
Saving, investment and real interest rates

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Since the 1960s, gross national saving rates in the major industrial countries have fallen by nearly five percentage points of GDP. Long-term real interest rates have increased by about one percentage point to around 4%. Real rates rose quite sharply in 1994, returning to the high levels of the 1980s. What are the main reasons for these developments? Are high real rates likely to persist? What are the implications for economic growth and welfare? Should economic policy change as a result?

These issues prompted the Chancellor of the Exchequer to propose a comprehensive study of saving, investment and real interest rates by the G10 finance ministries and central banks. The Chancellor's proposal was agreed in late 1994 and the G10 Deputies were charged with the task. The Deputies' report was published in October 1995.⁽¹⁾ The Bank of England played a full part in the study. Mervyn King, the Bank's Chief Economist, chaired a working group which drew together the analytical material underpinning the report. In addition, three research papers which formed part of this analytical base were produced in the Bank.⁽²⁾

This article describes the main conclusions of the G10 Deputies' study and the supporting research conducted in the Bank of England. The first part summarises the study itself and highlights the policy recommendations. Bank research is described in the second half, placing particular emphasis on the links to the Deputies' report.

The G10 Deputies' report

Real interest rates

Real interest rates equate the desired level of saving to the planned level of investment. From a policy perspective, there is a great difference between a rise in real rates because of a fall in desired saving and a rise following an increase in planned investment. The Deputies' report attempts to distinguish between these alternatives by examining the movements in savings, investment and real interest rates over the past 35 years and analysing the various influences on them.

The G10 study focuses particularly on long-term interest rates on central government bonds. Long rates are generally considered to have a greater influence than short rates on the saving and investment decisions of firms and households. Long rates are also less affected by changes in monetary policy in response to cyclical fluctuations. It is difficult, however, to measure long-term *real* interest rates in most countries (the nominal yields on long-dated government bonds adjusted for expected inflation over the life of the bond) because there is no particularly satisfactory measure of long-run inflationary expectations. Alternative indicators of short-run inflationary expectations, such as the

expected rate over the following two years, or the actual rate over the previous two years, are often used as proxies. The emergence of markets for index-linked government debt, in the United Kingdom in 1981 and more recently in other countries such as Canada, Sweden and Australia, provides a direct measure of long-term real rates and enables long-term inflationary expectations to be inferred. As Chart 1 shows, the proxy for real interest rates based on short-run inflationary expectations may be misleading. For the United Kingdom, the direct measure of long-term real rates provided by index-linked yields is less variable than the proxy measure.⁽³⁾ Moreover, the index-linked yield tends to be below the proxy when current inflation is relatively low by historical standards, and above the proxy when inflation is relatively high. This suggests that long-term inflationary expectations are relatively slow to respond to current inflation outturns. Evidence from other G10 countries presented in the report supports this view. As a consequence, countries with a history of high inflation may pay a significant inflation premium in nominal bond yields until market participants are convinced that price stability has been achieved on a durable basis.

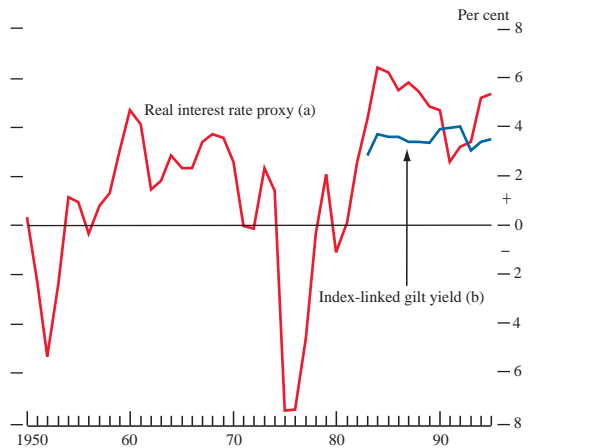
The problems with inflation proxies suggest a need for caution in interpreting and analysing secular movements in

(1) 'Saving, investment and real interest rates', Group of Ten: A study for the Ministers and Governors by the Group of Deputies, October 1995.

(2) 'Real interest rates, saving and investment', Jennifer Smith; 'A decomposition of stock and index-linked bond returns in the United Kingdom', Jo Paisley; 'Real interest rate linkages: testing for common trends and cycles', Darren Pain and Ryland Thomas. These papers will be published shortly. Full references for sources quoted in this article are on page 62.

(3) Calculated in this example and in the G10 study as a ten-year government bond yield less a two-year backward moving average of RPIX inflation.

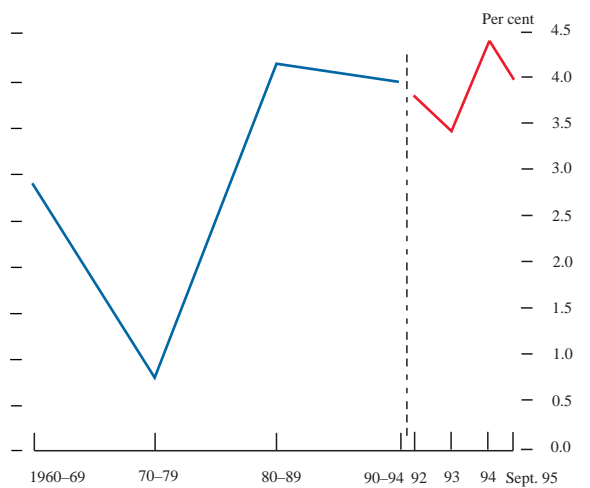
Chart 1
Comparison of long-term real interest rate proxy^(a) and index-linked gilt yields in the United Kingdom (annual data)



Source: Bank of England
 (a) Ten-year gilt yield less two-year backward moving average of RPIX inflation.
 (b) Ten-year index-linked gilt yield.

measured long-term real rates. Nonetheless, the evidence presented in the study suggests that there has been a trend rise of around 100 basis points over the past 35 years from rates varying around 3% to rates closer to 4% (Charts 1 and 2). Although not large in comparison with the movements in nominal bond yields from year to year, this is a

