MORTGAGES EXPOSED

Michael Kelly

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- ✓ A mortgage is probably the largest financial transaction in the lives of most people – it pays to know more about it and how to profit from it. *Mortgages Exposed* is written by an acknowledged expert with over thirty years experience in the mortgage business.
- ✓ The book delves into the innermost parts of mortgages and loans, explaining how they really work starting from the first principles of compound interest, describing the use of powerful comparative tools such as the Internal Rate of Return and the magic of gearing.
- ✓ The target audience is the more discerning borrower, as well as for anyone involved in the financial services industry. The book focuses on thinking from first principles, and so it should never date.
- ✓ Free, general-purpose spreadsheets are included on the attached disk (or for download on the web site): easy to use that you can become an instant mortgage expert, able to analyse many different scenarios and get immediate answers to all your “what if…” questions.
- ✓ Anomalies are exposed, the infamous Rule of 78, the flat rate loan and the lenders who calculate payments in bizarre ways. The new rules (as from April 2000) for APR calculations are explained.
- ✓ The endowment mortgage scandal is explained and analysed. A clear answer is given to the dilemma over whether to choose interest-only or capital repayment.
- ✓ Use the complete, general-purpose guide on how to choose any mortgage scheme from the thousands of available options.
- ✓ Flexible and Current Account mortgages are specifically looked at. Michael Kelly first launched these schemes as early as 1979.
- ✓ Kelly also goes into some detail on the advantages and risks of buy-to-let, and explains how to gear up your profits by several multiples.
- ✓ A section on how to become a millionaire will excite the entrepreneur wishing to exploit mortgages to create wealth.
- ✓ What is the lender’s view? Lenders and mortgage brokers will find the spreadsheets for designing a mortgage very useful to ensure the right returns are achieved.
- ✓ Equity release schemes of all descriptions are outlined together with the novel Reverse Mortgage scheme for the house rich but cash poor.
- ✓ The epilogue summarises the story and attempts to analyse the future of digital loans & mortgages.

Preface

Author Michael Kelly and his wife Dee were directors of software company Dunstan Thomas Limited for the last six years of the 20th century and both contributed much to our success as computer software pioneers. Their son Robert remains on the board and has inherited his father's skills in the mortgage business so we can continue to serve our growing band of financial services clients.

Dunstan Thomas is delighted to sponsor this book by hosting it as a web site. Michael Kelly has never intended to profit from its publication. As a champion of the consumer, he is more interested in seeing his message promoted both to the public at large and to fellow professionals in the mortgage industry where he worked for some thirty years. The Prologue summarises some of the key events in his remarkable business life.

As you will see as you read on, Michael is a great exponent of spreadsheets and he has designed a number of quite amazing mortgage and loan tools for borrowers, brokers and lenders, all of which are freely available for downloading on this web site.

For our part, we can design full-scale software applications for any financial service operation, which can be directly tailored to specific business needs, particularly when related to e-commerce.

This book is not for the faint-hearted: there is some mathematics lurking about, but Michael does make it as easy as possible to grasp important principles such as the Internal Rate of Return, so we commend your perseverance. Your reward comes in Part II, particularly the sections on gearing and how to make a million – indeed if you read those sections alone you could be repaid the time spent many times over.

Astute laypersons will also find much to delight them, even if they download just one spreadsheet on how to choose a mortgage – the Mortgage Scheme Select Wizard. The author's logical approach and his focus on principles, rather than just transient contemporary wisdom, ensures that the reader picks up some skills for life, as opposed to assisting a specific mortgage or loan transaction.

The book is also available as a printed manuscript, but we ask for a price of £10 to cover printing, materials and postage.

Chris Read

Chairman

Dunstan Thomas Limited

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Mortgages Exposed

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Van Roy's Law: "Honesty is the best policy – there's less competition."

Prologue - who is this book for?

Any exposé of mortgages might hint at dark secrets implicating our largest institutions in dirty deeds. While there are indeed secrets and surprises, most of the news is good, apart from just a few naughties: for instance, the so-called endowment mortgage scandal is analysed. Some readers may want to jump immediately to the section on "How to be a Millionaire" but it will probably pay to be patient, and work up to it.

The principal aim of this compendium is to get into the basic structure of a loan or a mortgage, and explain how they are designed, costed and calculated. What are the hidden costs, if any, and what is their relevance? How should a borrower select just one product from the thousands offered by some one hundred different lenders? What really is a "best buy"? When is it worthwhile switching from one scheme to another?

