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The Determination of Interest Rates

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EXECUTIVE SUMMARY

The charging of interest for lending money has not always been an acceptable practice. "Usury" is specifically condemned in both the Bible and in Shari'ah law, and modern Islamic banks operate only on the basis of profit.

In modern financial markets, however, the distinctions between interest, rent, profit and capital appreciation are not clear-cut. The current hotly-debated proposal on the taxation of interest within the EU has illustrated the difficulty of reaching legally precise definitions.

In economic theory, interest is the price paid for inducing those with money to save it rather than spend it, and to invest in long-term assets rather than hold cash. Rates reflect the interaction between the supply of savings and the demand for capital; or between the demand for and the supply of money.

Rates of interest can be expressed as a percentage payable (a "coupon"), usually *per annum*; or as the present "discounted" value of a sum payable at some future date (the date of "maturity"). There is an inverse relationship between the prevailing rate of interest at any one time, and the discounted value at that time of assets paying interest: i.e. bond prices fall when yields increase.

An important distinction must be made between "nominal" and "real" interest rates. A real rate of interest is the nominal – i.e. "coupon" – rate, *less* the rate at which money is losing its value. Calculating real rates, however, presents methodological problems, since there are significantly different ways of calculating rates of inflation.

Inflationary expectations, however, are one of the most important determinants of interest rates. Broadly, savers demand a real return from their investments. Changes in the forecasts of future inflation are therefore reflected in the current prices of assets. The effect on bonds of varying maturity, for example, can be charted as shifts in the "yield curve".

Rates of interest also reflect *varying degrees of risk*. A body with a rock-solid credit-rating, like the European Investment Bank, will be able to attract savings at a very much lower rates of interest than corporate issuers of "junk bonds". Countries with high levels of existing debt may have to pay higher rates on government borrowing than countries where the risk of default is less. Indeed, the guarantee that "sovereign debt" will be repaid on maturity has frequently allowed governments to borrow at *negative* real rates of interest.

Within any economy there will therefore be a multiplicity of interest rates, reflecting varying expectations and risks. The markets for different assets – physical and financial – will influence each other as savers shift their portfolios between cash, interest-bearing securities, equity in firms, complex derivatives, real estate, antiques, etc. Financial institutions and large corporations will behave differently from small savers and small businesses.

Short-term Rates

Money market levels of "overnight" (up to a week) and "short-term" (up to a year) interest rates are heavily influenced by the rates set by Central Banks. In the case of the euro area, the European System of Central Banks (ESCB) can use its power as the monopoly supplier of cash to set a "floor" and a "ceiling" to overnight and short rates (the Deposit Rate and the Marginal Lending Rate), as well as setting a benchmark central rate (the Marginal Refinancing Rate or "repo" rate).

Central Banks with the primary remit of price stability – like the European Central Bank (ECB) itself – will set short-term rates so as to prevent future inflation. Higher current rates should encourage people to save rather than spend, and businesses to defer capital spending. "Neutral" rates will be just high enough to fend off future inflation, but not so high as to choke off economic growth and raise unemployment.

There are a number of problems in implementing this theoretical model, however.

- Political support for the price-stability objective is not guaranteed. An alternative objective, for example, might be the maintenance of full employment, with interest rates being kept low to boost investment. Or nominal rates might only be changed to maintain real rates at some agreed level.

- It is difficult, if not impossible, to determine what "neutral" rates might be at any one time. Estimating inflationary risk is a matter of judgement, based on data of varying accuracy. The ECB operates a "twin pillar" approach, based on a 4.5% reference level for the annualised growth rate in the monetary aggregate M3; and a "broadly based assessment of the outlook for price developments", based on a range of other indicators: bond yields, consumer credit, the exchange rate, etc.

- There is uncertainty about the transmission mechanisms through which Central Bank interest rates feed through into market rates. Variations between different national economies and regions occur as a result of differences in the sources of corporate finance, the level and structure of corporate and household debt, and the degree of competition in the financial services industry. Little can be adduced from past experience, since financial systems are currently in a state of flux as a result of monetary union itself (the Lucas critique).

- National economies are increasingly open to the influence of international financial markets. Short-term capital can move rapidly between currency areas in search of higher returns, disrupting the operation of domestic monetary policy. This can lead to conflicts of the kind which faced the UK in September 1992, when higher interest rates were required to avoid a Sterling depreciation – and to keep it within the European Monetary System's Exchange Rate Mechanism – but lower rates to avoid a recession. The comparatively low proportion of euro area GDP which is traded, by comparison with the individual Member States' currency areas, has reduced, but not eliminated, such vulnerability.

Long-term Rates

The existence of global financial markets ensures that *real* long-term interest rates tend to move together in different economies. *Nominal* long-term rates, however, reflect inflationary expectations in the separate economies, which in turn reflect the credibility of domestic monetary policy. Linked to inflationary expectations are exchange-rate expectations; but exchange-rate movements can also take place for reasons unconnected to inflation differentials. Economic theory in this area has a bad record of prediction.

The effect of short-term interest rate changes on long-term rates is not, therefore, straightforward. A rise in short-term rates can lead to, or be contemporary with, a rise in long rates; but also to a fall if the markets are convinced that future inflation has been prevented.

National fiscal policies have also played a major part in determining long-term interest rates. Where budget deficits and/or the total level of government debt have been high, the need to borrow for current spending and to re-finance maturing debt has forced up long-term rates. The road of "monetisation" – i.e. printing money to meet current budget deficits, allowing inflation to erode the real value of existing debt – has led to borrowing at ever-higher rates of interest, and ever-shorter maturities, with default at the end. For this reason the provisions of the Maastricht Treaty, supplemented by the Stability and Growth Pact, require balanced budgets over the economic cycle, and entirely prohibit monetisation, privileged access to savings or the "bail-out" of defaulting public bodies. All euro area participants are committed to reducing the total level of public debt to 60% of GDP or below.

The extent to which changes in interest rate levels affect the real economy – investment, growth, employment, etc. – is likewise not clear-cut. A rise in rates, in general, has a negative effect on future GDP, and a fall in rates a positive one. But the effects in detail depend on the structure of a particular economy, and the components of demand within it. Recent Japanese experience shows that very low rates of interest, on their own, are not enough to revive a lagging economy.

Experience in the euro area

Nominal interest rates in the countries of the euro area have been falling steadily since 1994, and in mid-1999 stood at historically low levels. This has enabled countries like Italy to cut dramatically the cost of servicing public debt. It has not, on the other hand, necessarily been the case with real interest rates which, in Germany during early 1999, were probably higher than nominal.

Euro area monetary policy effectively began on 3 December 1998, when there was a co-ordinated reduction of key lending rates to 3% by the central banks of the participating countries. When the ESCB officially became responsible, this rate was confirmed "for the foreseeable future". In the early months of 1999, however, a sizeable slowdown in economic growth, and persistently high levels of unemployment, led to growing political pressure for an interest rate reduction. At the beginning of April the key rate was indeed cut to 2.5%. Although M3 was growing at above

target rate, inflationary pressures remained very low; but ECB President Wim Duisenberg made it clear at the time that "this is it!"

As the year progressed attention began to shift to the *external* value of €. By early summer, it looked like falling to parity with the $, and the € was widely described as "weak". But in July the exchange rate began to recover, and signs of higher economic growth appeared. Between July and September M3 also grew at nearly 6%, causing the ECB to talk of a "tightening bias" in monetary policy. On 4 November the key interest rate rose again to 3%.

The evidence so far is that the ECSB has entirely carried out its mandate. Current inflation is well below the 2% "price stability" definition. More important, inflationary expectations, as indicated by bond yields, also remain low, while economic growth is picking up, and unemployment is falling.

There remain, however, some question marks over the utility of the 4.5% M3 reference level; over the degree to which financial markets have yet integrated (there are still differences in national benchmark bond yields); and over policy towards the €'s external value.

Conclusions

The integration of the world's financial markets is increasing the pressure of external factors in the determination of domestic monetary policies. In addition, though the approaches of the world's major central banks towards the conduct of monetary policy differ in detail, there is broad agreement on fundamentals: the pursuit of price stability and the stability of financial markets. This is leading to the co-incidence, of not the co-ordination, of central-bank-determined interest rate changes.

For the same reasons, real long-term interest rates are likely to converge on an international norm, the level of which will be determined by a complex interaction of both monetary and real factors, and in particular by the pace of technological advance.

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CHARTS AND TABLES

Introduction

Everyone believes that they know what an interest rate is – particularly if they are paying off a mortgage or relying on income from savings. Interest is the price you pay for borrowing money, or that you receive for depositing it.

In the context of economic and monetary policy, however, such every-day knowledge can prove insufficient. In the media, financial experts are continuously speculating about the chances and possible effects of various interest-rate changes on markets. In more specialist journals academics do the same about the links – if any – between short and long-term rates, between interest rates and the money supply, saving, investment, growth, unemployment, currency parities, and so on, often using complex mathematical models.

Above all, there seem to be no clear answers to some fundamental questions. Do interest rates, for example, arise from market forces? Or are they set by Central Bankers and politicians?

This study has been prepared as a result of a request from the European Economic and Monetary Affairs Committee for briefing on these and related issues.

It first looks at the concept of interest rates and related economic theory, and at financial markets. It then examines how short- and long-term interest rates are currently determined, and their impact upon economies.

More particularly, it discusses their role in the economy and in the monetary system of the euro area, and how rates have moved within the area since it came into existence on 1 January 1999.

It ends with some conclusions both on the determination of rates, and on the record so far of the European Central Bank.

I. THE BASIC THEORETICAL BACKGROUND

1. The Fisherman and the Shari'ah

Consider the proposition that "in an economy without money, there are no interest rates". Within a pure barter economy, it can be argued, a calculable market price for borrowing and lending is not possible. Only the invention of money in its *store of value* capacity has made possible the precise calculation of time preferences in using resources: i.e. interest rates.

On the other hand, consider the parable of the fisherman.

> *He sits by a lake, and catches a fish a day with his bare hands. Suddenly he has the idea of making a net. But to do that he would need to stop fishing for a month, and might starve to death by the time the net was finished.*
>
> *Fortunately, he has a more highly-skilled friend who can catch two fish a day. Would the friend lend him thirty fish over the next few weeks? Yes, replies the friend; but what do I get out of it? At the end, says the fisherman, you of course get back your thirty fish, as soon as I've caught them; and then I'll add another thirty as well. Done! says the friend.*

The story illustrates a number of economic concepts. Most obviously, there is the general trade-off between current consumption and investment for greater future consumption. There is also the link between the level of investment in an economy and that of investable savings. Finally, there is the concept of a capital sum lent/borrowed, and a rate of interest charged (100% per month). And all done without money – although it could be argued that, in this example, fish have effectively been "monetised".

Indeed, the fisherman analogy is so intuitively easy to grasp that it can come as a shock to recall that, for much of human history, charging such rates of interest has been a capital offence.

Psalm 15 tells us in the last verse that:

> "*He that putteth not out his money to usury, nor taketh reward against the innocent. He that doeth these things shall never be moved*".

Aristotle, too, considered money itself to be "barren", and the charging of interest on loans "unfair". Such authorities were powerful influences in Europe throughout the Middle Ages and beyond.

It is true that attempts have sometimes been made to distinguish the charging of interest from "usury". Some have simply defined the latter as rates they are unwilling to pay. Others[1] have argued that Biblical "usury" relates, not to the rate of interest itself, but to the purpose for which the money is borrowed: i.e. for current consumption rather than investment[2]; or, alternatively,

[1] For example, Samuelson (see his *Economics*, 10th. Edition, p.605).

[2] Which can interestingly be compared to the "golden rule" for budget deficits and public borrowing.

that usury occurs when market positions are unequal: e.g. when a poor man who has no option but to borrow trades with a rich man who is not obliged to lend. These explanations are hard to reconcile with Ezekiel's stricture that only those "shall surely live" who "hath not given forth upon usury, neither hath taken *any* increase" (our italics).[3] The moral distaste surrounding the whole mechanism was summed up in the perhaps best-remembered of Polonius' "few precepts":

"Neither a borrower nor a lender be."[4]

Such attitudes are not merely ancient history, of no relevance to modern economics. In many Muslim countries, for example, much of the legal system is partly – and in a few cases wholly – determined by the *Shari'ah,* the code formulated in the 8th and 9th centuries, it is believed under direct divine inspiration. Under the *Shari'ah* the charging of interest is "impure".

Islamic Banks – for example, the Islamic Development Bank – do not therefore charge interest on loans. Instead, they base their lending activities on taking a share of the profits to be realised from the loan. This at the same time ostensibly removes the temptation to lend for current consumption, and has certain economic effects, notably in the field of monetary policy.

2. Interest, Discount, Rent and Profit

2.1. Discounting

The ways in which objections to the charging of interest have been circumvented are indeed themselves instructive. Samuelson describes[5] how, in the Middle Ages, the taboo against charging a 5% rate of interest was evaded through the "20 years' purchase". This relied on the simple mathematical fact that, given stable money, an asset generating income at 5% will have a current discounted value 20 times that of the annual income: i.e. the payments over 20 years.

Readers of 18th and 19th century novels will indeed know that the money-lenders of the time made their living by discounting bills. The borrower would sign a paper, promising to pay the lender a given sum at some future date. In return, he or she would receive a smaller sum: the present discounted value of the paper, depending on the rate of interest charged. In the succeeding years before maturity (i.e. the date of repayment), such bills might well be traded, their value at any one point varying inversely to the current prevailing rate of interest applied to similar bills (see Box 1).

This, effectively, is how the bond markets work. It explains the difference between the issuance interest rate or "coupon" (e.g. "Treasury 9%"), and the "yield to redemption": the actual rate of

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[3] Ezekiel, 18. Verse 8.

[4] William Shakespeare, *Hamlet*, Act 1, Scene 3.

[5] In a footnote on p.599 of *Economics.*

interest paid, given the current value of the asset and the date on which repayment of the capital sum falls due.

Box 1: Compounding, Discounting and changes in the Present Value of assets

Compounding means calculating the nominal value at some date in the future (FV) of an asset which pays interest, assuming that the interest payments are always added to the principal (that is, assuming compound interest). The formula is

$$FV=PV(1+i)^t$$

where *PV* is the sum in question (present value), *i* the rate of interest expressed as a decimal (i.e. 5% as 0.05), and *t* the number of years in the future.

Discounting is the reverse side of the same coin. It means calculating the current or present value (PV) of a sum receivable at some future date. The formula is:

$$PV= R/(1+i)^t$$

where *R* is the sum to be received, *i* the rate of interest, and *t* the number of years to the date of receipt.