Chart 2
Long-term real interest rate proxy in G10 (weighted average measure)^{(a)(b)}



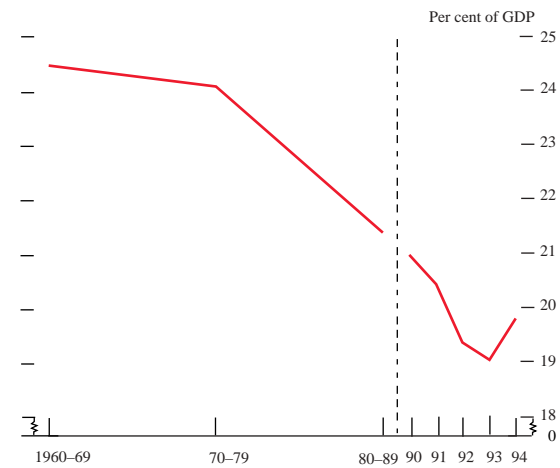
Source: G10 report.
 (a) Ten-year government bond yield less two-year backward moving average of CPI inflation.
 (b) Countries weighted together using fixed GDP weights.

significant rise in economic terms. It implies a one-third increase in the real rate of return on a substantial proportion of financial assets. Moreover, the increase in real rates has been common to most G10 countries. As barriers to capital mobility have been removed, financial markets have become increasingly integrated. The level of real interest rates is now largely determined by movements in global saving and investment. As a result, national economic policies can have significant effects on other countries through this channel.

National saving

The Deputies conclude that the main factor behind the secular rise in real interest rates is a decline in the aggregate national saving rate. This has outweighed a reduction in desired investment. In the G10 countries, taken as a group, gross national saving rates have fallen by almost five percentage points since the 1960s to under 20% on average (Chart 3). Although rates of national saving continue to

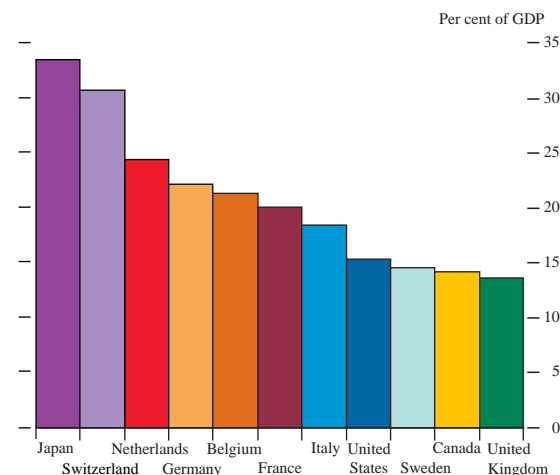
Chart 3
G10 gross national saving^(a)



Source: G10 report.
 (a) Countries weighted together using fixed GDP weights.

vary widely (Chart 4), the secular fall is quite widespread across industrial countries. And while the aggregate saving rate in developing countries has risen since 1970 at least, fuelled by a strong increase in Asia, the trend in industrial

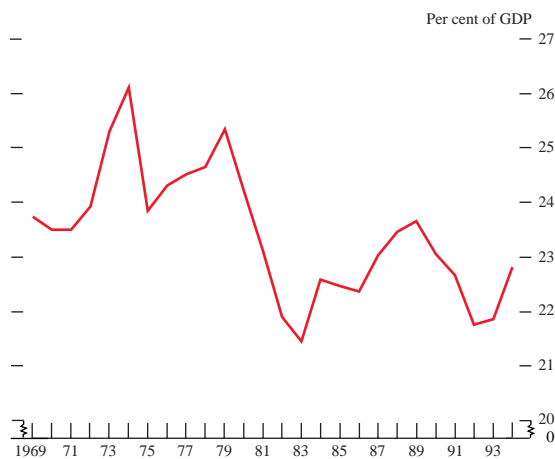
Chart 4
G10 gross national saving (1990-94 average)



Source: G10 report.

countries has dominated global developments (Chart 5). Over the longer term, low saving at the global level constrains investment, employment and economic growth. And over a shorter horizon, low saving provides less of a buffer in the event of adverse economic shocks.

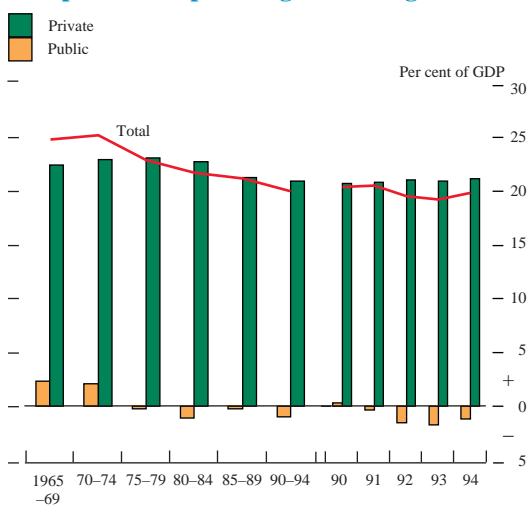
Chart 5
World gross national saving



Source: IMF World Economic Outlook, May 1995.

A fall in the rate of public sector saving is the main reason for the decline in national saving rates in the G10 countries, and accounts arithmetically for three quarters of the overall decline in national saving since the late 1960s (Chart 6). Private saving rates have also fallen in most countries, although the United Kingdom is an exception. In practice, the levels of public and private saving are interlinked. If fiscal policy is loosened and government borrowing rises,

Chart 6
G10 public and private gross saving^(a)



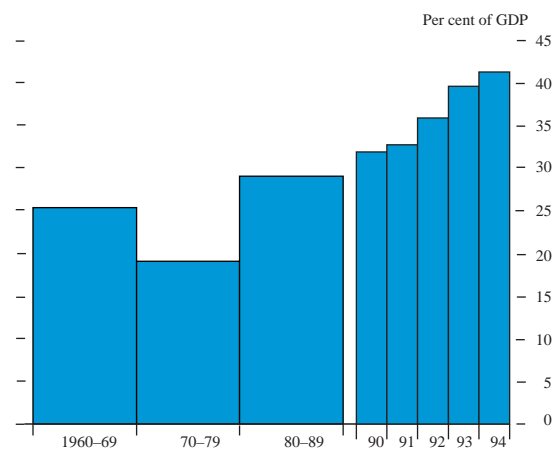
Source: G10 report.

