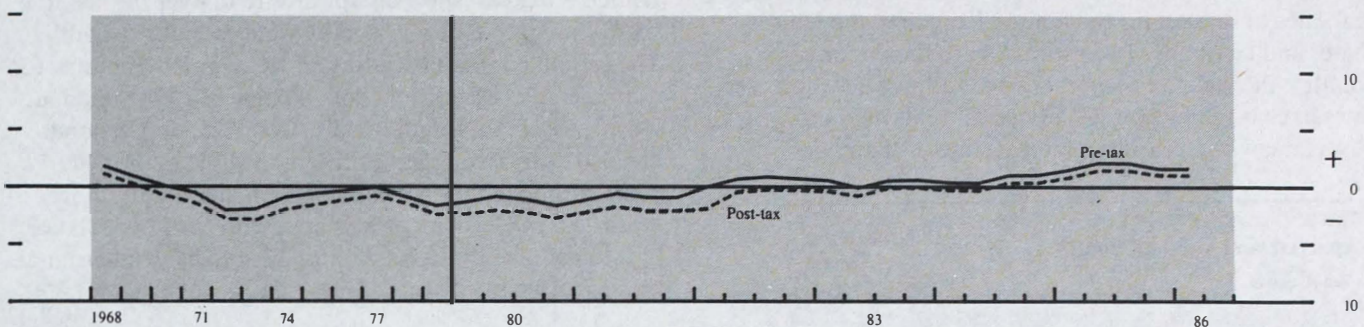
- (a) Annual data for 1968-79; quarterly thereafter.
- (b) 3-month commercial paper rate less expected wholesale price inflation (see Chart 3, lines 2 and 3 of December 1983 article).
- (c) Ceiling rate on small deposits less expected consumer price inflation (see Chart 3, new line and line 6 of December 1983 article).

**Chart 3**  
Real interest rates in Germany

Rates to corporate borrowers (a) (b)



Rates to lenders (a) (c)



(a) Annual data for 1968-79; quarterly thereafter.

(b) Nominal rate charged to large corporate borrowers less expected wholesale price inflation (see Chart 4, lines 2 and 3 of December 1983 article).

(c) Nominal rate on small deposits less expected consumer price inflation (see Chart 4, lines 5 and 6 of December 1983 article).

the mid-1970s and the current period of positive real interest rates dates from the early 1980s. Real interest rates in both these countries and in the United Kingdom have been higher in recent years than in the 1970s.

### Estimates of real medium-term interest rates

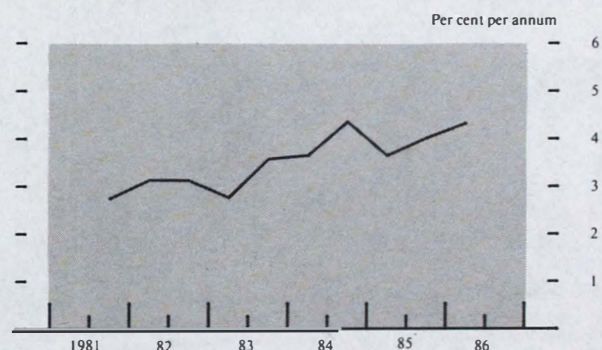
The market in indexed-linked gilt-edged securities in the United Kingdom offers direct estimates of forward-looking real rates of interest for more than thirty years ahead. Chart 4 shows how the yields on Treasury 2% Index-Linked stock 1996—the first index-linked stock to be issued—have changed since 1981. It shows that yields have risen from about 2½% per annum to about 4% during the last five years, despite the withdrawal in 1982 of restrictions on the eligibility to hold index-linked gilts. This evidence suggests that real medium-term interest rates have probably risen over this period.

Markets in indexed stocks have not been established in Germany or the United States. Yields on indexed gilts are, in any case, not entirely satisfactory indicators of forward-looking real interest rates, since the first indexed stock was issued only in March 1981 and the market remains comparatively small with relatively little secondary trading.<sup>(1)</sup> For this reason, forward-looking real medium-term interest rates were also estimated by adjusting nominal rates for estimated inflation expectations. The resultant estimates are not directly

comparable with quoted yields on indexed gilts, but they were thought to offer additional information on recent trends in real medium-term rates of interest.<sup>(2)</sup> Their estimation, however, presented a number of difficulties over the choice of nominal interest rate and over how price expectations should be estimated.

The most widely quoted medium and long-term nominal rates of interest are yields on bonds. Series for yields on 5, 10 and 25-year UK corporate bonds are computed within the Bank, and there is a wide selection of yields on gilt-edged stocks. Similar information is available for

**Chart 4**  
United Kingdom: yield<sup>(a)</sup> on 2% Index-Linked Treasury 1996



(a) Assuming 5% inflation.