Thus, taking the simplest examples, the value of €100 invested at 5% for a year will be €105. And the present value of £100 due in one year, and paying a 5% rate of interest, is €95.24.

It is not difficult to see that the larger the rate of interest, and the greater the number of years, the larger FV will be by comparison with PV, and the smaller the value of PV by comparison with R.

The present value of €100 discounted at 8% over a year is €92.59, at 12% €89.29, and so on.

Any change in interest rates will therefore result in the value of assets also changing: a rise in rates produces a fall in asset values, and *vice versa*. Likewise, any rise in the value of an asset means a fall in the rate of interest it earns, and *vice versa*.

Finally, the *extent* to which interest rate changes affect the value of an asset depends on its maturity.

For example, a rise in the rate of interest from 8% to 12% will lower the value of an asset maturing in a year's time from €92.59 to €89.29, or by only 3.6%. But a similar rise in interest rates on an asset maturing in ten years will lower its value from €46.30 to €28.75, or by 37.9%.

2.2. Rent

Although landlords who charge rent have historically enjoyed almost as bad a reputation as money-lenders charging interest, they have not been subject to the same *anthema.* What, then, is rent?

Classical economics defines the "factors of production" as land, labour and capital. Economic rent is the difference between the total return to the factor, and the price of its supply. In the case of labour and capital, the supply can vary, as can the cost. The "rent-element" of the return to these factors can therefore also vary. In the case of land, however, the supply can be taken as fixed; the supply price is therefore zero, and the total return to the factor takes the form of rent.

This economic definition is nevertheless somewhat different from the normal use of the word. "Rent" from real estate is technically only partially economic rent, since the supply of buildings can vary. The income received by property-developers can more plausibly be described as profit.

2.3. Profit

To the businessman, indeed, profit is much the same thing as economic rent: that is, the difference between the total return and the total cost of operations over a given period. To the economist, however, profit is defined somewhat differently as the excess return gained on a factor of production: i.e. over the borrowing costs of capital, the rent of land and the wage costs of labour. In perfectly competitive markets, the level of profit will tend towards zero: that is, returns will tend to equal the costs of production factors. In actual markets, of course, various competitive advantages – technical, geographical, aesthetic or through an element of monopoly – will make profits possible, at least in the short run.

Profit also has more precise definitions for the accountant, the tax consultant and the investment manager. These are determined by accounting standards and tax law rather than by economic theory, and can vary considerably between jurisdictions. A company's declared profits, for example, can be substantially affected by the way in which the accounts treat such matters as depreciation, stock valuation and bad debts.

Finally, where an investor has bought shares in a company ("equity"), the income from its profits can take the form of dividends (distributed profits) or a rise in the capital value of the shares as result of re-investment (retained profits).

2.4. Financial Markets

How do these distinctions relate to the real world? In the case of financial markets, it must be said, not a great deal. The growth of mixed funds and other complex investment products means that streams of income can be generated from assets that are part interest (income from bonds or bank deposits), part rent (from land and real estate) and part profit (from investment in equities).

This has already, for example, created problems for the proposed introduction within the EU of a "witholding tax" on interest paid to residents of another EU Member State. The Commission's draft Directive[6] defines "interest" as

> *"a) income from debt-claims of any kind, whether or not secured by mortgage and whether or not carrying the right to participate in the debtor's profits, and in particular the income from public debt securities or bonds, including premiums and prizes attaching to the latter…;*
>
> *b) the increase in value of debt-claims in respect of which the income, by contract, consists, wholly or partly, of that increase in value, irrespective of the nature of that increase. The interest to be taken into consideration in such circumstances is the difference, paid by the paying agent on redemption, between the capital reimbursed and the issue price of the corresponding securities;"*[7]

The income from undertakings for collective investment in transferable securities would incur the tax where they invested

> *"directly or indirectly more than 50% of their assets in debt-claims or corresponding securities"*[8].

However, the British Bankers' Association – among others – has observed that "such broad coverage creates a range of practical difficulties…"

> *"It would be impossible for a paying agent to know whether a bond fund, which might be based in the EU or outside it, was within or without the rules on any particular day. Exchange rate and market fluctuations combined with changing investment policy will all have an impact on whether the 50 per cent test is met".*[9]

Similarly – in an echo of the medieval device for avoiding interest payments – problems have arisen for the taxation of "zero-coupon bonds": that is, debt-claims where no interest is payable during the life of the bond, but is incorporated in the redemption value. The British Bankers' Association noted that

> *"the proposal to tax discounts on maturity is easily circumvented if an individual sells a bond to a company prior to maturity".*

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[6] *Proposal for a Council Directive to ensure a minimum of effective taxation of savings income in the form of interest payments within the Community* (COM(1998)195).

[7] COM(1998)195, Article 5: "Definition of Interest".

[8] Article 5(c)

[9] Evidence to the UK House of Lords Select Committee on the European Communities, 15th Report of 1998-9 session: *Taxes in the EU: can co-ordination and competition co-exist?* (HMSO, July 1999, £20).

3. Definitions of Interest

In any case, as in the case of profit, interest is treated in different ways by different specialists. The approach of the economist, for example, is different from that of the lawyer.

3.1. Economic definitions

For the economist, interest is above all a *price*, paid "for the use of credit or money". It follows that the theory of interest-rate determination is a sub-set of price-determination theory.

For the classical economists, the rate of interest was therefore determined by the interaction between the demand for investment capital (the fisherman making a net) and the supply of savings (the friend's surplus fish).

John Maynard Keynes also believed that interest rates were generally set in the market for loans. Other factors, however, were important: in particular, the "liquidity preference" of savers. The interest rate was determined by the level of reward they demanded for tying up their money in bonds or other assets rather than keeping it in cash. If savers believed that prices would fall (including those of financial assets), they would keep their money firmly under the mattress.

Hence the *liquidity preference* theory states that interest rates change to equate the demand for money with the supply. If demand for money rises – that is, if people decide they would prefer cash to interest-bearing securities – they sell them, and bond prices fall: i.e. interest rates rise. Likewise, if the supply of money rises people will move into bonds, the price of which will rise: i.e. interest rates fall.

A consensus subsequently emerged among most economists that there was a long-run equilibrium rate of interest, representing the expected rate of return required to defer sufficient consumption over a given period (i.e. save) to meet investment demand.

However, more contemporary economic thinking has tended to reject the notion of a single long-run equilibrium. Instead, concepts such as Professor James Tobin's "Portfolio Selection Theory" focus on the choices made by both firms and households between a wide range of physical or financial assets, each generating varying returns (i.e having different prices). These choices can in turn be affected by all kinds of financial or other event. A real economy, in other words, is a "spider's web" of complex interconnections, where interest rate levels and their effects cannot be predicted from any simple theory of long-run equilibrium.

3.2. Legal definitions

Black's law dictionary[10] defines an interest-rate as "the percentage of an amount of money which is paid for its use for a specified time". It adds that this is commonly expressed as an *annual* percentage rate so as to make it easy to "compare costs of borrowing money among several lenders or sellers on credit". Interest arises as the result of a contractual obligation to pay the stated amount to the legal owner of an asset (hence the term "bond").

[10] *Black's Law Dictionary* Fifth edition. West Publishing Co., 1979.

It will be seen that, by contrast with the economists, lawyers place emphasis on the *contractual and informative* properties of an interest rate. Borrowers must be clear about what they are required to pay. The emphasis on annual rates already has important implications.

Returning to the fisherman story the rate charged by the friend was expressed as 100% a month. It seems reasonable to assume that the annual rate was therefore 100 x 12%: that is, 1,200%.

Given that the maturity was only one month, this is indeed reasonable. But supposing that the loan had been for a whole year, or several years? In that case simply multiplying the monthly rate by twelve would have been misleading. Instead, the annual rate would have more honestly been presented as a, higher, *compound rate* (see Box 1). On this basis, the sum repayable at the end of a year would have been 122,880 fish, or 409,600%. It is for such reasons that credit card companies and others charging monthly rates are required to inform customers of the APR (Annualised Percentage Rate).

The earlier brief reference to the draft witholding tax directive and the problem of "zero coupon bonds" has indeed already indicated that the definition of an interest rate is not always clear cut. There are, it indeed seems, in practice different kinds of interest rate.

3.3. Nominal and Real Rates

One of the most critical differences is that between a nominal and a real interest rate. Briefly, the latter takes account of changes in the value of money; the former does not.

Mathematically, the difference is relatively simple: the real rate is the nominal rate *minus* the rate of inflation. Thus in an economy with a 4% rate of inflation, the real rate of return on an asset paying a nominal 6% is 2%. Where there is *deflation* in an economy, the real rate will of course be *higher* than the nominal.

The implications for economic behaviour are important. Most economies will necessarily operate on the basis of positive real rates, since most people will prefer to spend their money on current consumption rather than lose it investing – though this is not always the case (see section 3.5).

More important is the effect of *inflationary expectations*. If savers believe that *future* inflation will be at a certain level, they will demand nominal interest rates over the period in question which will provide positive real rates – whether the anticipated inflation occurs or not. This is a key element in the determination of long-term interest rates (see section 6).

There is, however, a methodological problem in determining real interest rates: namely, the price index used in their calculation. An analysis of the issue in the European Central Bank's March *Monthly Bulletin* observes that the Harmonised Index of Consumer Prices (HICP) is not necessarily the best benchmark. It includes components "whose impact on price developments may be transitory" – for example, energy prices. Moreover, a Consumer Price Index of any kind may not be as useful as a Producer Price Index (PPI), which is more relevant for investment decisions. Since 1991, consumer price inflation in € area countries was 2.9%, while PPI inflation was only 1.3%. This means that average real interest rates using the second index were substantially higher than using the first.

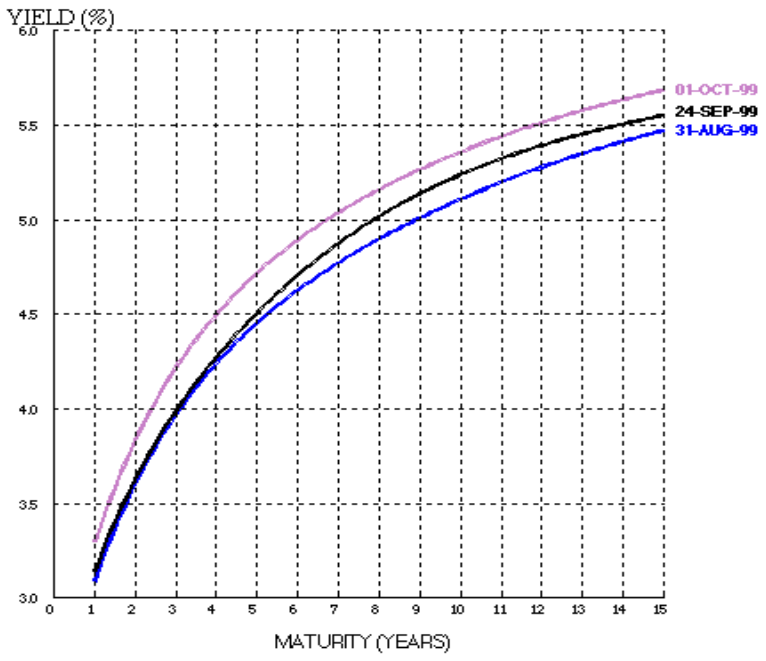
3.4. Short- and Long-run Rates

The differences between the interest rates charged on assets with different maturities is also crucial. It is common to talk about "short-term" and "long-term" rates. In reality, there exists at any one time a multiplicity of rates, applicable to assets along a spectrum of maturity. They range from the interest paid on "overnight" money to rates on securities maturing in thirty years.

Overnight rates are the rates at which a country's Central Bank lends to selected banks or other financial intermediaries (the so called discount-rate of a Central Bank – see next section) and the rates at which inter-bank money dealings take place (the so-called call money rates). From the name "overnight" it is evident that these rates concern transactions that take place overnight, in one or two days, or at a maximum in a week.

Short-term rates are those generally associated with treasury bills or comparable instruments that have a three-month maturity. However, in the markets there exists of a whole range of instruments: those with maturities of one month, three months, six months and twelve months are normally classified as short-term (see Chart 6).

Chart 1: Euro yield curves, August – October 1999



Source: Eurostat

Long-term rates are the rates are most usually defined as those associated with bonds with a maturity of ten years. In applying the Maastricht convergence criteria, for example, the EU used the yield on ten-year government bonds as the benchmark for defining the long-term interest-rate.[11] However, instruments with a five-year or a thirty-year maturity exist, and both fall into the category of yielding long-term rates.

The relationship between short-term and long-term rates will be discussed in greater detail later. In general, however, one would expect long-term interest rates to be higher than short term rates, since the longer the term of an investment, the higher the risk to the investor – of default by the issuer, or a need of instant liquidity – and the higher the yield required. At any one time, the yields on financial assets with different maturities can be plotted on a graph to give a *yield curve* (see Figure 1). This will normally be upward-sloping – but not always (see 6.1).

3.5. Interest Rates and Risk

Long term rates, then, are likely to be higher than short term rates because the greater the term to maturity, the greater the uncertainty. Likewise – as explained in section 3.3 – savers will normally require a rate of interest in excess of the expected rate of inflation: i.e. positive real rates. A comparison of the rates of interest on ordinary bonds with those on index-linked bonds of a similar maturity gives an indication of what *real* rates are demanded, and hence what inflation rate is expected (for further details, see 6.1).

How is it, then, that governments have often been able to fund their debt over long periods at *negative* real rates?

One explanation is that governments have been able, in some measure, to "capture" the savings of their citizens: that is, to make the purchase of government bonds obligatory. This has been the case, for example, when pension funds have been required to invest a proportion of their assets in domestic public debt. Within the EU, Article 104a of the Treaty now specifically forbids "privileged access"[12] to financial institutions.

There are, nevertheless, numerous examples of savers cheerfully accepting negative real rates of interest. Partly, this is because the alternative is holding cash, which loses them even more money. The most frequent motive for holding assets paying negative real rates, however, is security.

For example, in past times of turbulence on currency markets, large numbers of depositors have put their money into Swiss banks, despite having to pay for doing so, rather than receiving an

[11] This interpretation could create problems in the case of the applicant countries of Eastern and Central Europe, where financial markets are still undeveloped, and a full range of maturities does not exist. Even Poland, perhaps the most developed, has only just created a market in 10-year bonds.

[12] This is defined as "any law, regulation or other binding instrument" which either obliges financial institutions to hold public sector liabilities, or encourages them to hold such liabilities by providing tax advantages. This has not, however, entirely ended the ability of national authorities to "capture" domestic savings, since the relevant Regulation no. 3603/93 excludes certain measures designed to ensure the financial security of saving schemes "designed for households".

income. Confidence in the Swiss Franc, and banking secrecy, have made up for the loss. Likewise, issuers of sovereign debt have sometimes been able to pay negative real rates because, by comparison with others, there is at least a guarantee that the principal will be repaid on maturity. By contrast, the issuers of "junk bonds" must pay high real rates, given the risk of default.