(a) Countries weighted together using fixed GDP weights.

households and firms may save more to pay for an expected increase in taxation in the future. Although difficult to estimate with precision, the weight of empirical evidence suggests an offset of about one half. In other words, national saving falls by 50% of any fall in public saving. But even taking this offset into account, and recognising the role of other factors which account for the widespread fall in private saving, the decline in public saving is the most important single cause of the decline in national saving.

The cumulative impact of looser fiscal policy may also have had an impact on the level of long-term interest rates in the G10 countries. Net public debt relative to GDP in 1994 was more than double the level of the 1970s (Chart 7). Recent evidence from the IMF,⁽¹⁾ supported by research in the Bank by Jennifer Smith, suggests a clear link between the level of public debt in the major industrial countries as a group and the global real interest rate.

Chart 7
G10 net public sector debt^(a)



Source: G10 report.

(a) Countries weighted together using fixed GDP weights.

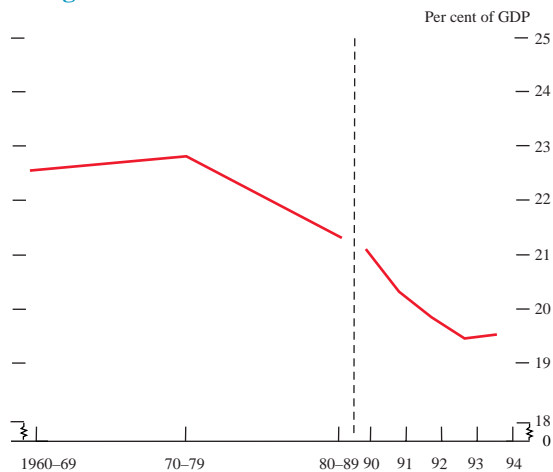
A recent study by the IMF⁽²⁾ examined the main influences on rates of private saving since 1970. Factors which tend to raise private saving are: widening fiscal deficits; falling dependency ratios (which will shortly start to be reversed as populations begin to age); and higher rates of depreciation on physical capital. However, factors pushing in the opposite direction have dominated in most countries. Slower economic growth and rising wealth tend to lower private saving rates. Greater provision of social insurance against ill health or loss of work may also have reduced precautionary saving, while the promise of a public retirement pension may have been an additional dampening factor. Financial liberalisation will have been a further influence. Improving access to credit and insurance markets leads to greater reliance on the use of credit, as opposed to savings, to smooth desired consumer spending over the life cycle. History suggests that the consequent fall in the aggregate private saving rate is largely temporary. There may, however, be a small permanent effect given the greater opportunity for households to diversify risks in financial markets, lessening the need for savings as a result.

Investment

As noted above, fixed investment has also declined as a share of GDP over a long period. Since the 1960s, the average investment share has fallen by about three percentage points of GDP in the G10 countries (Chart 8). The fall has been concentrated in private investment. The

(1) Ford and Laxton (1995) and Helbling and Wescott (1995).
(2) Masson, Bayoumi and Samiei (1995).

Chart 8
G10 gross fixed investment^(a)



Source: G10 report.

(a) Countries weighted together using fixed GDP weights.

main reasons for the decline are slowdowns in the growth rates of total factor productivity and the labour force. Total factor productivity is a measure of the combined productivity of capital and labour. According to OECD estimates, total factor productivity growth in OECD member countries slowed from 2.9% per annum in 1960–73 to 0.8% in 1979–94. Changes in total factor productivity are determined by technological progress and changes in economic efficiency. Structural economic policies have generally favoured a rise in economic efficiency over this period. Trade and financial markets have been liberalised and competition has also been strengthened by deregulation and privatisation. But the favourable impact has been outweighed by a slower rate of technical progress. This is not easy to explain, but may in part be connected to the completion of post-war reconstruction in Europe and Japan.

While the Deputies' report concludes that the dominant factor behind the secular rise in real rates over the past 35 years has been a decline in saving, in particular public saving, it also presents some tentative evidence which suggests that a rise in desired investment might have played a part in the increase in real interest rates recently. Research undertaken in the Bank by Jo Paisley, described in more detail below, shows that equity markets outperformed index-linked bond markets in 1993 and 1994 by more than historical experience would suggest. Although it is difficult to control for changes in risk, this may indicate that investment opportunities had improved. A second strand of evidence is the rise in the return on capital since the 1980s. This too should be viewed cautiously. It may not reflect higher desired investment but simply the effects of the crowding out of investment making capital scarcer.

The sharp rebound in real rates in 1994 may also partly reflect changing expectations of global growth prospects. Real rates fell temporarily in 1993 as economic conditions were generally weaker than expected. The fall was then reversed during 1994 as growth was unexpectedly strong.⁽¹⁾

As global growth slowed during 1995, real rates edged down from peak levels.

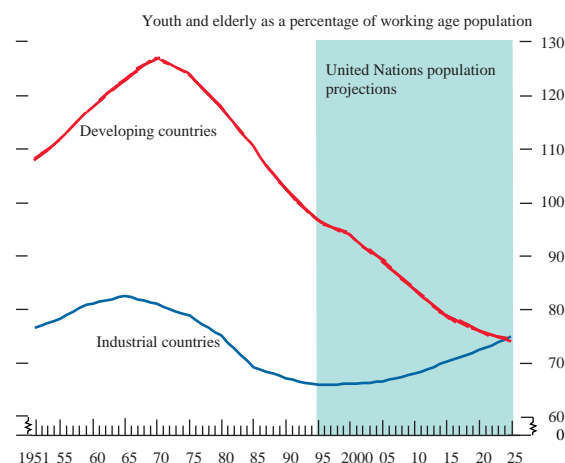
External demand for capital

Rising demand for capital from emerging economies and those which had been centrally planned and are now in transition is not viewed as a great influence on the secular increase in global real rates. Most of the rise in investment in the emerging economies in Asia has been financed by higher domestic saving. Indeed, there is evidence of a virtuous circle. Higher growth leads to higher saving which in turn finances the higher investment which fuels the continued high growth. Predictions of huge demands for external capital from transition economies have so far been exaggerated. Although there has been an increase in the flow of capital to developing countries in recent years, in proportion to GDP it has only returned to the levels of the early 1970s. Moreover, the flow is quite small. The net external financing needs of developing countries represented only about 4% of private saving in the G10 countries between 1992 and 1994. In comparison, public sector deficits within the G10 absorbed 16% of private saving.