(1) There is also a minor technical problem that calculated yields depend partly on an assumed rate of inflation, but this is only of significance with short-dated stocks. See December 1983 *Bulletin*, page 484.

(2) There are two reasons why inflation-adjusted nominal interest rates are not directly comparable with quoted yields on indexed gilts of the same residual maturity. First, indexed gilts guarantee a real return, whereas borrowing at fixed nominal rates involves risk as to the eventual real cost. For investors such as pension funds whose main objective is to achieve a particular real return, conventional bonds are a more risky alternative to indexed bonds: their estimated yield will consequently be slightly higher than on comparable indexed stocks. The second reason is that the cash-flow profiles of indexed and conventional gilts of the same maturity are usually very different. Indexed stocks yield more of their return in the form of the uplift of the eventual capital repayment than most conventional stocks. They are most similar to low coupon gilts in this respect.

Germany and the United States. A number of alternative bond yields were examined, but they all pointed to the same broad trends. Similarly, there are a large number of possible ways of modelling medium-term inflation expectations and various alternatives were tried. None was entirely satisfactory, but, rather than estimating expectations using a formula based only on past inflation trends, contemporaneous short-term Bank forecasts were used.<sup>(1)</sup> As with the choice of nominal yields, the resulting broad trend in the estimated real medium-term rates was not sensitive to the way in which price expectations were estimated.

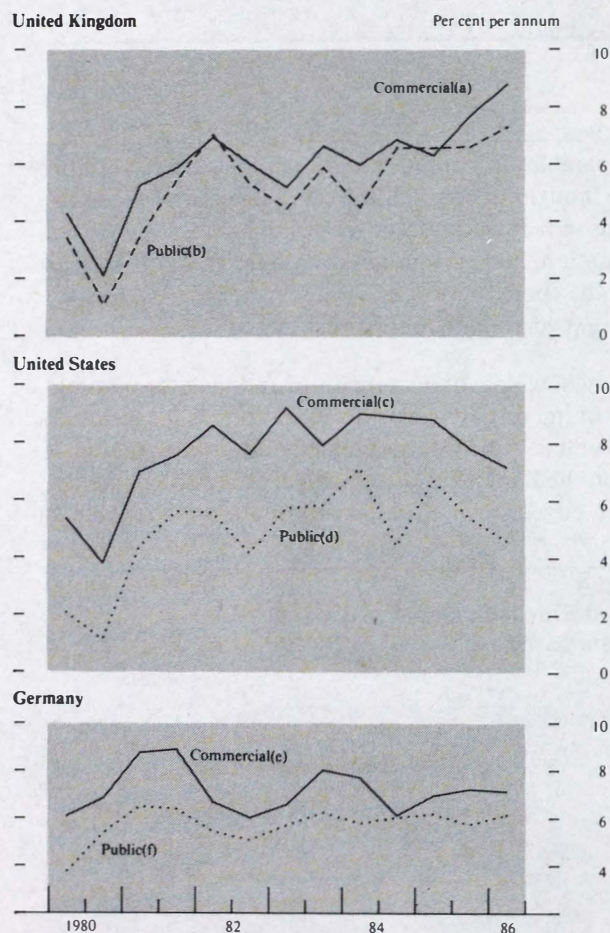
Chart 5 presents typical estimates of medium/long-term real rates of interest for the United Kingdom, the United States and Germany. Two estimates are shown for each country: the yield on corporate bonds adjusted for forecast rates of change in wholesale prices, and the yield on government bonds less the forecast rate of change in

consumer prices. It must be stressed that these series are no more than a rough and ready attempt to estimate trends in real medium-term rates. There is no means of assessing their realism, although, for the United Kingdom, they imply the same recent upward drift as indexed gilts' yields. The medium-term rates also appear more stable than the short rates, as might be expected on theoretical grounds. It would, nevertheless, be misleading to compare the estimated levels of real rates in the United Kingdom, the United States and Germany; the estimates are probably not reliable enough to warrant this.

The inflation-adjusted medium-term bond yields for the United Kingdom show an upward trend over the last five years similar to that revealed by yields on indexed gilts. The estimated inflation-adjusted yield on 10-year gilts, for example, increased from about 4% in early 1981 to about 7% in early 1986. Inflation-adjusted yields on US bonds are also estimated to have drifted upwards in the last five years, although they appear to have fallen slightly since mid-1984. In Germany, yields appear to have been flat or, in the case of commercial bonds, even to have fallen since the early 1980s.