The degree of risk involved in holding a particular asset is therefore a key determinant of interest rates. A system of classification has been devised to rank bonds – both sovereign and commercial – according to the probability of default. Where default is virtually inconceivable – as, for example, in the case of the European Investment Bank, which has an "AAA" rating – money can be raised at the lowest current rates of interest. Where the investment is highly speculative, and the chances of default correspondingly high, the rate of interest will contain a substantial element of "risk premium".

3.6. Repo, Discount and Lombard Rates

Three short-term rates are commonly associated with Central Banks' monetary policy.

The first is the **"Repo Rate"** – repo standing for "sale and repurchase agreement". When a bank, or a financial institution, does a "repo" it sells a security (for example a bond) and, at the same time, agrees to repurchase it at a future date. This means that the bank borrows money from the investor, offering securities as collateral. The difference between the repurchase price and the original purchase price is the Repo-rate. For most Central Banks the Repo-rate is one of the main indicators of the monetary authorities' interest-rate stance.

The **Discount**[13] **Rate** is that at which the Central Bank lends money to other banks. It is, however, seldom used, and is often associated with emergency loans to banks.

The **Lombard Rate** is that charged by a bank when giving a "Lombard loan" to a client. Such a loan is usually conditional upon the presentation of collateral that, for example, can be made up of shares that are quoted on the stock-exchange or bank assets that are easily transformed into cash. Only non-speculative assets originating from low-risk countries are accepted.

3.7. The European Central Bank's key interest-rates

The ECB uses three main money market interest-rates:

- a Repo rate called the Marginal Refinancing Rate (MRR);
- a Deposit Rate (DER); and

[13] The use of the word "discount" in this context is possibly confusing. Its economic sense is that described in Box 1: i.e. estimating the present value of an asset using the interest rate – or expected interest rates – payable until its maturity. More popularly, shops sell at "discounted" prices: i.e. reduced prices.

- a Marginal Lending Rate (MLR).

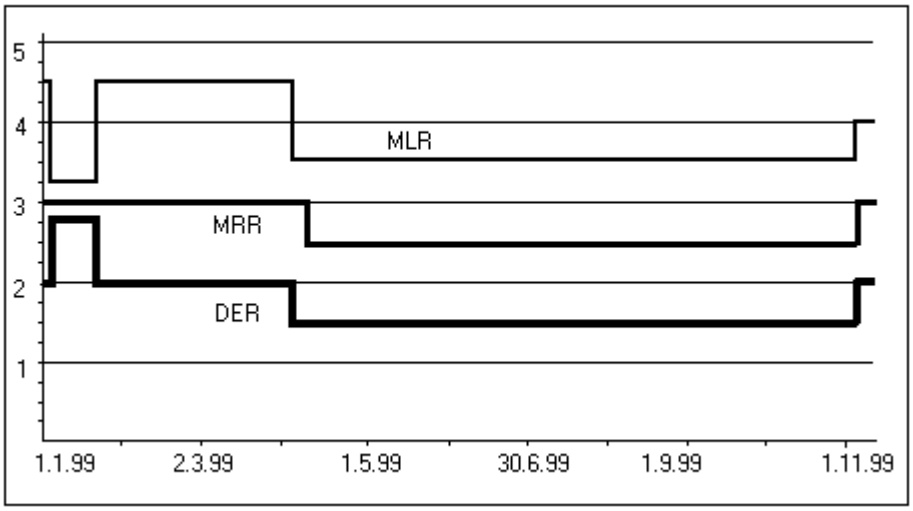
The **MRR** is the rate used when the ECB undertakes refinancing operations, and is a fixed-rate. Between the 24th of May and the 23rd of June 1999, for example, the ECB made five main refinancing operations, all at the fixed rate of 2.5%. However, there is currently speculation that the ECB will switch to a variable MRR in the future (which was the policy of the *Bundesbank*).

The **DER** is the pre-specified interest-rate given by the ECB to counterparties[14], on their own initiative, which make overnight deposits at the ECB. Similarly, the **MLR** is the pre-specified interest-rate charged by the ECB when counterparties, on their own initiative, use the Central Bank's service of providing overnight credit.

In normal circumstances, the DER provides the **floor** for the overnight market rate, while the MLR similarly provides the **ceiling**.

The interest rate for euro transactions carried out by the ECB is obtained by constructing a weighted average of the most representative rates on the domestic money markets of the countries whose currencies make up the euro area

Chart 2: ECB Interest rates since 1 January 1999



Source: Eurostat

[14] These are financial institutions which have been identified by the Central Bank as suitable channels for operations involved in conducting monetary policy. For details of the system see "Eligible assets in the Eurosystem – Eligibility criteria and approved procedures" (*Deutsche Bank Research, October 20, 1999*).

4. Assets and Financial Markets

The capital assets that are bought and sold in an economy are of many kinds. Some are physical: metals (gold, silver, platinum, vanadium); commodities (oil, wheat, coffee, cocoa, pork-bellies); works of art and collectors' items (Old Masters, Impressionists, antiques, jewelry, postage stamps); and, of course, real estate (land and buildings).

Others are financial assets: bills, bonds, stocks, shares, insurance policies, mortgages, etc. Some of these pay interest in the traditional sense (e.g. mortgages and bonds). Some pay variable dividends, depending upon the profitability of the asset (shares).

At first sight, a basic distinction between physical assets and financial assets would seem to be that the (hoped for) return on the former will take the form of capital appreciation – i.e. a rise in the price; whereas the return on the latter will take the form of annual interest or dividend payments. As we have already seen in the case of equities and "zero coupon bonds", however, this distinction is, at the least, very blurred.

Moreover, not only can annual payments be taken in the form of capital appreciation, but capital appreciation can also be taken in the form of annual payments – so called "peeling off". For example, a particular fund – which might consist partly of gold, partly of commodity futures, partly of equities and partly of bonds – might be managed so as keep its real capital value constant, with any capital gains being distributed as income.

A more useful system of classification, therefore, is based on the *liquidity* of assets: that is, how easily they can be turned into consumption.

4.1. Money

The most liquid form of asset is clearly money[15]. In the form of coins, notes and now electronic credit it is immediately exchangeable for goods and services, as well as fulfilling its other functions as a store of value and a unit of account.

In origin, money was as often as not also a commodity, like the fish in the story: copper, gold and silver also had uses in manufacturing or art. Today, currency generally takes the form of "fiat" money: that is, paper or credit accepted in payment because is it backed by the state. In the context of monetary policy, cash forms the most basic element of the money supply: M0, sometimes described as "high-powered money".

Normally, cash holdings do not attract interest. In a number of special contexts, however, they do produce a yield, which can be expressed as interest. Central banks, for example, earn an income in the form of *seigniorage* from the bank notes they issue.

"Money" can also be more broadly defined to include bank deposits: both current accounts, which may pay interest, and deposit or savings accounts, which practically always do. There is, indeed, a whole range of money-supply definitions, (M1, M2, M3, M4, etc.), depending on

[15] It might be argued that only money which is "legal tender" is truly liquid, since only in this case is there a legal obligation to accept it in settlement.

degrees of liquidity and whether the deposits are "retail" (held by individuals) or "wholesale" (held by corporate bodies). The definitions are in a constant state of flux, as financial markets change.

The "money multiplier" – that is the extent to which any quantity of "high-powered money" (M0) is reflected in a quantity of "broad money" – is also liable to change. Between 1968 and 1994, for example, the ratio of M0 to M4 in the UK rose from 1:6 to 1:26.

4.2. Bills

The term "bill" is used to cover a security with a relatively short maturity – generally up to nine months. The yield is usually obtained, not through the regular payment of interest, but through discounting (see Box 1). Bills can be issued by local, state or national governments (when they are termed "t-bills"); or by private bodies ("bills of exchange", for example, are the traditional means of financing international trade).

4.3. Bonds

A bond is a written promise to pay a certain sum at a specified future date - typically 5 to 10 years - and to pay a certain annual rate of interest (the "coupon") during its lifetime. It is the principal vehicle through which markets exist in assets representing public or corporate debt.

One class of government bond has no maturity date, but continues to pay interest until a decision is taken to redeem. In inflationary times, the capital value of such assets can rapidly erode, enabling the issuing government to "monetise" its debt. This contrasts with the effect of inflation in the case of bonds with a fixed maturity. Though the capital value of these will also be eroded, the debt will usually have to be re-financed on maturity, and investors will then demand a much higher coupon. The end of this line is a downward spiral of higher interest rates and shorter maturities, leading to default.

The return on some corporate bonds, "convertibles", can in part comprise an option to buy shares in the company concerned at a particular price and time. But, as debt, corporate bonds represent a prior claim on a company's assets: e.g. in the event of liquidation, the bond-holders get paid before the shareholders.

4.4. Shares

Although, like bonds, shares are traded in markets, they represent ownership of a corporate body's *equity* or stock rather than debt owed by the body.

Price movements in the equity markets reflect large numbers of variables: expected future earnings, credit-worthiness, the current or expected economic climate, "sentiment", etc. The effects on equity prices of interest-rate changes alone are complex. On the one hand, higher interest rates can mean that dividends must keep pace with bond yields, resulting in a fall in price. A rise in interest rates will also mean that bonds become "cheap", resulting in a switch

away from equities. On the other hand, if higher nominal interest rates are the result of rising inflation or inflationary expectations, equity prices – representing real assets and income flows rather than money debt – can also rise.

In any case, different sectors of the economy – and hence the equity of companies – can vary in their sensitivity to cyclical factors and associated short-term interest rate changes. The turnover and profitability of sectors close to the consumer – for example, retailers, leisure groups, etc. – will be immediately affected by the easing or tightening of consumer credit. In sectors like telecoms or pharmaceuticals, by contrast, other, non-monetary factors will be relatively more important: for example, the pace of technical advance.

4.5. Derivatives

Bills, bonds and equities can de described as the "classical" financial instruments. In modern financial markets, however, a large proportion of trading is in "derivatives": that is, in often mathematically complex financial products based on underlying assets. The most common derivatives are futures, options and interest rate or currency swaps. They have all developed as ways of hedging against risk in financial markets. But trading in options can also be highly speculative, with large gains or losses to be made.

Futures contracts are, traditionally, the way in which commodity trading takes place. They take the form of agreements to buy a certain quantity of a product – coffee, cotton, orange-juice, etc. – at a particular date and at a pre-determined price. In origin they were a way of ensuring, for example, that a manufacturer could plan production on the basis of a known price for raw materials; or that a farmer could guarantee an income from a crop before actually harvesting.

Options are financial products of more recent origin. They take the form of a possibility to buy, or to sell, a particular asset at a particular price on some future date. The holder of the option does not have an *obligation* to exercise it; only the issuer to trade if the option is exercised (see Box 2). The function of options is to limit downside risk without limiting the possibility of upside gains.

Interest Rate Swaps, have as their the main purpose the limiting of risk to the financing of an investment, or to the returns from a holding, resulting from changes in interest rates. Typically they takes the form of exchanging the difference in payment streams from two different assets, one paying on the basis of fixed interest, the other a floating rate. If interest rates rise, the value of fixed interest rate assets falls. Contrariwise, the cost of borrowing *via* floating-rate debt rises. Hence swapping liabilities spreads the risks.

Currency swaps fulfil the same function in spreading the risk of exchange-rate movements. Typically, two banks with matching exposures – i.e. obligations to make similar payments, but in two different currencies, at some future date – will swap the risks. Without the swap, any movement in the exchange rate of one currency against the other would make windfall profits for one bank, but losses for the other. The swap means that the banks neither lose nor gain.

Box 2: Options Trading

Call options. I buy an option for €100 to buy 1000 shares in a company, at €10 a share, in one year's time. If by then the market price is €12, I exercise my option, obtain 1000 shares for €10 each (€10,000 in total), sell them for €12,000, and clear a profit of €1,900 (€2,000-€100). If, on the other hand, the price in a year's time is below €10, I do not exercise the option, and lose my €100 investment.

Put options. I buy an option for €100 to sell 1000 shares, at €10 a share, in a year's time. If by then the market price is €8, I exercise my option, buying the 1000 shares on the market for €8,000, selling them for €10,000 and clearing a €1,900 profit. Again, if the price rises above €10 instead, I lose my €100 investment.

Of course, I do not need to keep the option until the time comes to exercise it. If it begins to look that exercising it might turn out to be profitable – but if I have doubts or need the cash – I can make a small profit by selling the option for, say, €500. Likewise, if it begins to look as though it might not be worth exercising the option, I can cut my losses by selling it for, say, €50. And if I know something other traders don't I may be able to pick up eventually profitable options cheap from those who are selling.

From the point of view economic management, and the impact of interest rates, an important feature of derivatives trading is the degree of *leverage* involved. For example, in the case of the call option outlined above, I would need to invest €10,000 from the start to clear the €1,900 profit through normal trading. But through the options market I need only invest €100, or perhaps even less. This means that, if I have, say €1 million to invest, only that sum is in play in normal trading: but in the options market, the sum is €100 million or more. This feature can increase the volatility both of the derivatives markets themselves, and the primary markets on which they depend. If trading is largely carried out on the basis of large-scale borrowing, it can also increase the risks of default and systemic collapse.

The pricing of options, however, provides a useful indicator of the *degree of current uncertainty* that exists in the market concerning future interest rate and other developments. As explained in the ECB's December *Monthly Bulletin* (Box 4), this can be deduced from the implied volatility of short- and long-term rates incorporated in option prices.

4.6. Real Estate and other physical assets

Assets like real estate (buildings and land), antiques and paintings can generally be considered to lie at the far end of the liquidity spectrum – selling a house or an Old Master can take a long time. On the other hand, they can rapidly become liquid if used as collateral. For this reason, as

well as their inclusion in mixed funds and other portfolios, they also play a part in any consideration of interest rates.

4.7. Asset price structure and movement

Within and economy, therefore, there exists a wide variety of assets, of differing liquidity, with which are associated a spectrum of interest rates or asset prices.

On the *supply* side these assets are generally differentiated by *product*: bond, equity, physical asset, etc.

But on the *demand* side the most useful differentiation is by *customer*: financial institution, large or small company, private investor, etc. The response of a large financial institution like a pension fund to changing monetary conditions is likely to be different from that of a small private investor.