Prospects

The ageing of the population in industrial countries is likely to have a profound impact on global saving and investment trends. Saving rates are likely to rise in the next 10 to 20 years and then fall faster than investment. The average dependency ratio⁽²⁾ in the industrial countries is likely to rise by around ten percentage points in the next 30 years

Chart 9
Dependency ratios



Source: IMF World Economic Outlook, May 1995.

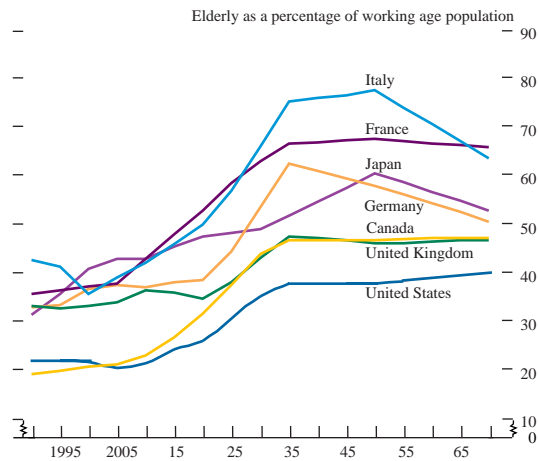
(Chart 9). Over this horizon this increase will push private saving rates down sharply. Investment demand may also fall back, as desired investment should be lower with fewer workers. The net effect of demographic changes is likely to favour saving over the next 10 to 20 years, as the baby-boom generation enters the highest-saving years of the

(1) Ganley and Noblet (1995).

(2) The ratio of dependent children and the retired to the population of working age.

life cycle. Thereafter, saving is likely to fall much faster than investment as the retirement boom commences. This is expected around 2005 in Japan and 2015 in Europe and the United States (Chart 10). The trend of an ageing population

Chart 10
Elderly dependency ratios in the G7, 1990–2070



Source: OECD Economic Outlook, June 1995.

in the industrial countries may be offset somewhat at the global level as the dependency ratio is likely to continue to fall in developing countries. This should help to sustain global saving, although the IMF warns that projections of saving in developing countries are particularly sensitive to the assumption that high growth and high saving continue in China.

Public pensions, health care and spending on education will be most affected by the prospective change in the dependency ratio in industrial countries. Pensions are a particularly acute problem. At present, pensions are largely organised on a pay-as-you-go basis in G10 countries. Under such a scheme, the contributions of current workers finance the payments to the current retired. As the demographic balance tilts, raising the ratio of the retired to the working population, such a system comes under increasing stress.

Recent projections by the OECD illustrate the possible effects of demographic changes on government finances.⁽¹⁾ Under relatively neutral assumptions, there will be a major deterioration in general government finances between 2000 and 2030 (ranging between 4% and 9% of GDP in terms of the primary balance in each of the G7 countries—except in the United Kingdom, where the outlook is comparatively less pessimistic). This emphasises the need for reform. The G10 study recommends an urgent move to more fully-funded pension systems, together with action to dampen the trend towards early retirement. Under a fully-funded system, beneficiaries receive a pension consistent with their contribution, accrued interest on the contribution and their life expectancy after retirement. Such a system would adapt automatically to changing demography. It would also raise national saving. The main disadvantage of starting a fully-funded system is that today's

workers would have to pay twice (for themselves and their parents, who have not built up any funds because they paid in turn for their parents). In addition, it may be difficult to guarantee a minimum retirement standard for the poor. Remedial action to resolve the pensions problem may lead to considerable transfers of wealth between generations. The Deputies emphasise the importance of ensuring that steps taken are broadly endorsed and credible.

Policy recommendations

The Deputies conclude that the solution to the problem of high real rates and low national saving can be found in three key policy areas:

- *Fiscal consolidation.* Reducing fiscal deficits is the key to raising national saving. Public debt levels are too high and should be reduced to a more acceptable level. Thereafter, a prudent medium-term rule is to aim for a steadily falling debt-to-GDP ratio in normal circumstances.
- *Inflation control.* Countries with a history of high inflation pay a premium in the form of higher nominal interest rates. An unflinching commitment to policies of non-inflationary growth is the single most important way to reduce expectations of long-term inflation and to eliminate this premium.
- *Pensions reform.* It is essential to take timely action to minimise the adjustment costs. Countries should promote a move to more fully-funded pension schemes. While there are no general rules for the degree of public involvement, the Deputies note that a case can be made for a system of basic benefits in a public scheme which allows for supplemental benefits from private or public fully-funded pension schemes.

A major theme of the report is that the emergence of a global market for capital implies that national economic policies have significant repercussions on other countries through their impact on saving, investment and the global real interest rate. This provides an increasing reason for countries to work together when confronted by economic policy challenges. Moreover, financial markets can exact sizable risk premia when they doubt the soundness of a country's economic policy strategy. The Deputies conclude that the pursuit of sound economic policies is not only consistent with national self-interest, but also best meets the interests of other countries.

Bank of England research

The research undertaken in the Bank of England as background to the Deputies' study addressed three main questions:

- First, what are the main determinants of saving, investment and real interest rates at the national and

(1) OECD Economic Outlook, June 1995.

global levels according to standard econometric techniques?⁽¹⁾

- Second, can financial market indicators shed light on the relative importance of alternative explanations of the recent movements in long-term real interest rates?⁽²⁾
- Third, can modern statistical techniques provide evidence on the degree of common movement in real interest rates which would in turn mark the extent of capital market integration?⁽³⁾

The three studies are summarised briefly below.