The estimates of forward-looking real rates in Chart 5 are subject to wide bounds of possible error, not least in the past twelve months. The recent large falls in the prices of oil and other primary products make it particularly difficult to identify inflation expectations in industrial countries over the next, say, five to ten years. If anything, the estimates of forward-looking real medium-term interest rates since the beginning of 1985 probably overstate the true rates as perceived by borrowers and lenders. This is because the estimates shown are based in part on forecasts of wholesale and consumer price inflation over the following three years and these forecasts may understate medium-term inflation expectations since they largely reflect what may prove to be a once-for-all adjustment to lower prices for oil and primary products. When the effects of these price falls work through to final prices, and assuming no further substantial changes in primary product prices, rates of price inflation in the industrial countries will be largely determined by indigenous inflationary pressures. This is particularly relevant to the assessment of inflation expectations in the United Kingdom because the recent falls recorded in consumer and producer price inflation largely reflect the effects of lower prices for oil and other primary products, and domestic inflationary pressures have not yet eased to the extent that they have in other major countries. If, for example, these pressures are proxied by the current rate of increase in unit labour costs in manufacturing (adjusted for cyclical effects), the resultant estimates of forward-looking inflation-adjusted rates in the United Kingdom are seen to have shown little

**Chart 5**  
**Expected real yield on bonds**

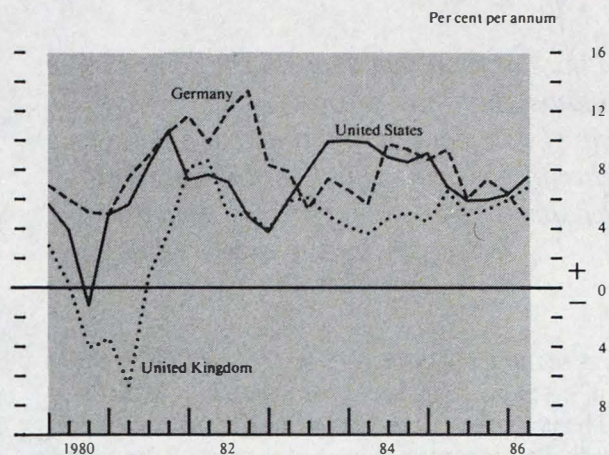


- (a) Yield on 15-year commercial bonds less forecast producer price inflation.  
 (b) Yield on 10-year gilt-edged securities less forecast consumer price inflation.  
 (c) Corporate bond (all industries) yield less forecast wholesale price inflation.  
 (d) Long-term (over 10 years) Treasury bond yield less forecast consumer price inflation.  
 (e) 'All industrial bonds' yield less forecast wholesale price inflation.  
 (f) 'All public bonds' yield less forecast consumer price inflation.

(1) These forecasts cover a three-year horizon, longer than is consistently available from published sources. There is no satisfactory method of estimating expectations over the rest of the 'medium term'; in this note the average rate of inflation over the forecast period has been used. This may be misleading during adjustment to one-off shocks—as at present (see below)—but there is no obvious method for taking this into account. It is, of course, possible to obtain an implicit estimate of inflation expectations from a comparison of the yields on conventional and indexed stocks. Some problems in implementing this approach were discussed in the March 1983 *Bulletin*, page 13, and are touched on in footnote 2 on page 361. In any case, it would not help to derive estimates of real interest rates that were independent of the yields on indexed stocks.

overall change since early 1982, although there has been an upward drift since early 1985 (Chart 6). On these definitions, real interest rates in the United Kingdom

**Chart 6**  
Corporate borrowing rate less increase in unit labour costs<sup>(a)</sup>



(a) Using the same nominal rates as in Charts 1 to 3 but deflated by normalised unit labour costs in manufacturing.

were distinctly lower than in the United States and Germany for most of 1983 and 1984, and have been at about the same level since early 1985.

## Conclusions

The estimates presented earlier suggest that forward-looking real short-term rates of interest in the United Kingdom have been at historically high levels since the beginning of 1985. While this has been a burden to corporate borrowers, it has been a benefit to personal depositors; those paying income tax at the basic rate, for example, have been able to earn a positive post-tax real return on short-term savings for the first time since the 1960s. Real short-term rates in Germany also seem to have been historically high since the beginning of 1985, unlike in the United States where they are estimated to have fallen in early 1985 from the very high levels experienced in the early 1980s.

Real medium-term interest rates appear to have drifted up slightly since the early 1980s in the United Kingdom and the United States, but to have been flat or even to have fallen in Germany.