In many countries, for example, the single most important asset owned by a large proportion of families is a house. If they have a variable-rate mortgage, this makes them particularly sensitive to short-term interest rate changes; and, at the same time, susceptible to the "wealth effect" of rising or falling house prices[16]. The investment manager of a large fund, on the other hand, needs to carry out a complex balancing act between yield, risk and capital appreciation, as well as tasks such as exercising voting rights as a major proxy holder of equity, and maintaining a favourable public image.

This means that forecasting the effect of a particular event on an economy as a whole cannot be an exact science. A change in the price of a short-term asset will "ripple" through the markets, encouraging shifts in the make-up of portfolios.

Moreover, as important as the price-change itself will be the expectations it creates of *future* changes (see 6.1). For example, a rise in short-term interest rates can be seen as a sign that more rises are to come; or that a necessary "correction" has been made, and that the next movement will be down. Current effects will depend upon the balance between, and the relative market power of, the opposing schools of thought.

[16] When prices rise, they feel richer and spend more freely; when they fall, they feel poorer, and cut consumption.

II. INTEREST RATES IN PRACTICE

5. The Determination of Short-Term Interest Rates

The quick answer to the question: who sets short-term interest rates? is a simple one. It is the monetary authority of the economy in question. In the U.K., for example, it was until 1998 the Chancellor of the Exchequer, and is now the Monetary Committee of the Bank of England. Within the euro-area it is, for all eleven participating countries, the Governing Council of the European Central Bank.

The transmission mechanism by which these decisions feed through into the financial markets and the real economy, however, is a much more complicated matter. So are some key questions: *why* do monetary authorities decide on particular interest rate changes? And do they really have much choice; or are they, too, largely responding to market forces?

5.1. Monetary policy instruments

In the conduct of monetary policy, a Central Bank has at its disposal a number of instruments, most of which depend upon setting or influencing interest rates.

First, the **discount and other rates** set by the Central Bank will feed through into the financial system. The Bank is the "lender of last resort" in an economy, and can determine the short-term rate floor and ceiling. Decisions on interest rates by a Central Bank also act as signal to the financial system, which tend automatically to move their rates in the same direction.

This is because Central Banks can re-enforce their interest rate "stance" by other means.

A Central Bank is usually the **monopoly supplier of cash** to the financial system of an economy. It can therefore set interest rates by the way in which it makes that supply. It can make fixed amounts available at a fixed rate of interest, "rationing" the supply between the bidders according to some key. Or it can auction a fixed amount, which is allocated to the institutions offering the highest rate of interest. The buying or selling of Treasury Bills or bonds - **open market operations** - will have the effect of raising or lowering their price: i.e. of lowering or raising the interest rate.

Further instruments which can directly effect the degree of liquidity in a financial system, and hence interest rates, include changing **minimum reserve requirements**. These are legal obligations placed upon banks to hold a certain amount of liquid assets, like Treasury Bills. Central Banks can also remove liquidity from a system by requiring financial institutions to make **special deposits** with the Central Bank. This mechanism can be useful, for example, when it is necessary to "steralise" money which has been issued (i.e. created) to support a currency in the foreign exchange markets.

The setting of short term interest rates by the monetary authorities of a particular economy is, therefore, in part a matter of direct decision, and in part the exercising of "leverage" within the financial system

5.2. The standard model

Within the euro area, the primary purpose of such changes in short-term interest rates – as with the use of other monetary instruments – is to maintain price stability. This arises from the clear statement in the Treaty that this must be the overriding priority for the European System of Central Banks.[17]

Any rise in the rate of inflation – or, more important, in the *expected* rate of inflation – is therefore likely to trigger a higher short-term interest rate. This should have a number of economic effects.

- By raising the returns on bonds and similar assets – i.e. reducing their price – it will *change liquidity preferences*. Citizens will prefer to save rather than spend, so reducing consumer demand. This, in turn, will reduce inflationary pressures.

- Higher short-term interest rates, feeding through into the financial markets, *will raise the cost of borrowing*. This, in turn, will result in the deferral of marginal investment decisions, likewise reducing inflationary pressures.

At any one time the monetary authority will hope to set short-term rates at a "neutral" level: that is, one which is just sufficient to prevent future inflation, but not so high as to choke off economic growth and raise unemployment.

This simple model[18], however, must be qualified by a number of complexities.

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[17] The tasks of the ESCB are defined by Article 105 of the Treaty. Paragraph 1 states that

"The primary objective of the ESCB shall be to maintain price stability".

It will also be required to

"*support the general economic policies of the Community"* provided that this is "*without prejudice to the objective of price stability";* and to act *"in accordance with the principle of an open market economy with free competition, favouring an efficient allocation of resources, and in compliance with the principles set out in Article 3a".*

This latter Article requires the adoption by the EU of

"*an economic policy which is based on the close coordination of Member States' economic policies, on the internal market and on the definition of common objectives, and conducted in accordance with the principle of an open market economy with free competition."*

[18] Which can be expressed diagrammatically as $M \downarrow \Rightarrow i_r \uparrow \Rightarrow I \downarrow \Rightarrow Y \downarrow$ where M is the money supply, i_r the interest rate, I investment and Y aggregate demand.

5.3. Differing policy objectives

First, it is by no means universally agreed that short-term interest rates, or monetary policy in general, should be used only, or even primarily, to maintain price stability. Though the remit of the ECB gives only subordinate status to supporting *"the general economic policies of the Community"*, this is not the case with other Central Banks. In the case of the United States Federal Reserve, for example, real economic factors – growth and employment – are given equivalent weight.

One sharply alternative primary objective, for example, might be **the maintenance of full employment**. Early so-called "Keynesean" policies indeed aimed to secure this by expanding the money supply as far as was necessary to accommodate the demands of the real economy for cash. Interest rates were kept at the lowest possible level to facilitate investment[19].

It might also be argued that any activist policy with regard to interest rates is unwise: either raising them aggressively with the objective of "squeezing out" inflation, or of cutting them sharply to stimulate demand. Like fiscal policies based on "fine tuning", knowledge of the time lags and transmission mechanisms (see below) involved may be insufficient to prevent such policies being pro- rather than anti-cyclical: i.e. to prevent them making matters worse. The search for **a neutral level of short-term rates** will always be hampered by incomplete statistics, imperfections in economic models and, of course, "events"[20].

In such circumstances, the objective of monetary policy could also be defined as **real interest rate stability**. Changes in *nominal* short-term interest rates would in principle only be made so as to keep *real* interest rates constant at some agreed level.

In any case, it is in practice extremely difficult to make the setting of interest rates a purely technical matter. In the United Kingdom, for example, one of the most often-heard arguments against membership of the € area is that the setting of short-term rates is far too politically sensitive to be left to "un-elected bankers in Frankfurt".

Even within the euro-area itself a lively debate took place during the early months of 1999 as to whether the ECB should cut interest rates so as to stimulate the core economies of Germany, France and Italy. Though the ECB stoutly maintained that its decisions would be taken on purely anti-inflationary grounds; and though the chief proponent of a "Keynesean" stance, German Finance Minister Oskar Lafontaine, lost his job; nevertheless, the short-term rate was indeed eventually cut (see Section 7).

[19] Though Keynes himself had of course observed that, where demand was deficient, reducing interest rates to stimulate investment was like "pushing on a piece of string". In these circumstances, the answer had to be public investment.

[20] The UK Prime Minister of the late 1950s and early 1960s, Harold Macmillan, was once asked by a journalist what he most feared. "Events, dear boy", he replied. "Events".

5.4. Transmission mechanisms

The effectiveness of short-term rate changes in achieving a particular economic result depends to a considerable extent on the way in which, and the speed with which, they feed into the real economy: i.e. on transmission mechanisms. Empirical studies, for example, have shown that, before the start of EMU Stage 3, significant differences existed in the effect of similar interest rate changes in EU Member States.

These studies have outlined a number of significant factors: for example, **the sources of corporate finance**; the **level and structure of household and corporate debt**; and the degree **of competition in the financial services industry**.

5.4.1. The sources of corporate finance

Any change in the authorities' monetary stance is likely to affect financial and commercial bodies differently **according to their size**. Small firms, for example, will have less internal liquidity, and be more dependent on external finance. This makes them more sensitive to a monetary "squeeze", or to monetary relaxation.

A further critical factor is the extent to which firms are financed **by banks, as opposed to capital markets.** The contrast between Continental Europe on the one hand – where banks play a major role – and the UK and US on the other – where finance is generally raised through the markets – is frequently highlighted. For example, the banks' share of non-financial enterprises' debt liabilities has been around 80% in Germany, 50% in the UK and 30% in the US. The variation in the speed of transmission works through the relationship between a bank and its customers.

> *"When lending is organised in a competitive securities' market, lenders have no reason to cushion the effect on the borrower of a change in policy-determined interest rates. Instead, a bank which appreciates the long-term relationship with its customer will be prepared to absorb, at least temporarily, some of the consequences of an interest rate hike…."*[21]

5.4.2. Household and corporate debt

Where the **level of consumers' indebtedness** in an economy is high, a rise in short-term interest rates can be expected to lead quickly to reduced consumption, as disposable income net of debt-servicing is cut. Contrariwise, where the level of household debt is low, but the level of savings invested in **government debt** is high, a rise in interest rates can lead to *rising* consumption, as disposable incomes rise.

This factor helps explain why an increase in short-term interest rates has apparently depressed consumption in high *private* debt countries like the UK and Sweden, but boosted it in high *public* debt countries like Belgium and Italy.

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[21] Favero and Giavazzi (1999) *Monetary Policy Transmission in the Euro Area* , European Parliament, DGIV, ECON 101, April 1999, p.7.

Likewise, variations in the **maturity and nature of corporate debt** have important consequences. In countries with a history of relatively high inflation – for example, the UK and Italy – much borrowing is short-term: that is, changes in official interest rates are rapidly passed on through re-financing or indexation. By contrast, borrowing in countries with a record of price stability – notably Germany – tends to be longer-term, and at fixed rates of interest.

5.4.3. Competition in the financial services industry

Where competitive pressures are high, changes in short-term interest rates rapidly feed through to the securities markets. Where they are low, there can be considerable time-lags. Studies in the early 1990s[22], for example, showed that a change in the money market rate had entirely fed through to ordinary borrowers after 3 months in the Netherlands and the UK. In France, Italy, Spain and Germany, however, the figure was only around 50% after 3 months; and in France it was only just above 50% after 6 months. A similar study by the IMF in 1996[23] found that "a 100 basis point increase in the policy rate raises bank lending rates by 45 basis points in Germany, 51 in France and 75 in Italy".

5.4.4. Conflicting effects and the "Lucas critique"

But the complex characteristics of a modern economy in any case make it difficult to disentangle often conflicting effects. It might be expected, for example, that economies in which capital goods account for a comparatively large part of GDP – for example, Germany – would be particularly sensitive to interest-rate changes through their effect on investment decisions. On the other hand, where bank-finance to companies takes the form of long-term loans at fixed rates of interest – again as in Germany – one would expect the effect of an interest rate rise on the real economy to become apparent only after a considerable time-lag.

Likewise, where variable-rate mortgages play an important role in the economy – as in the UK – a short-term interest-rate rise can result in an almost immediate rise in current housing costs; but also in a downward pressure on house prices.

Any studies based on pre-January 1999 statistics are also vulnerable to the "Lucas critique": namely that the behaviour of financial markets is likely to change substantially precisely as a result of monetary union.[24] As ECB Vice-President Christian Noyer told the European Parliament's Economic and Monetary Affairs Committee on 27 September 1999, developing an accurate model of monetary transmission mechanisms within the € area is still at an early stage. Convergence both within the € area itself, and within the wider Single Market (comprising not just the EU, but in varying degrees the EEA, EFTA and candidate countries), may in due course modify all the factors outlined in *5.4.1* to *5.4.3* above.

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[22] See Cottaralli and Kourelis (1994) and Borio and Fritz (1995).

[23] *World Economic Outlook*, Washington DC, October 1996.

[24] For a more detailed treatment of this issue, see *Adjustment to Asymmetric Shocks* (European Parliament, DG4, Economic Affairs Series ECON-104)

Finally, there is in any case considerable disagreement about the effect of changes in short-term interest rates on investment decisions – a key factor in the standard model. A rise is short-term rates might be expected to lead to a rise in long-term rates and a fall in investment. But if a rise in the short-term rate has the effect (as it is meant to) of reducing inflationary expectations, long-term interest rates may actually fall and investment rise (see 6.1). Certainly there is some evidence of a contrary effect: i.e. a *failure to raise* short-term rates leading to a rise in inflationary expectations and in long-term rates, causing a fall in investment.

5.5. Globalisation and the exchange rate

One further cause of uncertainty is that national economies are increasingly open to international financial markets. Internal monetary conditions can be strongly influenced by external factors.

The volume of "footloose" short-term capital on world markets is over 30 times the amount required to finance world trade. The flows of such funds affect economies in at least two ways.

- An inflow/outflow of investment into/out of the bond markets will result in a rise/fall in bond prices, and hence a fall/rise in long-term interest rates (see section 6); and
- Such flows will also affect the exchange rate, and hence domestic monetary policy.

A fall in the external value of a currency, for example, can be expected to have a number of potentially inflationary consequences. The price of imports will immediately increase, and will feed through into the general price level to the extent that demand is price inelastic. At the same time, demand for exports will rise, reinforcing inflationary pressures.

Likewise, a rise in the value of currency may be expected to have deflationary effects, as import prices and demand for exports decline. This explains the efforts of the Japanese authorities in late 1999 to limit the rise of the Yen against the Dollar at a time when the economy was only just recovering from a major recession.

In conditions where exchange rates are not fixed, therefore,

> *"the exchange rate channel will usually add to the interest rate channel and magnify the impact of monetary policy"*[25]

Theoretically, exchange-rate movements take place to correct disequilibria in trade and capital flows, and have overall benign effects. Again theoretically, market rates will tend towards the Purchasing Power Parity (PPP) rate, where real price levels are identical in all economies.

Unfortunately, empirical evidence does not lend much support to these theories. In conditions where vast sums of capital can move rapidly between economies, there is a persistent tendency for the markets to overshoot any correction justified by economic fundamentals. Some analysts have even concluded that at least short-term movements are better predicted by "random walk" theory than by the correction of disequilibria.

[25] Commission paper (1998).

The relative level of interest rates is nevertheless one clearly significant factor in determining a currency's external exchange rate. Differences between countries – arising, perhaps, from purely domestic monetary considerations – can trigger large capital flows as investors seek to place their funds where returns are highest. This, in turn, will result in a fall in the exchange rates of the countries of outflow, and a rise in the exchange rates of the capital importers

The expected return from such movements, however, will not derive exclusively from interest-rate differentials, but also from anticipated parity changes. The attraction of a relatively high interest rate can be offset by the perception that the currency in question is likely to depreciate. Nominal interest-rate differentials, in other words, must be *discounted by the markets' expectations of future changes in exchange rates*.