Empirical determinants of real interest rates, saving and investment

Work undertaken by Jennifer Smith has extended Robert Barro's published work⁽⁴⁾ which examines the empirical determinants of real interest rates. In a world of perfectly integrated capital markets, expected real interest rates are determined by the interaction of planned saving and investment. A system of equations is estimated where real interest rates equate desired saving and planned investment—the coefficients provide estimates of the importance of the various factors influencing saving and investment. Potential explanatory factors are discussed in turn.

The desired saving ratio will be affected by temporary fluctuations as well as permanent factors. For example, transitory shocks to income will temporarily affect the saving ratio. One of the most important factors causing such fluctuations in income in recent decades has been the price of oil. The proportion of national income spent on oil is included in the econometric equations to capture this effect.

Government policy—both fiscal and monetary—can also affect the national saving rate. Three fiscal variables are included. Blanchard (1985) showed that private saving should depend on expected future liabilities, namely future public debt. Empirically, this may be proxied by current debt. It is also possible that current fiscal deficits might help to predict future government indebtedness, particularly if variations in deficits due to purely cyclical factors are removed. Fiscal policy can also affect national saving if the private sector does not perfectly compensate for changes in government saving. As noted above, the balance of econometric evidence suggests that perfect compensation is unlikely. In this case, government current expenditure also has an influence on the national saving rate.

If prices are sticky in the short run, monetary policy may have a temporary effect on saving and hence on real interest

rates. For example, in recessions, policy-makers are likely to loosen the monetary stance by reducing nominal rates. This could lower real rates in the short run as nominal rates fall faster than inflation. Saving will be discouraged by the lower real interest rate, but the income effect of higher output is likely to increase the volume of savings, even if the saving rate falls. Such an effect is likely to be much more important for short-term real interest rates than for long-term rates.

Planned investment is determined within Tobin's 'q' framework in Barro's model. In this framework, investment is stimulated whenever the market valuation of the profit stream on new capital is greater than the cost of installing it. The ratio of the market valuation of capital to the cost of replacing it is known as the valuation ratio or Tobin's 'q'. Based on this model, a country's investment rate may be linked empirically to the level of real share prices in that country, as a proxy for the valuation ratio.⁽⁵⁾

Assuming capital market integration, world real interest rates⁽⁶⁾ will be determined by the factors affecting global investment and global saving. In Barro's framework, the global influences are defined as the analogue of the national variables: for example, world investment is linked to a weighted average of real share price movements.

Barro's original model focused on the determinants of short-term real rates (a three-month rate less expected inflation). Smith uses more recent data and has also extended the framework to examine movements in long-term real rates.⁽⁷⁾ Because of the difficulties of measuring long-term inflation expectations and long-term real rates, the results should be interpreted with some caution.⁽⁸⁾ The expected world real interest rate equations are estimated over the period 1959–92. In terms of short real rates, the particularly influential factors were: share prices; the ratio of world government debt to GDP; the global monetary stance (as measured by changes in narrow money); and the proportion of GDP spent on oil (the G10 countries are net oil importers). Movements in world government debt and world oil consumption were the prime determinants of movements in long real rates over the same period.

The influence of these factors are best illustrated in terms of the broad changes in real interest rates over the past three decades. The period between 1959 and 1992 can be divided into three 'regimes' (see Charts 11 and 12) defined by medium, low, and high global real interest rates. Similar patterns are apparent for both short and long rates. From 1959 to 1973 real rates were in the 'medium' regime (with short real rates averaging 2.4% and long rates 2.5%—see Table A). Real interest rates then fell, and indeed were

(1) Updating the work of Barro and Sala-i-Martin (1990) and Barro (1992). See Smith (*ibid*).

(2) Drawing on the framework of Blanchard and Summers (1984), which has been extended using the approach of Campbell and Ammer (1993). See Paisley (*ibid*).

(3) Using the techniques of Vahid and Engle (1993). See Pain and Thomas (*ibid*).

(4) Barro and Sala-i-Martin (1990); Barro (1992).

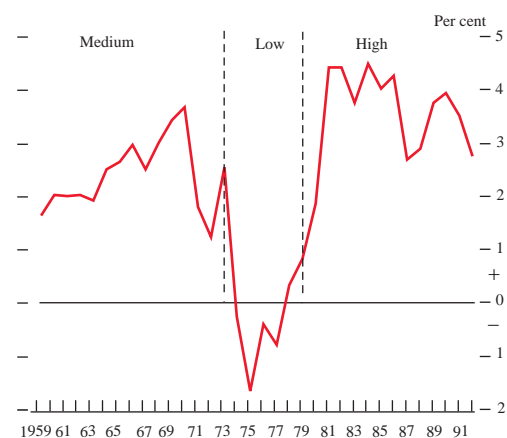
(5) Since corporate equity is quoted primarily on domestic stock markets.

(6) The 'world' is taken to be the G10 excluding Switzerland in this model. Global variables are constructed using GDP weights.

(7) Smith has also extended the theoretically derived model of country rates.

(8) A two-year centred moving average of CPI inflation is used to proxy inflationary expectations in Smith's study.

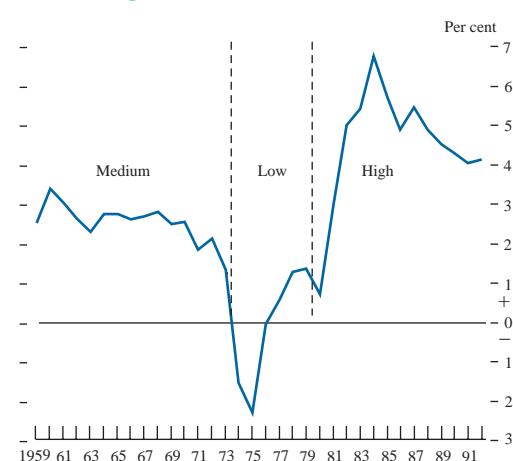
Chart 11
World short real interest rates^(a)



Source: Smith (forthcoming).

(a) Three-month interest rate less a quarterly ARMA forecast of CPI inflation.