The book does not set out to be a popularist treatment of mortgages. Rather, it aims to present readers with all the necessary tools and thought processes to enable them to come to their own, logical conclusions. It attempts to explain basic principles and facts rather than offer opinions and list opaque empirical rules, and focuses on those facts that are most often misinterpreted. It might seem complex in parts to some readers, yet over simple to others. It also dwells on a few novel concepts.

Mathematics is involved, but the formulae used to perform almost any calculation involving mortgages or loans is explained as simply as possible. Readers need no profound knowledge of mathematics, beyond a good level of numeracy to secondary school level. The purpose is to impart a better understanding of the generic anatomy of any loan as a financial product.

Access to a spreadsheet programme such as Excel or Lotus 123 is helpful, since a useful range of easy-to-use spreadsheets is included on a disk or, for web readers, as a free download. These sheets are designed to answer most of the important mortgage and loan questions without the need for any special spreadsheet knowledge.

The full power and sophistication offered by some more advanced mathematical methods is also included for completeness but not for necessity. Anyone professionally involved in the mortgage and loans business will hopefully find something of value. Borrowers with enquiring minds may find much to enlighten them. Technical terms are explained and the more complex parts are consolidated into a separate section called "Technical bits" in Part I, to insulate the merely curious from the technicians. Computer programmers may find some of the formulae discussed here to be useful for their work.

Innovation

The fierce rivalry in the mortgage & loans business persists. Contemporary money supply mechanisms have ensured there is more cash available to lend than there are people wishing to borrow. As a result of this oversupply, lenders are constantly experimenting with innovative products to attract an increasingly discerning and Internet-aware consumer. The classic endowment mortgage has already fallen from grace and we will look at the pros and cons of this long running dilemma in more detail.

Today's loan products are far more sophisticated than ever before. Flexible payments, cashbacks, discounts, fixed rates, low starts, impaired credit, non-status, buy-to-let, shared appreciation, index linked, LIBOR linked and many more ideas go and come and occasionally reappear.

The Internet now provides a business channel that demands far closer attention to real value for money as well as comparing all the other key attributes of a well-designed mortgage or loan product. Mass customisation is now easy to automate on the World Wide Web. Never before has it been so essential to understand the numbers behind the numbers.

So what is the best deal for the borrower? What product is more attractive for the lender? How are the monthly payments calculated? What is the redemption amount? What is the Rule of 78? Is a re-mortgage worthwhile? What is the best product for an individual and is the new APR effective for this purpose? Is it worth borrowing to buy a rented property? What is gearing? Is it worth borrowing at all?

For the answers, read on. Check the disk that comes with the book, which not only replicates this text, but also provides practical, dynamic examples of the maths in action in simple spreadsheet format, so all your personal “what if” questions are handled instantly. The whole treatise is available for downloading on www.mortgagesExposed.com including the spreadsheets.

Why me?

From an early age I have always been fascinated with mathematics. The logic and preciseness of the essential thought processes were particularly comforting to an adolescent, trying to come to terms with a greater world, which seemed anything but logical.

But it was especially delightful to discover later on that maths could be such an intrinsically practical activity. It was possible to define real life situations using mathematical formulae with a precision that could even take account of the vagaries and unpredictability of real life.

For example, the life insurance actuary possesses the skill to define a human life span in terms of formulae on which a whole industry depends. Nothing is less predictable than your own date of death, but when an actuary takes the human tribe as a group, he would literally gamble his bonus on getting life expectancy "dead" right. This rudimentary, but magical expertise is the fundamental basis of the huge life insurance industry.

In the mid sixties, I was a twenty something year old Army officer with a Cambridge University degree in Engineering, but otherwise pretty unworldly. My wife and I were content with renting our modest, comfortable and subsidised Army quarter, especially as we paid neither interest to a lender nor premiums to an insurance company. I remember arguing with some equally naive insurance broker who was determined to sell me an endowment policy in preparation for a future mortgage.

Whilst this broker was very insistent that the endowment mortgage was the right stuff, my freshly educated mind was then expecting a simple mathematical proof, which he was not able to present. By then my whetted appetite demanded more knowledge. Eventually another broker convinced me to buy a house, and a life insurance policy, using a series of simple mathematical arguments that seemed stunningly conclusive.

I was so struck by the logical deductions in the sale process that I declared there and then that I wanted to leave the Army, buy a house (with the largest, longest, cheapest mortgage I could get) and then become a mortgage consultant and spread the gospel. This was in the late sixties, when most of my colleagues in the Services thought renting was the right thing to do. I was aching to convince them that there was a better alternative.