These external factors create certain dilemmas for monetary authorities. On the one hand, it can prove necessary to use short-term interest rates, not to pursue purely domestic monetary policy, but to defend the external parity of the currency. In times of crisis, indeed, short-term rates of 100% or more may be needed to offset the perception in the markets that devaluation is imminent; and this, in turn, can lead to an unwelcome squeeze on the domestic economy and rising unemployment (see Box 3).

On the other hand, a policy of setting rates entirely according to domestic monetary criteria can result in "imported" inflation or deflation through depreciation or appreciation of the currency.

5.6. How open is the € area?

The seriousness of such problems depends critically on a currency area's *degree of openness*, as generally measured by the proportion of GDP accounted for by trade outside the area.

Where the proportion is low, as in the case of the United States (about 10%), a policy of "benign neglect" towards the external value of the currency is feasible. Where it is high, as in the case of most EU Member States before monetary union, exchange-rate movements can prove extremely disruptive. This, indeed, was the main lesson of the ERM crises of 1992-95. Only by creating a single currency area, the external exposure of which was similar to that of the United States, would it be possible to conduct monetary policy, including the setting of interest rates, on the basis of internal requirements alone.

The extent to which the € area, as it now exists, achieves this objective is still not entirely clear. The International Monetary Fund, based on 1996 statistics, has calculated the area's trade *in goods only* at about 12% of GDP. On the other hand, the ECB, in its August Bulletin, put the share of GDP accounted for *by exports only of goods and services* at 17.8% (though a significant proportion of this was to non-€-area EU and to EEA countries).[26]

The December *Bulletin* went into some further detail: exports of goods and services formed some 17% of euro-area GDP (US and Japan 11%), and imports around 15% (US: 13%, Japan 10%). In

[26] This issue is treated in the paper prepared for the European Parliament's Economic and Monetary Affairs Committee by Prof. Daniel Gros in September, 1999.

addition, however, there were significant differences in the three economies' relative openness with regard to other regions.

> *"As a consequence, the euro area, the United States and Japan have different exposure to external shocks transmitted via trade links."*[27]

In any case, whether "benign neglect" is still the policy of the US, and a possibility for the € area, is a matter of debate. Bitter experience has taught the politicians and Central Banks of several countries that defending a particular parity by intervention-buying can lead to massive – and futile – losses. On the other hand intervention to *hold down* a currency, financed by steralised money-creation, can be entirely successful. Such might be the basis of a multilateral system.[28]

Box 3: Interest Rates - the 1992 experience

Short-term interest rates as an instrument of internal monetary policy may conflict with their role in exchange-rate policy. This can be illustrated by the relationship between the £ Sterling and the D-Mark before and after the September 1992 EMS crisis.

One consequence of German re-unification was an internal monetary expansion. To head off inflation, the *Bundesbank* raised German short-term interest rates, which, in turn, led to upward pressure on the D-Mark's external value, notably against the $.

Higher interest rates at first caused no problem for UK monetary policy, since strong inflationary pressures in any case made high nominal interest rates necessary. As inflation fell, however, these increasingly became high *real* rates, which exerted a severe deflationary squeeze on the economy. Internal economic conditions in the second half of 1992 therefore required a lowering of UK nominal rates. But this would have led to an immediate downward pressure on Sterling, which was required to remain within the narrow fluctuation bands against the D-Mark arising from the EMS exchange-rate mechanism.

The tensions created by this situation came to a head in September 1992, when large speculative positions against Sterling were taken in the financial markets. Neither substantial intervention buying by central banks, nor a rise in UK short-term interest rates to 15% were able to convince the markets that the existing Sterling parity was sustainable.

Faced with the choice either of raising short-term interest rates to very much higher levels – which conflicted with the needs of domestic monetary policy – or of allowing a depreciation of Sterling, the UK government chose the latter.

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[27] ECB December *Monthly Bulletin*, Box 8, p.53

[28] This argument is developed by Prof. Peter Bofinger in a second paper prepared for the European Parliament's Economic and Monetary Affairs Committee in September, 1999 (*European Parliament, DGIV, ECON-115)*

6. The Determination of Long-term Interest Rates

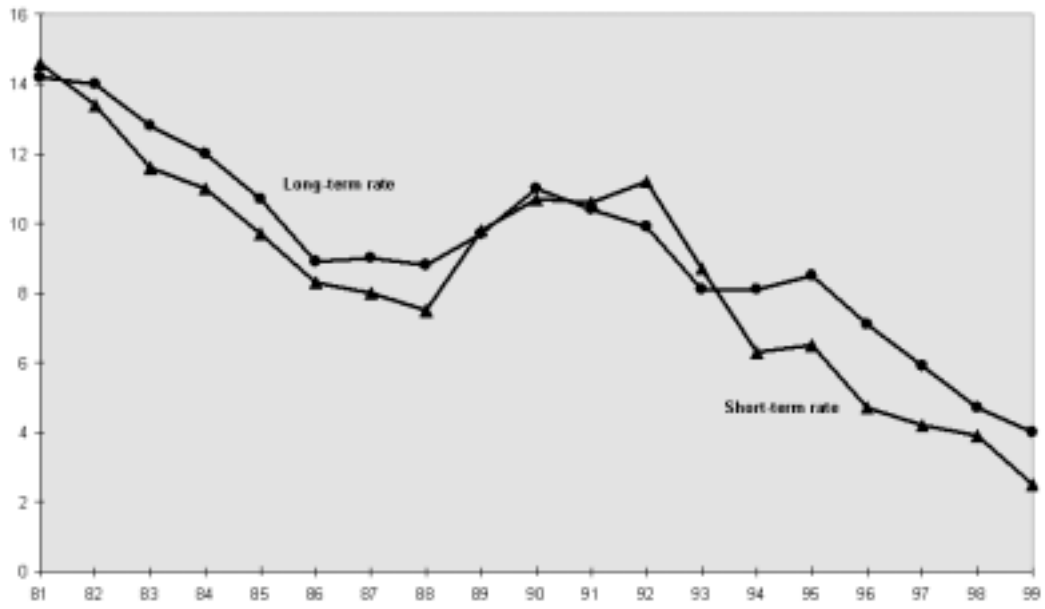
As in the case of short-term interest rates, a quick answer is also possible to the question: Who sets long-term interest rates? The answer is: the markets. However, this answer also conceals considerable complexity. Some key, and interacting, factors can be identified.

6.1. Short-term Rates and Inflationary Expectations

Long-term interest rates will normally be higher than short-term rates. This is because the risks of inflation are likely to increase with time; and also – given the importance, already noted, of international capital flows – because there may also be increasing risks of currency depreciation.

Similarly, short- and long-term rates can normally be expected to move in the same direction. A rise in short rates may have **a "portfolio effect"**: that is, investors redirect their funds to short money market instruments, and away from bonds, thus leading to a fall in bond prices and a rise in yields (i.e. long-term rates). Indeed, empirical evidence *does* show that short and long rates tend to move together (see Chart 3). This has been found to be true also, for example, in the US, where studies[29] have concluded that long rates are sensitive to short-term changes.

Chart 3: Short- and long-term nominal interest rates, € area countries 1981-99



But these assumptions about the relative levels and movements of rates are not always the case. From time to time, for example, the yield on government securities with a long term to maturity

[29] e.g. Cohen and Wenniger (1994) and Lee and Prasad (1994).

can be higher than that on those with a shorter life: that is, the yield curve can slope *downwards*. Such was the situation, for example, in the UK in 1989.

Similarly, a rise (or fall) in short-term rates does not necessarily lead to a rise (or fall) in long-term rates.

The explanation for such apparent paradoxes is the **"expectations effect"**, which a study[30] carried out for the ECB's precursor, the European Monetary Institute (EMI), in 1996 found decisive. When short-term rates changed, there was "no mechanical link to long-rates";

> *"- instead, policy actions will influence long rates to the extent that they affect expectations of price stability."*

Rising short-term rate and falling long-term rates was explained by the "Fisher effect".

> *"…if short-term nominal interest rates were raised by the monetary authorities in an effort to reduce the rate of inflation, this may reduce inflation expectations if the change is seen to be credible. This, in turn, should reduce the inflation premium component of long-term interest rates and may entail a fall in long rates following a rise in short rates."*

It followed that monetary authorities could not automatically affect the real economy by altering long-term rates *via* changes in short-term rates. For example, a cut in short-term rates to boost investment would back-fire if the effect was to raise rather than reduce long-term rates.

Long-term rates are also affected by any *uncertainty* concerning the direction of short-term rates; and the results can be counter-intuitive. For example, the ECB's November *Bulletin* observed that the rise in long-term rates in early October 1999 was in part due to uncertainty about the monetary stance. The rise was immediately reversed on publication of "higher than expected euro area M3 growth data", since this made it virtually inevitable that the ECB would decide on a precautionary increase in short-term rates.

The relationship between short- and long-term interest rates is therefore a matter of considerable uncertainty. As the Commission has observed : [31]

> *"In unregulated financial markets, long interest rates are driven by the interaction of market expectations concerning future developments in inflation, exchange rate, the real economy, monetary policy strategy, and, as a function of these, the future stance of monetary policy…..Depending on the economic (or political) situation, a change in policy rates may be seen as conveying different information, and can therefore have different effects on long rates."*

As for the apparent correlation between movements in short- and long-term rates,

> *"Co-movements can arise from a causal link; but they do not necessarily imply causality."*

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[30] "The Role of Short Rates and Foreign Long Rates in the Determination of Long-Term Interest Rates" by John P.C.Fell. *(EMI Staff Paper no. 4, May 1996).*

[31] "Monetary Policy and Long-Term Interest Rates", Commission DII, May 1998

6.2. Real expectations: evidence from index-linked bonds

Long-term rates therefore reflect interacting expectations on inflation and levels of short-term interest rates. They also, however, reflect expectations about the real economy: notably, the growth of the economy's GDP, of profits and of real asset values. These are reflected in a rise or fall in the demand for capital, and produce changes in *real* long-term rates.

The European Central Bank, in its February 1999 report, drew attention to one possible method of distinguishing inflationary from real economic expectations. Comparisons could be made between the yields on inflation-index-linked bonds and those from normal bonds.

> "*The differential between a long-term nominal bond yield and the real yield available on an index-linked bond of the same maturity is generally known as the 'break-even inflation rate'. This is because, under this rate of inflation, the expected nominal return to an investor will be the same regardless of whether the investment is made in a fixed nominal income or an index-linked bond*".[32]

The method could not be entirely accurate as a result of such factors as the relatively lower liquidity of index-linked bond markets. Moreover, no index-linked bonds had been issued within the € area until the French Treasury issued the OATi *(Obligation Assimilable du Trésore Indexée*) bond in September 1998, which is linked to the French Consumer Price Index, *minus* the price of tobacco.

Using this as the best available indicator, the ECB's September 1999 Report noted that the "break-even inflation rate", having fallen throughout late 1998 and early 1999, had begun to increase again later that year: i.e. that inflationary expectations had started to rise again.

6.3. International markets and exchange rates

The 1996 EMI study concluded that, as the direct effect of changes in short-term rates on long-term rates became less predictable, the influence of foreign long-term rates was becoming more important.

Broadly, the long-term rates of the world's major economies tend to move together, reflecting the overall economic and political outlook and the *arbitrage* exercised by the markets. Thus the ECB's *Monthly Bulletin* for August 1999 showed that the yield on 10-year bonds in the US and the € area fluctuated almost in parallel in the May to July period (see Chart 9).

There was, nevertheless, a significant yield gap between them of some 1.5 percentage points; but this narrowed by about 50 basis points over the period. While US bond yields rose from 5.5% to 6% (i.e. bond prices fell), those of €-area bonds rose from 4% to just over 5%.

The ECB's analysis of these movements over the relatively short period in question illustrates the complexity of the factors involved. The only modest rise in US yields

[32] Box 2 in the *ECB Monthly Bulletin*, February 1999.

"seemed to reflect countervailing influences on market perceptions concerning the longer-term inflation outlook in the United States. While data on consumer and producer price developments, as well as some evidence of a deceleration in the pace of economic activity, seemed to have a favourable influence on bond market developments, indications of upward pressures on labour costs tended to partly offset this. In addition, the recent weakening of the US dollar may also have played an offsetting role".[33]

Added to the "little change" in Japanese bond yields, these international bond market developments were seen as a "benign influence" on long-term bond yields in the € area. In July, however, these were offset by upward pressures which

"seemed to come chiefly from upward revisions to the expectations of financial market participants regarding the pace of economic activity in the euro area, which were linked in particular to indications of improving business sentiments."

Various theories have tried to construct a rational link between long-term interest rates and movements in exchange rates. In the previous section, it was noted that movements of "hot money" tended to take place on the basis of short-term interest-rate differentials, as discounted by the markets' expectations of future changes in exchange rates. Attempts have therefore been made to forecast future exchange rates on the basis of uncovered interest rate parity (UIP): for example, the gap between the 12-month interest rates of any two currencies should indicate the expected annual change in parities after a year.

As the economic journalist Samuel Brittan[34] has observed, however, this theory performs poorly when applied to real foreign exchange movements: for example, between the £ Sterling and the D-Mark/€ since 1996. This does not necessarily invalidate exchange-rate expectations as a determinant of long-term rates – merely the fact that the markets are as likely to get things wrong as to get them right. This explanation would seem to fit the findings of Prof. Goodhardt (1988)[35] that

"the forward exchange rate contains virtually no information on future spot rates".

6.4. Public Sector Borrowing

With the growth of "big government" over the last century, the level and financing of public expenditure has become an increasingly important influence on long-term interest rates. In many economies the available traded bonds have been overwhelmingly "sovereign debt" – that is, borrowing by governments to fund budget deficits.

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[33] *ECB Monthly Bulletin* for August, 1999, p.13.

[34] Brittan, S. (1999), "Uncertain Pound" in the *Financial Times* of 30 September, 1999.

[35] Goodhart, C. (1988). "The Foreign Exchange Market: a Random Walk with a Dragging Anchor", *Economica*, no.55, London School of Economics, 1988.

In such economies, fiscal policy has therefore been as important an interest rate determinant as monetary policy. Several factors have operated.

- Where governments decide to fund budget deficits by borrowing, they must issue new debt: i.e. increase the supply of bonds. This may depress bond prices: i.e. increase interest rates.