Chart 12
World long real interest rates^(a)



Source: Smith (forthcoming).

(a) Government bond yields less a two-year centred moving average of CPI inflation.

negative at times in the 1974 to 1979 period. In the early 1980s, real rates rose to levels higher than in the previous two decades, and have remained relatively high ever since. Short real rates averaged 3.9% per annum between 1980 and 1992 and long real rates some 5.0% on this measure.

Table B
Contributions to changes in world short real interest rates^(a)

Proportionate contribution of:	Share prices	Oil consumption		Narrow money growth		Government consumption	Government debt	Government deficit	Proportion explained (b)	Proportion unexplained
	$STOCK_{t-1}$	$\Delta OILCY_{t-1}$	$OILCY_{t-1}$	$\Delta M1_{t-1}$	$\Delta M1_{t-2}$	GCY_{t-1}	$RDEBTY_{t-1}$	$RDEFY_{t-1}$		
'Regime' change:										
Medium-low (fall in rates)	0.23	0.05	-0.59	0.08	0.09	0.47	0.31	0.03	0.68	0.32
Low-high (rise in rates)	0.20	0.06	-0.04	0.05	0.03	-0.04	0.63	-0.03	0.86	0.14
Coefficient	0.042	-0.629	1.054	-0.174	-0.101	0.596	0.171	-0.252		
t-value	4.41	-1.37	1.86	-2.32	-1.66	1.16	2.30	-1.03		

Note: 'Regimes' are defined as follows: medium: 1959–73; low: 1974–79; high: 1980–92. For exact variable definitions see the annex. Coefficient estimates are for the full sample (1959–92).

(a) Source: Smith (forthcoming).

(b) Components may not sum to the proportion explained because of rounding.

Table A
Average level of world short and long real interest rates^(a)

'Regime'	Average value of world short real interest rate	Average value of world long real interest rate
Medium (1959–73)	2.4	2.5
Low (1974–79)	-0.3	—
High (1980–92)	3.9	5.0

(a) Source: Smith (forthcoming).

How much of these broad, inter-'regime' movements can be explained by the factors suggested by the theoretical framework? The empirical results suggest that movements in the level of world public sector debt and in equity markets made the biggest contributions to changes in average world short-term real interest rates during the past 30 years. Turning first to share prices, their weighted average for the ten major economies rose by an average of 5% a year between 1959 and 1973, fell almost 11% a year between 1974 and 1979, and rose on average over 9% a year between 1980 and 1992 (see the annex for data). Using these figures and the estimated coefficients, the fall in share prices between the first and second periods accounted for over 20% of the decline in short real interest rates (see Table B).⁽¹⁾ The increase in equity returns between the mid-1970s and the 1980s also contributed 20% to the subsequent increase.

Changes in the average government debt-GDP ratio for the ten countries had an even greater effect. Between the first and second periods, the reduction in debt from 33% of GDP (1959–73) to 28% (1974–79) contributed over 30% to the decline in real rates (see Table B). The rise in world government debt in later years to around 43% of GDP on average contributed over 60% of the rise in real short rates during that time.

The contribution of other aspects of fiscal policy can also be seen in Table B. Over the period as a whole, the effects of world government current expenditure and the world budget deficit on global short real rates were not significant. The

(1) In relation to Table B, a positive number implies that the variable was responsible for part of the movement in real rates. A negative number suggests that the variable's effect was outweighed by other factors.

Table C
Contributions to changes in world long real interest rates^(a)

Proportionate contribution of:	Share prices	Oil consumption		Narrow money growth		Government consumption	Government debt	Government deficit	Proportion explained (b)	Proportion unexplained
	$STOCK_{t-1}$	$\Delta OILCY_{t-1}$	$OILCY_{t-1}$	ΔMI_{t-1}	ΔMI_{t-2}	GCY_{t-1}	$RDEBTY_{t-1}$	$RDEFY_{t-1}$		
'Regime' change:										
Medium-low (fall in rates)	0.07	0.09	-0.66	0.02	—	0.65	0.50	0.03	0.72	0.28
Low-high (rise in rates)	0.05	0.09	-0.03	0.01	—	-0.04	0.79	-0.03	0.84	0.16
Coefficient	0.013	-1.023	1.123	-0.043	-0.005	0.797	0.261	-0.243		
t-value	1.45	-2.39	2.14	-0.61	-0.09	1.53	3.75	-1.06		

Note: 'Regimes' are defined as follows: medium: 1959–73; low: 1974–79; high: 1980–92. Coefficient estimates are for the full sample (1959–92).

(a) Source: Smith (forthcoming).

(b) Components may not sum to the proportion explained because of rounding.

government deficit⁽¹⁾ appears to have had very little effect on real interest rates. Indeed, as in Barro and Sala-i-Martin (1990) and Barro (1992), the estimated coefficient on the government deficit has the 'wrong' sign. These findings are not too surprising given that, empirically, the current budget deficit is a poor predictor of future deficits (Barro 1992) and Blanchard's (1985) theoretical contention that the current budget deficit matters only to the extent that it predicts a weighted sum of future budget deficits.

Chart 12 and Table A demonstrate that world long real rates followed a broadly similar pattern to short rates. Empirical results, summarised in Table C, suggest that, as for short rates, the level of aggregate government debt in relation to world income was very important in influencing long real rates. Indeed movements in public debt explain some 50%–80% of the movement in long rates between the different regimes. The other factor that appears to be vital for long rates is the movement of oil prices. Surprisingly, equity markets do not appear to be particularly important in this formulation.

The above results are in line with recent studies undertaken in the IMF⁽²⁾ and OECD,⁽³⁾ also referred to by the G10 Deputies, which suggest that global fiscal pressure has a significant impact on real interest rates. Earlier studies had examined the relationship between interest rates and fiscal variables at the national level and had not found strong support for a link. The relationship appears to be more powerful and easier to identify at a global level, as would be expected in an integrated global capital market. This supports the conclusion that spillovers are important and that countries have a common interest in pursuing sound fiscal policies.