In those young, innocent days, my naïve excitement was almost like a missionary calling. I wanted to share my ingenuous, St.Paul-like conversion to the concept of house-purchase-by-mortgage with the entire world.

It was some years later when I realised that the successful early sales I had achieved was more to do with my rather transparent enthusiasm and not, as I then believed, the high minded logic that I had pompously considered as being so persuasive. My early clients, colleagues and friends, later confided that they actually had little idea what I was actually talking about from my initial sales patter. But they did admit to being caught up with my own zeal to the extent that they thought I must be "on to something" and so they bought my passionate story. I give thanks to those early, tolerant disciples, who luckily prospered from the housing market they were encouraged to enter.

I spent the first half of the seventies as a mortgage broker, and the second half dealing with more general financial planning and investments. I combined the two in 1979 by launching the first ever index-linked investment product (linked to the RPI or Retail Prices Index), which was underpinned by my concept of a residential index-linked mortgage. Our new company was initially named ILMI – which rather cumbersomely stood for the “Index Linked Mortgage and Investment Company Limited”.

Despite double-digit inflation, and before index-linked gilts were invented, the mortgage product proved more attractive than the investment, which then lacked the credibility of a brand name. Merchant bankers, Lazards, were later persuaded to sponsor the first RPI index-linked unit trust. Skandia Life also launched the first RPI linked pension fund. Both schemes used my index-linked mortgage concept, which ILMI both marketed and administered. The mortgage product is explained in more detail in Annex A.

The principal attraction of the index-linked mortgage was the low start. The initial monthly payment was around 30% lower than a "normal" mortgage and future payments were guaranteed to remain the same in "real" terms throughout the term, in other words, the true purchasing power was constant throughout the term.

The low initial payments permitted people to afford larger loans. In a decade when house prices moved only upwards, this method of loan also promised greater profits to the borrower. Falling house prices would (and did later) have the opposite effect.

The eighties proved to be a particularly exciting decade for the mortgage business that was then at its most innovative. The low start payment method was refined to attract conventional funding. Mortgage Systems Limited was born out of ILMI in 1981 to exploit the demand for a new style low start, flexible payment mortgage. The Thatcher years were more about investing than nesting, and the house purchase business was then booming. Mortgage products, particularly those that enabled you to obtain a larger mortgage for a lower cost, were in great demand. Mortgage Systems obliged by designing,

marketing and processing applications for a whole range of low start, flexible payment mortgages for its many lenders, and we then provided an on-going mortgage administration service.

Adrian Bloomfield, the well-connected entrepreneur then running second mortgage lender Premier Portfolio, introduced me to John Gunn's British & Commonwealth, a company determined to be a major force in financial services. They showed an interest in our still quite fledgling company. When we finally sold Mortgage Systems to British & Commonwealth in 1989 (who later went into administration and were forced to sell our old company on to the Skipton Building Society, who renamed it Homeloans Management Ltd), our 600 dedicated staff were managing over £3.5 billion of mortgages for around 20 worldwide institutions, occasionally processing over 2,000 new applications per week. But although now my main business passion had been sold, I was not yet quite ready for retirement.

1990's

I joined the board of Mortgage Group Holdings, which then owned UK's most popular mortgage broker, John Charcol, ably led by its clever founders, Johnny Garfield and Charles Wishart. I was already a non-executive director of Private Label Mortgage Services Limited, the hugely successful mortgage design and marketing operation run by the ebullient Stephen Knight.

Stephen & I attempted to launch a reverse mortgage scheme by founding a company called Home Income Trust PLC, with a product designed for asset rich, but cash poor, homeowners. But this turned out to be incredibly badly timed. House prices started to move downwards and some well-publicised scandals surrounding home income schemes frightened off both potential customers and their lawyers. Soon the public's confidence in these plans all but collapsed so we withdrew the product and mothballed the company to wait for better times. The scheme still has merit, and is described herein.

A spell first as a consultant and then as a director of The Paragon Group in the late nineties (Paragon was previously NHL - National Home Loans - another company founded out of the exuberant mortgage market in the mid eighties) enabled me to experience for the first time life as a wholesale lender. NHL had expanded fast in the eighties. It was sales led, and it sold just about everything demanded by borrowers and mortgage brokers alike.

Unfortunately the subsequent house market collapse in 1990 left NHL exposed to the less reliable borrower, and massive arrears almost sunk the company. In the early nineties, a new and very able team of Directors gradually put the company back on its feet and the share price rebounded. Home Loans Direct was first formed to restart our lending programme (this was my new role) and now, as the renamed Paragon Group, we have successfully expanded, by both acquisition and organic growth, into other niches and consumer loan activities.