- The extent to which this occurs depends substantially on the existing total level of government debt. When this is already high, there is not only the problem of funding new expenditure, but also the continuous need to re-fund existing debt as it reaches maturity. Because high overall levels of debt increase the risks of default, higher levels of interest have to be offered in compensation – the "risk premium". Finally, the need to pay high levels of interest can increase budget deficits even further.

- Rising real interest rates will also affect the private sector of the economy, as borrowing for investment becomes more expensive. If the level of savings does not increase to fund new public debt, there will be a "crowding out" of private investment.[36]

- It is always open to governments to reduce budget deficits by raising taxes. Rising deficits therefore create an expectation of future tax increases, adding a risk premium to interest rates paid on private and corporate borrowing.

- A government can also, however, decide to "monetise" its deficits: that is, to increase the money supply sufficiently to cover the new expenditure. This creates the necessary liquidity to fund new borrowing; but it is also inflationary, and will have an immediate effect on long-term interest rates. These will rise to compensate for the expected fall in the value of the currency.

- As already noted, the initial effect on public finances will be apparently benign: as a result of the "inflation tax", the real total of debt will fall. It will be the first step, however, on the downward spiral of falling credit ratings, higher interest rates and shorter maturities, at the end of which lies default.

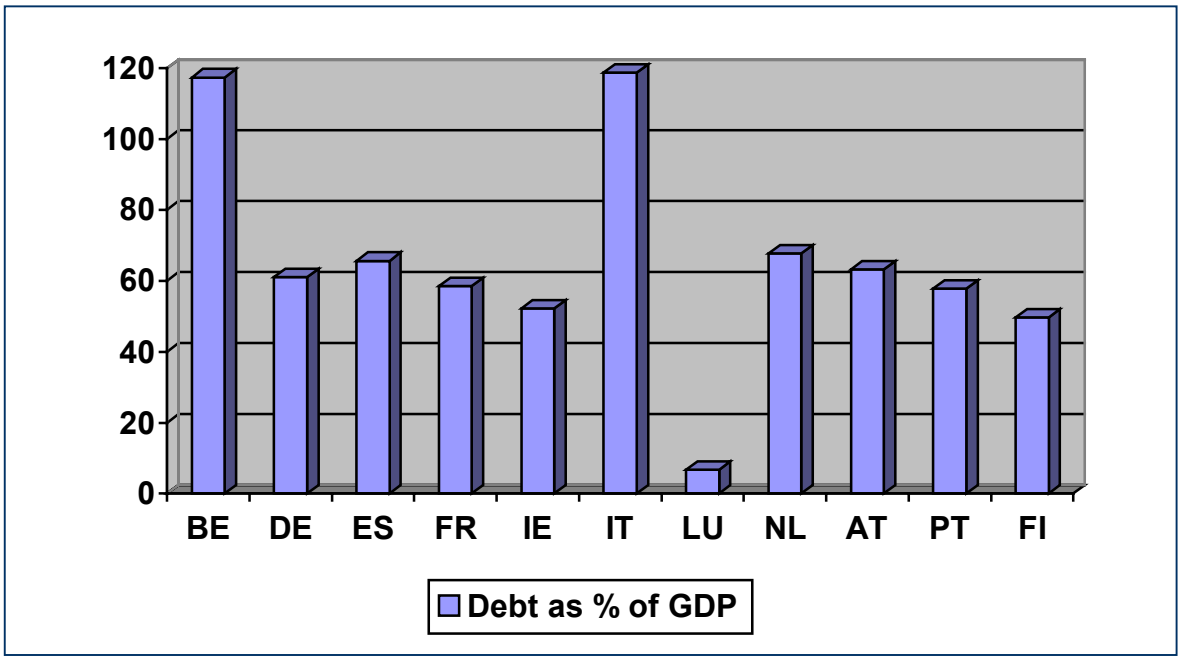
For precisely this reason, all these factors have been blocked or severely curtailed within the € area. All €-area participants must, under Article 109e of the Treaty, "*avoid excessive government deficits*". This is expanded in the Stability and Growth Pact, which requires all participating states to maintain balanced budgets over the economic cycle; and in any case not to exceed 3% of GDP in any one year, except in certain defined special circumstances. Under Treaty Article 104c, non-€-area EU Member States must also likewise "*endeavour to avoid excessive government deficits*".

[36] However, the economic effects depend very much on the extent to which public debt is funded internally. Where this is the case, as in the two EU Member States with debt levels above 100% of GDP, Belgium and Italy, the effect is largely to transfer resources from the citizen as taxpayer to the citizen as bond-holder. (For further analysis, see *The Co-ordination of National Fiscal Policies in the Context of Monetary Union*, European Parliament, DGIV, Economic Affairs Series E-6, 1996).

In the case of overall debt levels, though the "reference value" of 60% of GDP contained in the Maastricht convergence criteria was exceeded by a number of countries, it is understood that all participants will aim to achieve that target in time.

The monetising of deficits is directly prohibited by the Treaty though Article 104[37], and also since the ECB is forbidden to accept instructions on the conduct of monetary policy from national governments.

Chart 4: Gross nominal consolidated debt of €-area countries, 1998



Source: ECB

Finally, there is also a Treaty prohibition in Article 104b[38] on the "bailing out" of any government which finds itself on the point of defaulting. The objective is to prevent "moral

[37] This provides that

> *"overdraft facilities or any other type of credit facility with the ECB or with the central banks of the Member States….in favour of Community institutions or bodies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States shall be prohibited, as shall the purchase directly from them by the ECB or national central banks of debt instruments".*

Watertight though these prohibitions appear to be, it has nevertheless been pointed out that they do not prevent the monetary authorities from intervening in the secondary markets: that is, helping a government to fund its debt by sustaining bond prices.

hazard – a situation in which a bankrupt organisation can nevertheless continue to raise funds, since the market knows that repayment is in the last resort guaranteed by the monetary authorities. The "no bail out" provisions therefore ensures, in principle, that a Member State approaching an unsustainable debt position will find its credit rating falling, and be obliged to pay an ever-increasing "default premium" on its borrowings.

An analysis of developments in long-term real interest rates during the 1990's, contained in the ECB's November *Bulletin*, concludes that the fall in rates during the period can be largely attributed to the adoption of the "stability-oriented monetary and fiscal policies" formalised in the Treaty. Progressively lower rates of inflation had

> *"reduced uncertainty about future price developments and the associated inflation risk premia in long-term real interest rates".*

At the same time, fiscal policies aimed at

> *"improving the sustainability of public finances has reduced distortions in the real interest rate, thereby freeing capital for private investment and allowing the capital market to work moe efficiently".*

6.5. Price/yield levels of other assets

It has been observed in section 4.4. that there are complex interactions between bond prices and equity prices. Though equity yields will normally be below bond yields – reflecting the expectation of capital appreciation – a rising equity market can be associated with either rising or falling bond markets, depending upon the underlying causes.

Long-term interest rates will therefore also reflect the expectations of investors in equities – and, indeed, all the other markets listed in section 4: commodities, real estate, antiques, derivatives, and so on.

The ECB therefore also closely monitors stock-market prices (see its monthly *Bulletins*). Its October *Bulletin* illustrates the often conflicting pressures.

> *"In an environment of improving expectations for economic activity in the euro area, the principal explanation for the volatility in euro area stock prices seemed to have been a spillover of declines in stock prices in the United States during September. In addition, the aforementioned upward movements in domestic long-term bond yields may have placed a downward pressure on stock prices."*

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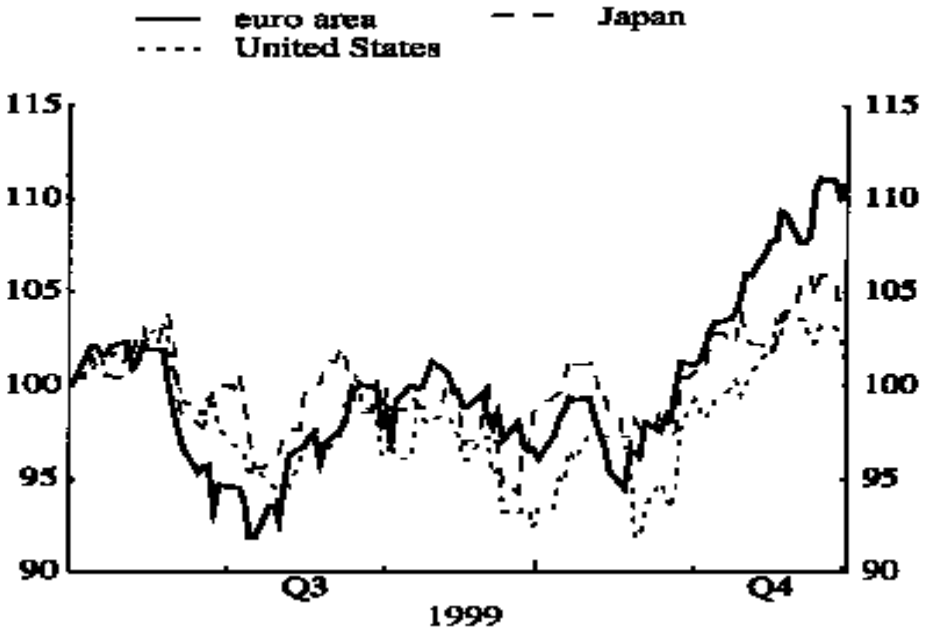
[38] *"The Community shall not be liable or assume the commitments of central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of any Member State, without prejudice to mutual financial guarantees for the joint execution of a specific project. A Member State shall not be liable for or assume the commitments of of central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of any Member State, without prejudice to mutual financial guarantees for the joint execution of a specific project."*

Chart 5: Stock price indices in the euro area, the US and Japan



Sources: Reuters for the euro area; national data for the US and Japan.

Notes: Dow Jones EURO STOXX broad (stock price) index for the euro area. Standard and Poor's 500 for the US and Nikkei 225 for Japan

Stocks, bonds and real estate are not included in Consumer Price indices. Changes in their price can, however, have important indirect consequences for consumer demand – for example, the wealth effect (see 4.7). Rising assets prices can also quickly feed through into the price of capital goods.

Movements in asset prices therefore create a number of problems for the conduct of monetary policy, particular in periods – like the present – where consumer prices are stable, but stock market prices are rising strongly. The risk is not merely that higher asset prices will ultimately be reflected in higher consumer prices, but also that the bursting of an asset price "bubble" will result in a sharp deflation.

Fears of the latter in the United States, where the stock market's capitalisation is currently equal to 128.4% of GDP, have prompted a number of warnings from the US Federal Reserve Bank. In the € area the equivalent figure is so far only 55.1%, making it apparently less vulnerable;[39] but the European economy would not escape the effects of a Wall Street crash.

[39] Figures from the ABN-Amro Bank, quoted in the *Financial Times* of 16 November 1999. By contrast , the

6.6. Long-term rates, demand and growth

The economic forces which determine long-term interest rates are therefore highly complex. Is it nevertheless true – despite uncertainties about the transmission mechanisms - that movements in long-term rates will have a predictable effect on the real economy?

The classical economic model, outlined in section 5.2, asserts that rising interest rates will cause the cost of capital to rise, and hence cause investment to fall. This, in turn, will cause a fall in aggregate demand and output. Similarly, a fall in long-term rates should result in increased investment, demand and output.

Empirical research does, in general, confirm the theory. A study carried out by Thomas Meyer of Goldman Sachs (1999)[40], has shown that a steeper yield curve does depress credit demand, leading to a reduction in GDP growth of around 0.75% for every 1% rise in rates after a time lag of a few quarters.

However, it does not automatically follow that a fall in long-term rates will have a similarly positive effect on growth. Keynes' observation on the matter has already been noted in footnote 19. Recent experience in Japan also shows that even if long rates are low – they have fluctuated between 1 and 2 % during 1998 and 1999 (see Chart 9) – the boost to the real economy has been minimal.

Much also depends on **the structure of an economy**, and the **components of demand**. Interest rate changes feed through at varying speeds to different sectors, with different effects on asset prices (see 4.4). The effect on inventories is more immediate than on capital projects. There can be strong regional variations, reflecting the structure of regional economies.

In any case, it is methodologically difficult to disentangle the economic effects of changes in interest rates with those resulting from often associated changes: most notably, of **fiscal policy**.

At the macro level, for example, the orientations of fiscal and monetary policy may in the same direction. But it also possible for a "tight" monetary policy to be combined with a "lax" fiscal policy, and *vice versa*. At the micro level, the effects of an interest-rate rise on particular sectors can be offset by state aids or tax breaks.

All that can be said for certain, therefore, is that long-term interest rates tend to move in step with movements in the real economy. Which is cause and which effect, however, is not at all certain.

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relative positions in the case of bond markets is reversed, with the US ratioonly 86.4% of GDP, and the € area 150.7%.

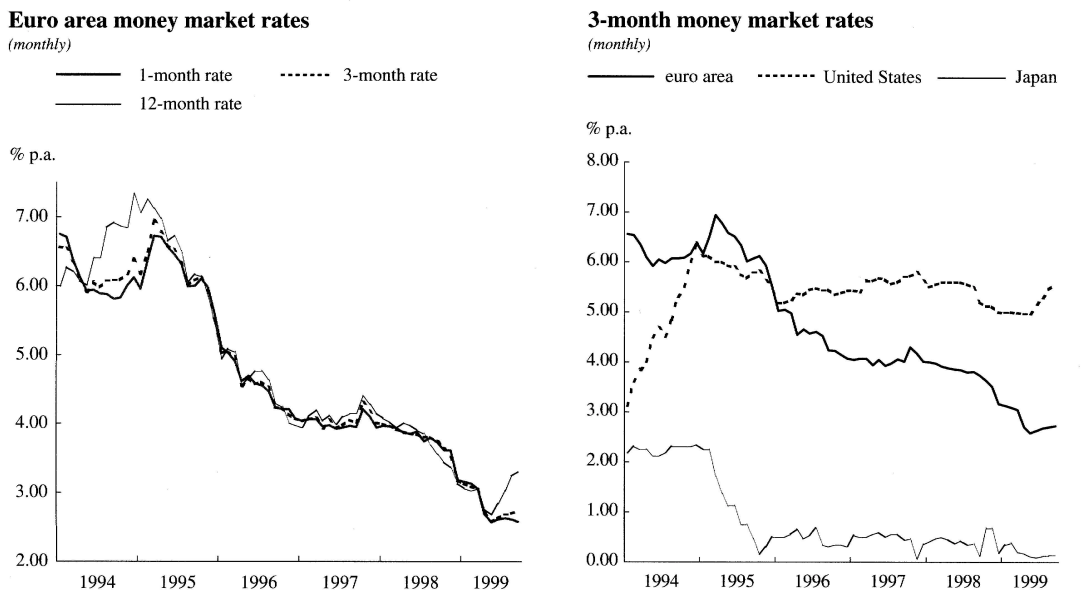
[40] And quoted by Daniel Gros in his paper for the European Parliament's Economic and Monetary Committee (1999).