A comparison of returns on stock and index-linked bonds in the United Kingdom

Blanchard and Summers (1984) noted that relative movements in equity and bond markets may help to distinguish the source of economic shocks. For example, a

rise in the expected profitability of investment would lead to an increase in equity prices as well as to a rise in real interest rates. Conversely, while an adverse shift in national saving linked to an expansionary fiscal policy would also lead to a rise in real rates, this would tend to be associated with downward pressure on equity prices, at least in the longer run.⁽⁴⁾

A forthcoming paper by Jo Paisley looks in detail at the returns to holding equities and index-linked bonds in the United Kingdom, and analyses the possible sources of 'news' which may have led to the significant rise in long-term real rates during 1994.

UK data are particularly well-adapted to such a study. As already noted, the index-linked gilt market in the United Kingdom provides a direct measure of long-term real rates extending back to the early 1980s. An analysis of relative movements in UK equities and index-linked gilts consequently yields a relatively direct test of the source of shocks to real rates, while avoiding all the complications associated with the measurement and stability of inflation expectations. The basic principle used to try to distinguish shocks to investment from shocks to saving is that, in an efficient market, higher planned investment should be associated with a higher present discounted value of expected future dividends. An improvement in investment opportunities would consequently be reflected in a rise in the relative return to equity. This again is linked to Tobin's 'q' idea.

Experience in the mid-1980s provides a good example. There was a strong rise in equity prices in the United Kingdom in 1982–86, with the annual return on equities outstripping that on index-linked bonds by about 20% per annum. There was a further surge in early 1987, before the sharp correction in October which, however, only returned real equity prices⁽⁵⁾ to their level at the start of the year. Although there is normally a significant premium for holding equities rather than index-linked gilts to compensate for the additional risk, and indeed this risk premium may

(1) This is measured empirically as the (cyclically adjusted) change in the public debt.

(2) Ford and Laxton (1995), Helbling and Westcott (1995).

(3) Orr, Edey and Kennedy (1995).

(4) There may be a temporary rise in the short run if the temporary increase in output and profits from the fiscal expansion outweighs the effects of higher interest rates. See Blanchard and Summers (1984).

(5) Defined relative to the RPI.

vary over time, the returns in the mid-1980s were exceptional. This may be interpreted as an indication that investors were becoming increasingly optimistic about future profitability. Steady improvements in actual profitability may have reinforced these expectations. The mid to late 1980s saw a strong rise in fixed investment in the United Kingdom, in line with the earlier financial market signals.

Recent movements in the UK equity market have been less pronounced than in the mid-1980s. There was a substantial rise starting in late 1992 which by early 1994 had extended to some 50%. The increase was stronger than the rise in index-linked bond prices over the same period. The rise in equity prices was linked in part to the expectations of economic recovery, and actual profitability has recovered strongly from the recent cyclical trough in the United Kingdom as well as in several other G10 countries. These data are consistent with the view that an improvement in the outlook for profitability contributed to the rise in long-term real rates during 1994.

Corroborative evidence on the ‘news’ which led to the sharp rise in real long-term interest rates during 1994 may be obtained using the asset-pricing model of Campbell and Shiller (1988) and Campbell (1991). The broad idea is to identify separately the different elements of ‘news’ which may drive expected asset returns.

At the first stage, a statistical model linking current and past values of long-term asset returns, real interest rates and other variables is estimated. This is known as a vector autoregression model (VAR). The model is assumed to capture the information available to investors in each period. For each period, the model is run to generate two types of forecast: first, a one-period-ahead forecast, and second, forecasts of real interest rates, future dividends and future excess returns over longer horizons. The one-period-ahead errors, or differences between the observed result and the one-period forecast, can be interpreted as ‘news’ received by investors. Given the news about future returns and/or future cash flows, the longer-horizon rational-expectations forecasts of asset values are subsequently revised.

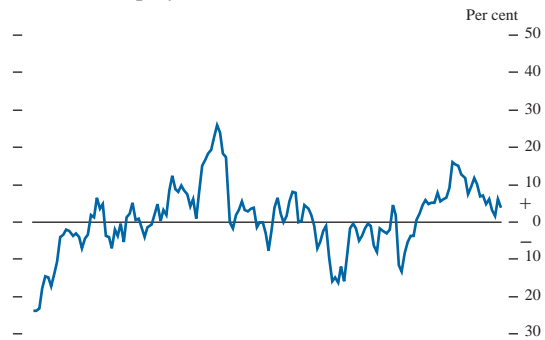
Excess returns are used in the analysis: these are holding-period returns relative to the return on a ‘risk-free’ rate (taken to be the one-month interbank interest rate). Paisley shows that revisions to the rational-expectations forecasts of excess real bond returns are accounted for by news about the risk-free rate⁽¹⁾ and future excess bond returns. The corresponding revisions for equity returns reflect news about the risk-free rate, future excess returns and future real dividends. Prices of stocks and real bonds should reflect the same news about the risk-free rate. So the difference between the expected returns on the two assets should provide information on whether there is news about

either their expected future relative riskiness⁽²⁾ or expected future dividend growth.

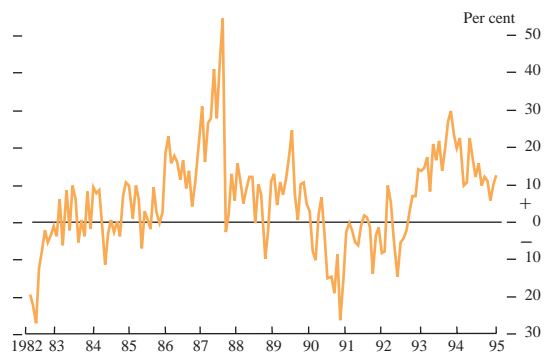
On the assumption that the relative riskiness of equity and indexed-linked bonds did not change significantly in 1993 and 1994, Paisley’s results provide some evidence of a rise in expected future dividends (see Chart 13). Over this period the multi-period forecast of equity returns relative to index-linked returns was being consistently revised upwards (the slope of the top line in the chart) in the light of news. At the same time, revisions to forecasts of dividend growth were positive (the slope of the bottom line). This gives further support for the view that, taking the two years together, a rise in expected profitability may have contributed to upward pressure on real rates.