7. Interest rates within the € area

Since the start of EMU phase 3 at the beginning of 1999, nominal interest rates within the € area as a whole have been at historically low levels. The change has been especially dramatic in certain countries: notably Italy, where the level of public sector debt, a record of currency depreciation and expectations of future inflation had previously kept rates at relatively high levels. The fall in rates, indeed, has been a major factor in enabling Italy to meet the fiscal for € area membership: debt-servicing costs have been reduced (to 7% of GDP), making possible budget deficits below 3% of GDP, a restructuring of the debt's maturity from about 2.5 years in 1990 to about 5.5% in 1999, and a steady reduction in the total.

It must be noted, however, that this is not so true of real interest rates. During the early months of monetary union, during which the ECB set its Repo rate at 3%, real rates in Germany, in particular, actually rose as inflation fell to zero and probably below[41].

Chart 6: Short-term money market rates, 1994-1999



Sources: Reuters and ECB.

1) *Interbank deposit bid rates to December 1998; offered rates thereafter.*
2) *End-of-period rates to December 1998; period averages thereafter.*
3) *Before January 1999 synthetic euro area rates were calculated on the basis of national rates weighted by GDP.*
4) *From January 1999 column 1 shows the euro overnight interest average (EONIA); other euro area money market rates from January 1999 are euro interbank offered rates (EURIBOR).*
5) *From February 1999, London interbank offered rate (LIBOR).*

[41] The "probably" reflects the uncertainties, much discussed at the time, as to whether the existing indices of inflation were leading to an overestimate of the real rate – for example, by failing to take full account of changing product quality and by excluding certain transactions.

7.1. The ECB's short-term rates

The structure of the interest rates set by the ECB itself has been outlined in section 3.7. The application of the system, and the surrounding course of events, is outlined below.

7.1.1. December 1998 to November 1999

The new system effectively began on 3 December 1998, when all the national central banks of the eleven participating countries decided on a co-ordinated reduction of their key lending rates to 3%[42].

The first official setting of rates by the ECB's Governing Council took place on 22 December 1998, applying when trading opened on 4 January 1999. The fixed tender rate (MRR) was to remain at 3% "for the foreseeable future". For a transitional period, the marginal lending rate (MLR) was set at 3.25% and the deposit facility rate (DER) at 2.75%, so as to set a narrow interest rate "corridor" while markets adjusted. From 21 January the MLR was set at 4.5% and the DER at 2%.

The Governing Council meetings in January and February confirmed these rates. Figures for December 1998 had showed money supply (defined as M3) growing at 4.7% p.a., "close to the reference value of 4.5% per annum set by the Governing Council". Inflation for 1998 as a whole had come in at only 1.1%.

At the beginning of March, the Bank maintained the same rates. Its *Bulletin* for the month observed that there was

> *"an absence of significant pressures on prices – either upwards or downwards – which would have warranted a change in the monetary policy stance".*

At the same time, however, the Bank noted other developments, which pointed in different directions. The January monetary data had shown M3 growing at the rate of 5.7% - though the Bank did not consider this "a signal of upcoming inflationary pressures". At the same time, there were signs of a "sizeable slowdown" in economic growth: production in the manufacturing sector had fallen by 1% in the last quarter of 1998. There were increasingly outspoken political pressures – notably from German Finance Minister Oscar Lafontaine – for a cut in interest rates, which the Bank discretely described as "increased uncertainties about the political support for a stability-oriented monetary policy".

At the beginning of April the Bank decided on a significant interest rate cut. MRR went down to 2.5%, MLR to 3.5% and DER to 1.5%. There were, the Bank said in its April *Bulletin*, "subdued inflationary pressures", while M3 growth in February had declined to a rate of 5.2%. Meanwhile, forecasts for economic growth in 1999 and 2000 were being revised downwards. Even so, Bank President Wim Duisenberg notably remarked when announcing the rate cuts: "This is it!"

Throughout April and May the indicators for inflation and money supply were sufficiently stable for the Bank to maintain existing interest rates. Meanwhile, however, media and public attention

[42] In the case of Italy the initial reduction was to 3.5%, with a further fall to 3% on 23 December 1998.

was focussing on events in the foreign exchange markets. The Bank's May *Bulletin* had noted "volatility" in the euro's external value, which it in part attributed to the military conflict in Kosovo. By the end of May, however, the € had declined to a rate of $1.04, and by July speculation was growing that it would soon be at parity (see Chart 10). The apparent "weakness" of the € had been an issue in the June elections to the European Parliament (but see section 7.5 below). On the other hand, data were pointing to a recovery of economic growth in the second half of 1999, and M3 was beginning to rise again. "Credit to euro residents continued to expand at a robust pace", observed the July *Bulletin*.

Parity with the $ was not reached; and in July the € recovered to $1.08. Inflation remained at a very low level and M3 growth declined; but long-term bond yields began to rise as the prospects for economic expansion improved. The Bank maintained the existing interest rates.

By September, however, members of the Bank's Governing Council were beginning to talk about "upward risks to price stability", and a "tightening bias" in monetary policy. Bond yields had continued to increase, and the July figures showed M3 rising once more at the rate of 5.6%, "moving away from the reference value of 4.5%".[43] August figures showed a marginal increase in the rate of inflation, to 1.2%. Nevertheless, the existing interest rates were maintained throughout both September and October.

The expected interest rate rises were announced on 4 November 1999: a 0.5 percentage point increase in all three rates. The rise of a full 50 basis points, the November *Bulletin* explained, *"would avoid the need for stronger measures later"* and would "*contribute to reducing any uncertainty premia potentially prevalent in financial markets"*. In the July to September period, M3 had risen at the rate of 5.9%, almost 1.5 percentage points above the reference level. "The strong growth of the most liquid components of M3 is particularly noteworthy" the Bank President observed[44]. Moreover, the growth of M3 had been accelerating from an annualised figure of 5.7% in August to 6.1% in September.

7.1.2. Some analytical considerations

These events provide indicators to the Bank's interest rate policy. The ECB's "stability oriented monetary policy strategy"[45] defines "price stability" as

> *"a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%"*.

The policy for achieving this is based on two pillars: a 4.5% "reference value" for the annual growth of M3; and a "broadly based assessment" of possible price developments. This was preferred to a specific inflation target, and was based on the previous practice of the *Bundesbank*.

A number of questions can nevertheless be asked.

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[43] October 1998 Bulletin, p.5.

[44] Press conference, Thursday 4 November 1999.

[45] "The stability oriented monetary policy strategy of the Eurosystem", *Monthly Bulletin*, Pebruary 1999, pp.7-28.

- **First, how great a part in the conduct of policy has the 4.5% M3 reference value actually been?** For almost all of 1999 the monthly rate has been 0.5 percentage points or more above it, and was around that level in April when interest rates were cut. As was also observed at the 4 November press conference, the amount of reliability attributed by the Bank to M3 figures has appeared to vary from month to month.

  The Bank President's reply was to emphasise the "two pillar" nature of the strategy. In April 1999 the M3 figures the general inflationary indicators had been pointing in different directions. In October, however, they were pointing in the same direction.

- A second question concerns the importance **of current rates of inflation, and in particular differences in rates within the € area.** In certain parts of the area – notably in Ireland, Portugal, the Netherlands and Spain – prices in late 1999 were increasing at a rate in excess of the 2% definition of stability.

  The President's reply was that

  "...current inflation rates are not a determinant of our decisions on interest rates at any time. We have a forward-looking strategy."

  He added that the inflation differentials "as they exist today in the euro area" were "by no means exceptional, or anything special."

  A detailed analysis of the issue in the October *Bulletin* indeed found that the differentials were no different from those to be found in "a long-established monetary union" like the United States. Research had indicated that over 30% of the HICP differences were due to "erratic" factors like weather conditions, oil prices and indirect tax levels. Patterns of consumption varied, with a consequent effect on the accuracy of the HICP index itself. In the case of Ireland, Portugal and Spain there is also an element of "catching up".

  The integration of economies brought about by the Single Market would tend to reduce the differences, the analysis concluded. Even if they persisted, the remedy could not lie in monetary policy which could "only be geared towards the objective of price stability on an area-wide basis", but in national structural policy.

- Third, **how far is the policy of the ECB aimed at "neutral" rates of interest?** (see section 5.2). The reply of the Bank's President to a question on the issue implied that this was indeed the objective:

  "..this move today is a move in the direction of the so-called neutral rate.."

  The problem, however, was that it was not possible to tell at any one time precisely what a neutral level would be.

- Finally, the question arises as to whether **the external value of the €** – in particular the €/$ exchange rate – has played any part in the determination of the ECB's short-term interest rates. The maintenance of the low rates set in April during a period when the € was falling sharply against the $ gives an indication of the answer. This was confirmed by the Bank's

President on 4 November when he replied that the €/$ exchange rate had been, in determining the rise in interest rates on that day,

"no issue at all."

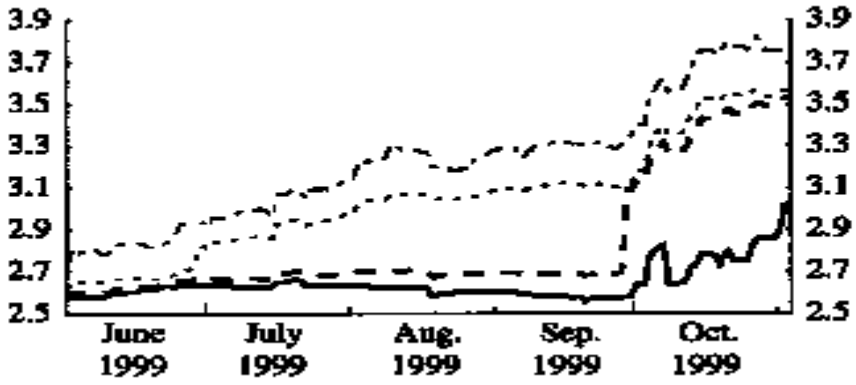
7.2. Short-term money market rates

The ECB has also monitored closely movements in **short-term market rates** since the start of EMU stage 3. These are measured by a number of different indices, compiled by financial institutions themselves, of which EURIBOR and LIBOR are the most important (see Box 4). EURIBOR in the main index used within the € area itself, having replaced most – but not all - of the previous national indices; and it this rate that is quoted by the *Monthly Bulletins* of the European Central Bank.

The three-month EURIBOR rates, having remained relatively steady at around 2.6-2.7%, rose suddenly at the end of the third quarter of 1999 to around 3.1%, influenced by the possibility of millennium problems at the year's end, and again rose to over 3.5% by 3 November. Both the six- and twelve-month EURIBOR rates also rose steadily in the third quarter of the year (see Chart 7).

Chart 7: Short-term interest rates in the euro area
(percentages per annum: daily data)

___ one-month EURIBOR ----- six-month EURIBOR
- - - three-month EURIBOR - --- twelve-month EURIBOR



Source: Reuters

Retail interest rates have shown a similar pattern (see Chart 8). Having fallen steadily over recent years, the rates paid on short-term deposits have levelled off, with the rate on medium-term bank deposits (2 years) rising sharply from mid-1999.

The interest charged on loans also fell through 1996-8, with the rates charged on home loans beginning to rise again in mid-1999.

Box 4: Current € Area Inter-bank Market Interest Rates

EURIBOR (€ Inter-bank Offered Rate): the rate at which € inter-bank term deposits within the € zone are offered. It is computed as an average of daily quotes provided for thirteen maturities by a panel of 57 of the most active banks in the € zone. It is quoted on an act/360 day count convention, and is fixed at 11:00 am (CET) provided that at least 50% of all panel banks contributed. The top and bottom 15 % are eliminated (the deleted number always being rounded up) and the remaining average, to three decimal places.

EONIA (€ Overnight Index Average): rate calculated by the ECB and disseminated by the EBF (European Banking Federation). It is the weighted average of all overnight unsecured lending transactions in the inter-bank market, initiated within the € area by the contributing panel banks.

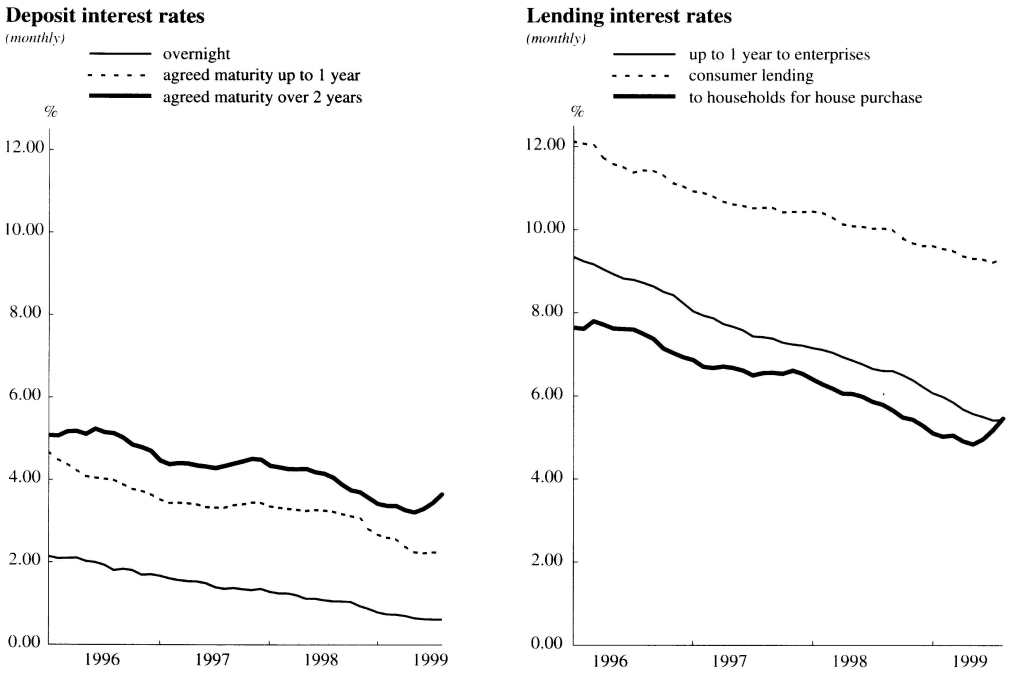
LIBOR (London Inter-bank offered Rate): interest rate offered by a specific group of London banks for US$ dollar deposits of a stated maturity.

TAM (Taux Annuel Monétaire): a French floating benchmark rate calculated by annualising the latest twelve monthly overnight average rates.

CIBOR (Copenhagen Inter-bank Offered Rate): interest rate for liquidity offered in the inter-bank market (in Denmark) on an non-collateralised basis. CIBOR is calculated on the basis of rates offered by a number of individual banks.

MIBOR (Madrid Inter-bank Offered Rate): it is defined as the mean average of the interest rates referring to 1-year maturity operations (from 354 to 376 days) in the market of inter-bank deposits.

Chart 8: Retail Bank interest rates



Source: ECB.

These euro area retail bank interest rates should be used with caution and for statistical purposes only, primarily to analyse their development over time rather than their level. They are calculated as the weighted average of national interest rates provided by the national central banks. The national rates represent those rates that are currently available from national sources and which are judged to fit the standard categories. These national rates have been aggregated to derive information for the euro area, in some cases relying on proxies and working assumptions due to the heterogeneity observed in the national financial instruments across MU Member States. Furthermore, the national interest rates are not harmonised in terms of their coverage (new business and/or outstanding amounts), the nature of the data (nominal or effective) or the compilation method. The country weights for the euro area retail bank interest rates are derived from MFI balance sheet statistics or close proxies. The weights reflect the country-specific proportions of the relevant instruments within the euro area, measured as outstanding amounts. The weights are adjusted monthly, so that interest rates and weights always refer to the same month.

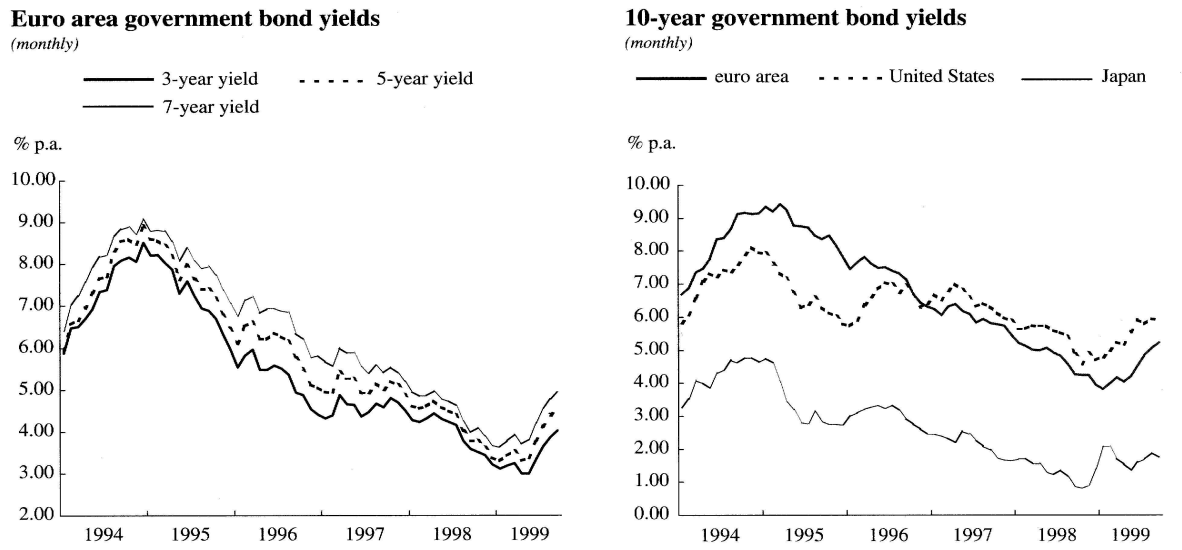
7.4. Long-term rates

Like short-term rates, **long-term interest rates** in what is now the € area fell steadily between 1994 and mid-1999 – the yield on 10-year benchmark bonds went down from over 9% to around 4% (see Chart 9). Since May of 1999, however, they have been on a rising trend. At the beginning of October 1999 the 10-year bond yield stood at 5.34%, over 130 basis points higher than at the start of the year. These upward pressures on yields, the ECB's October Report observed

> *"seem to have been mainly associated with changing expectations concerning the future outlook for economic activity in the euro area…."*

However, long-term rates were volatile during October itself, with benchmark yields first rising above 5.6%, then dropping back to the previous level of around 5.3%.

Chart 9: € area long-term government bond yields, 1994-99



Sources: Reuters, ECB, Federal Reserve and Bank of Japan.

1) *To December 1998, 2, 3, 5, and 7-year euro area yields are end-of-period values and 10-year yields are period averages. Therafter, all yields are period averages.*
2) *To December 1998, euro area yields are calculated on the basis of harmonised national government bond yields weighted by GDP. Thereafter, the weights are the nominal outstanding amounts of government bonds in each maturity band.*

7.5. The credibility of the ECB

In the period leading up to the start of EMU stage 3, there was considerable discussion about whether, and how soon, the new European Central Bank would be able to establish its "credibility". By this was meant the extent to which financial markets would believe it capable of carrying out its primary task of maintaining the internal purchasing power of the €.

The considerable initial scepticism about monetary union in Germany was largely based on doubts about how far the ECB would be able to achieve this objective. The credibility of the *Bundesbank* had been built up over several decades, with the result that the D-Mark had the reputation of being "strong". It was for this reason that the Maastricht Treaty was drafted in such a way as to make the € appear, as far as possible, a "continuation of the D-Mark by other means".

However, by contrast with the *Bundesbank* – as its former chief economist, now ECB Board Member, Professor Otmar Issing, observed in recent lecture[46] – the ECB is an entirely new institution.

[46] *"The monetary policy of the ECB: stability, transparency, accountability".* Speech at the Royal Institute of International Affairs, London, 25 October 1999.

"…Academics and central bankers agree that, when it comes to establishing credibility, the most reliable route remains that of building a track record of living up to one's word. Such an option was, however, simply unavailable for the ECB at its start."

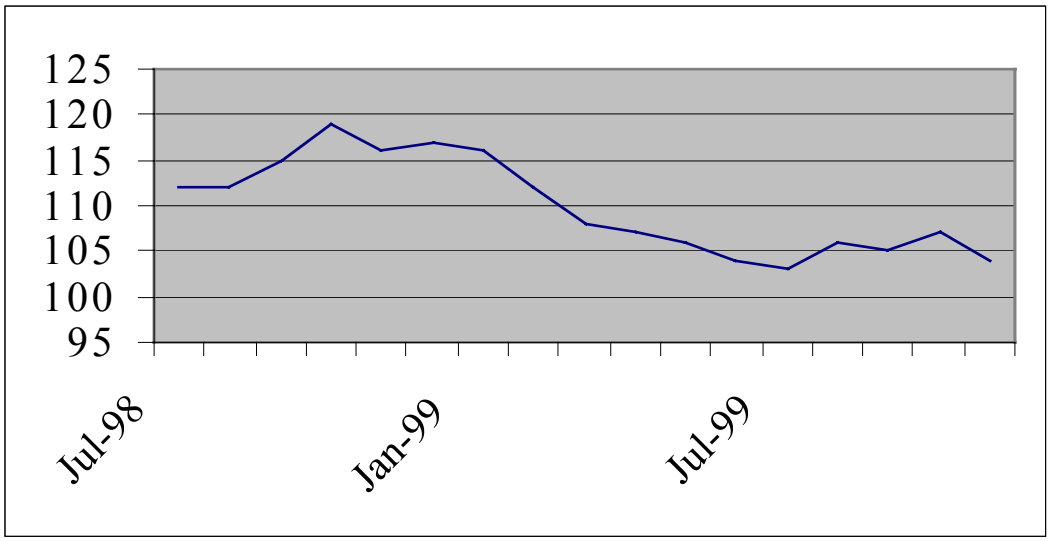
In addition, the issue of ECB credibility was greatly obscured in early 1999 by movements in the foreign exchange markets.

Following the fixing of the €'s composition in May 1998, the proto-currency began to rise against the $, almost reaching $1.20 by October. At the beginning of 1999 the € officially came into existence, and was quoted at the rate of $1.18 on 4 January; but after a few weeks began to fall back again. By early summer it fell below $1.02.

The late summer saw a reversal of the trend, and by October the rate was back to $1.07. But in November the € again fell against the $, and at the beginning of December briefly traded at under $1 for the first time.

Chart 10: ECU/€ exchange rate against the $ (monthly averages)

US cents per €



Source: ECB

For this reason, much of the press has been able to print successive headlines about the € reaching "another historic low". It has frequently been described as "weak". Economic journalists explained the movement as reflecting the contrast between the US's "goldilocks economy"[47] and apparent stagnation in the € area.

It is nevertheless clear that the ECB has so far completely fulfilled its duty of maintaining the €'s *internal* purchasing power. The Bank's initial definition of price stability has been a rate of

[47] Not too hot (inflation), not too cold (recession).

inflation below 2%; and by mid-1999 the annual increase in the € area's Harmonised Index of Consumer Prices (HICP) was below 1% (June figure 0.9%).

More important, however, is the evidence from the bond markets that *inflationary expectations* are also low. As Otmar Issing, put it in his lecture:

> *"If one looks far enough, beyond the horizon of business cycles, changes in long-term nominal interest rates typically reflect markets' perceptions of long-term inflation risks. If the central bank is credible, long term rates will not move very far away from levels consistent with maintained prospects of price stability; they will quickly jump to higher levels if credibility is lost. If I take a look at long-term bonds denominated in euros, I can conclude that the ECB has already earned a considerable level of credibility."*

7.6. Bond Market Spreads

Since the start of EMU Stage 3 at the beginning of 1999, the € area has had a single monetary policy and a single structure of short-term interest rates. The possibility of exchange-rate movements within the area has also been removed. It might be expected, therefore, that the yields on all €-area benchmark government bonds would be identical.

This is not, however, the case. On 4 November 1999 yields varied on 10-year bonds between 5.12% on German *Bunds* to 5.47% on those of Portugal. To some extent such variations can be explained by slight differences in redemption dates. When these are corrected, however, there is still a small but clear "spread" (see Table 1).

Table 1: 10 year Benchmark Spreads

Country	Spread against Bunds
Austria	+ 0.19
Belgium	+ 0.27
Finland	+ 0.28
France	+ 0.08
Germany	-
Ireland	+ 0.22
Italy	+ 0.21
Netherlands	+ 0.13
Portugal	+ 0.34
Spain	+ 0.21
Denmark	*+ 0.38*
Greece	*+ 1.61*
Sweden	*+ 0.53*
United Kingdom	*+ 0.19*

United States	*+ 0.88*

Source: Financial Times

The continued existence of these spreads reflects a number of special factors. Although most benchmark bonds, and all new issues, are now denominated in €, the bond markets are not yet fully integrated, and there are variations in market liquidity. In certain cases the fiscal position of the country may also be a factor: i.e. there is a residual risk premium.

The spreads within the € area can also be compared with those within the EU as whole. Here the variation is considerably greater, varying from the 5.12% on *Bunds* to 6.83% on Greek bonds. With the exception of the UK, yields are higher in the non-€ countries.

8. Conclusions

It is clear from the way in which financial, foreign exchange and other markets operate that only in the case of rates set by central banks themselves is there a precise answer to the question: how are interest rates determined?

Even in the case of central banks it is not possible to state with certainty the reasons for a particular rate change. Full disclosure of the way in which the responsible bodies reach their decisions might help. But the relative importance, and varying accuracy, of the data upon which decisions are based – money-supply and credit figures, current inflation rates, movements in yield curves, exchange rates, etc. – will always make the exercise imprecise.

The problems are even greater when it comes to tracing exactly how the rates set by central banks feed through into the rates ordinary citizens pay for bank loans or mortgages, or companies pay for their capital. In the case of short-term rates, existing research – even that using complex economic models – does not shed a great deal of light on the transmission mechanisms, if only because financial markets are in a constant state of flux. Within the euro area the problem is that much more difficult in that very little can yet be adduced with certainty from past experience (the Lucas critique).

Finally, there can be hardly any certainty at all about the determination of long-term interest rates. Changes in the rates set by central banks are only one among a number of influences, with expectations about future inflation and/or future exchange rates playing a part in the level of both short- and long-term rates. Investors, large and small, are constantly seeking the best return on their savings in a network of inter-related markets, whether they have billions to bet in the derivatives market, or are wondering whether to sell the family silver and put the money in a deposit account instead. Borrowers, likewise, are trying to raise the capital for their businesses or house-purchase at as low a rate as possible. Meanwhile, governments struggle to contain interest payments on new or existing public debt, while resisting the temptation to solve the problem – temporarily – *via* inflation. And finally, in the background, lies the unpredictability of the real world: unexpected technological advance, irrational human behaviour, luck, chance, war, the weather and Acts of God.

Given this clouded picture, a number of points can be made.

- Other than in emergencies, central banks are likely to aim for "neutral" short-term interest rates: that is, rates which are just high enough to prevent economic overheating and future inflation, but not so high as to kill economic growth and raise unemployment. This, indeed, seems to be the policy of the European Central Bank, despite it being a matter of judgement rather than technical precision to say at any one time what a "neutral" level is.

- So far, the ECB appears to have entirely achieved this objective. Long-term interest rates indicate that € inflation in the future is expected to be low, while economic growth in the area is picking up to respectable levels.

- The main *internal* forces which might lead to rising inflationary expectations and substantially higher interest rates within the € area have in any case been blocked by provisions of the Treaty:
    - the independence of the ECB and its primary target of price stability;
    - the prohibitions on the monetary financing of budget deficits, on privileged access by governments to the savings of their citizens, and on the "bail-out" of governments threatening default; and
    - the requirement to avoid "excessive" budget deficits, to which has been added the presumption of balanced budgets over the economic cycle under the Stability and Growth Pact.

- There remain, however, important *external* forces: in particular the levels of interest rates in other major economies, and developments in foreign exchange markets. Very large sums of short-term capital can rapidly move between currency areas, for reasons and with effects, both on internal monetary policy and exchange rates, which are poorly predicted by economic theory. The relatively low level of the € area's GDP accounted for by external trade mitigates, but does not eliminate these factors.

- The result is co-incidence – if not co-ordination – in central-bank-determined interest rate changes. Within the EU itself, for example, the ECB and the Bank of England both raised benchmark rates on 4 November 1999, and the US Federal Reserve Bank did the same a fortnight later. Though the world's major central banks have varying approaches to monetary policy, and though there are important differences in the structure of the economies they serve, there is general agreement on fundamentals: the need for price stability and stability in financial markets.

- In consequence, real long-term interest rates are likely to converge on an international norm (though the economic theory predicting this is open to challenge). The level of this real long-term rate will, in turn, be determined by the complex interaction of both monetary and real factors: the liquidity of financial markets, the level and freedom of world trade, growth rates in lead economies and – in the view of some the decisive factor – the creation of new investment opportunities as a result of technological advance.

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