Chart 13
Returns on equities and index-linked securities^(a)

Forecast of equity returns relative to index-linked returns



Forecast of dividend growth



Source: Paisley (forthcoming).

(a) Forecasts based on a vector autoregression model.

The results from the UK analysis may have wider applicability if two conditions are satisfied: first, that UK index-linked bonds are a good proxy for movements in global real yields and, second, that at the same time UK equity yields have moved in line with global equity markets. In an integrated global capital market, the first condition is likely to hold: there are no strong grounds for expecting a major change in the UK default risk premium on government bonds in 1994. As for the second condition, equity markets do tend to respond to changes in news about national profitability trends and are likely to be rather less closely correlated internationally in the short run. The

(1) This term enters purely because the analysis is done with excess returns. News about inflation also has an effect because UK index-linked bonds are not perfectly indexed.

(2) This term is the difference between the expected future excess return on stocks and the expected future excess return on index-linked bonds or the ‘index-linked’ equity risk premium. This differs from the usual definition of the equity risk premium because in this case the bonds are indexed.

recent changes in UK real equity prices are, however, fairly typical of the pattern in many G10 countries. In most countries, prices rose in late 1992 and 1993, but slipped back somewhat during 1994, although the equity market remained strong in the United States, which had a significant impact on the G10 weighted average.⁽¹⁾ For the G10 countries as a group, real equity prices rose by over 16% in 1993 and fell by only some 4% during 1994. This fall was less than the drop in index-linked bond prices.

The broad conclusion drawn by the G10 Deputies is that part of the increase in real rates during 1994 could have reflected an increase in the demand for capital, based on an increase in expected future profits. But the evidence should not be overstated. Equity and bond markets are very volatile and it is hard to distinguish between changes in news about investment opportunities and movements in the relative risk premia. Because of this volatility, the Deputies conclude that it is not possible to quantify the importance of a possible increase in investment demand with any precision.

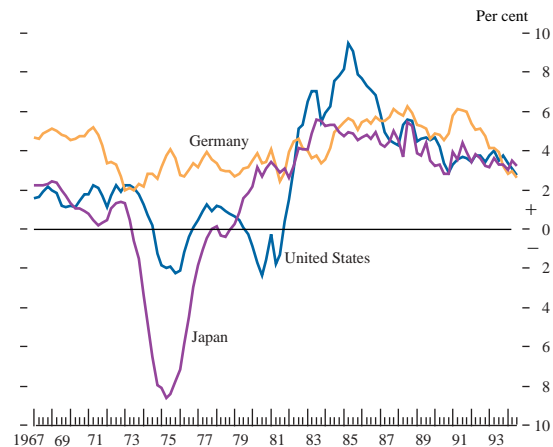
Capital market integration

A range of evidence presented in the Deputies' report suggests that capital mobility increased in the 1980s and 1990s and that capital markets are becoming increasingly integrated. The analysis described above of the empirical determinants of saving, investment and real interest rates provides one source of information on the importance of global trends. Another approach is to examine statistically the degree of co-movement in real interest rates. In an environment of perfect mobility in goods and capital markets, not only should real interest rates move together in the long run, but they should show similar patterns across countries at similar stages in the business cycle. A recent study by Darren Pain and Ryland Thomas examines the degree of co-movement in real interest rates by testing for the existence of 'common trends' and 'common cycles'

using co-integration techniques, which identify common long-run or trend movements, and the more recently developed common-feature analysis, which identifies common movements over economic cycles.⁽²⁾

Pain and Thomas analyse two systems of real interest rates. They first explore the linkages between short real rates in Germany, France and the United Kingdom and then examine long-term real interest rates⁽³⁾ in the United States, Japan and Germany. European short rates exhibited considerable co-movement over the whole sample period from 1968 to 1994. The technique works less successfully for the long-rate system, but the results suggest that, while there is little evidence of common movement over the whole sample period (1968 to 1994), there was much greater linkage in the more recent period (from 1980 onwards) (see Chart 14). In this sub-period a common trend or 'world' real rate can be identified, again supporting the view that capital market integration has increased.

Chart 14
Real interest rate movements: G3 long rates^(a)



Source: Pain and Thomas (forthcoming).

(a) Government bond yields less a two-year centred moving average of CPI inflation.

(1) GDP weights.

(2) Vahid and Engle (1993).

(3) Proxied by ten-year government bond yields less a two-year centred moving average of CPI inflation.

Average value of independent variables in world real interest rate equations^(a)

'Regime'	$STOCK_{t-1}$	$\Delta OILCY_{t-1}$	$OILCY_{t-1}$	ΔMI_{t-1}	ΔMI_{t-2}	GCY_{t-1}	$RDEBTY_{t-1}$	$RDEFY_{t-1}$
Medium	0.047	—	0.010	0.076	0.069	0.189	0.328	-0.003
Low	-0.107	0.002	0.026	0.089	0.092	0.167	0.278	—
High	0.093	-0.002	0.024	0.077	0.079	0.165	0.433	0.006

Note: 'Regimes' are defined as follows: medium: 1959–73; low: 1974–79; high: 1980–92.

(a) Source: Smith (forthcoming).

Variable definitions

Main source: International Financial Statistics (IFS) published by the IMF.

Short real interest rate	Short (three-month) real interest rate: Treasury bill rate where available (money market rate where not), less a quarterly ARMA(1,1) forecast of CPI inflation with deterministic seasonals.
Long real interest rate	Government bond rate, less a two-year centred moving average of CPI inflation.
<i>STOCK</i>	December-on-December changes in stock market prices less December-on-December changes in CPI.
<i>OILCY</i>	Oil consumption as a proportion of GDP.
<i>MI</i>	Narrow money.
<i>GCY</i>	Government current consumption as a proportion of GDP.
<i>RDEBTY</i>	Real government debt as a proportion of GDP.
<i>RDEFY</i>	Change in real debt (cyclically adjusted by regressing on lags of GDP) as a proportion of GDP.

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