To lighten our load, my wife and I disposed of our interest in e-commerce & software specialists Dunstan Thomas Limited in May 2000 and resigned our directorships. With just a property investment company and a debt management company left, I am now sort of retired – well, shall I say "in a reflective phase", but my early passion for the science of mortgage design still thrives. Consequently, while my recall system is still just able to function, I felt I wanted to set down and distil some of those early, but still valid, logical

arguments in a more generic and understandable way and relate them to today's faster moving digital world.

So now, here we are with a book that is more about the numbers behind the scenes rather than the art of marketing mortgages. I hope I have made it interesting enough to encourage the reader to start using the spreadsheets included that are general purpose enough to be really practical, and the on-line tools on the web site.

I remember a well-known parable. If a man is starving, don't just give him a fish, as this might only feed him for one day. Instead, give him a fishing rod, and show him how to use it, so he can then eat every day. I am attempting to offer you, dear reader, a fishing rod plus some instructions. Hopefully you will then be able to apply the techniques described here to fish for a better loan product, and encourage others to do the same.

June 2000

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Introduction

Mort is a French word meaning dead. A mortgage is better known as a loan secured by land or property, although sounding like a mortuary and indeed some people might contemplate murdering their mortgage lender. More precisely, a mortgage is actually a legal document, but one *amortises* a loan, which means paying it off over an agreed schedule and thereby killing it.

In fact, the only distinction between a normal loan and a mortgage, is that mortgage lenders have a house they can legally sell in the event of the borrower not paying as scheduled. Some loans are secured with other assets, such as cars or washing machines, stocks or shares. Some loans are unsecured. But the basic structure and mechanics of the loan is the same whether it is secured or not.

The three essential variables describing any loan or mortgage are: -

1. The initial capital sum or *principal* that is to be lent.
2. The *interest* rate which sets the amount of interest to be charged on outstanding capital and when it is charged. The interest rate may vary.
3. A *repayment schedule* laying out how the interest and capital is to be repaid.

As far as item 3 is concerned, there are an infinite number of repayment variations but the two main types of schedule are: -

(i) *Capital repayment loans*, where capital is repaid gradually throughout the loan term as part of a regular payment,

(ii) *Interest-only loans*, where only interest is paid during the term, and the amount owing settled at the end with a lump sum. This sum usually arises from selling a separate asset. An *endowment* mortgage aims to use the proceeds of a maturing endowment policy to repay the debt, but more often it is the sale of a house that settles the mortgage.

While interest-only loans are very straightforward from the lender's viewpoint, their overall value-for-money for the borrower depends totally on the performance of the separate repayment vehicle.

A loan to a borrower is an investment to the lender. The interest paid by the borrower is an investment return to the lender. So the formulae used to calculate a loan schedule are practically identical to those applying to an investment. Fees and costs will affect the overall return to the investor and will also add to the final burden for the borrower. But fundamentally the mathematics is the same for the borrower and the lender.

Compound interest can be an elusive subject. There is no known simple, single formula that can be used to calculate true interest rate, given a repayment schedule: so comparing loan schemes has never been an easy task. Fortunately, there is an excellent method available and the more prevalent use of spreadsheets has greatly simplified its application. If this book sheds light on this process alone, it may have been all worthwhile.

Terman's law: "Education is what you get from reading the small print. Experience is what you get from not reading it"

PART 1 – The Theory

Please don't be frightened off this initial part as possibly being too technical - it is not as mathematical as you think. It is important to understand the *shape* and *feel* of the figures illustrated in the various tables. It is not necessary to test every line, unless you are a real enthusiast. I have included the more technical bits in a separate section at the end of Part I, so it's all there if you wish to indulge in the full magic of the maths, and of course the figures reappear in the spreadsheets together with the formulae used.

Simple and Compound interest - the fundamentals

Banking may not be the oldest profession but it was probably started by demand from *the* oldest profession. There are people who have money and those who need it. Depositors or investors want a safe return on their capital, and businessmen and others want to raise capital for a variety of reasons. The bank was the earliest go-between, passing back to their depositors most of the interest they charge their borrowers, naturally retaining a modest margin for themselves. Building Societies were formed later on as mutual non-profit making businesses to focus on straightforward savings and the provision of mortgages.

These Institutions created the need for some basic mathematics to enable them to maintain a fair and consistent standard for rewarding investors and charging borrowers. They had to have some simple formulae to calculate interest over time. The phrase *Time is Money* is an exact science as far as banks are concerned, as time is the essential ingredient of interest.

You were probably taught that there are two ways of calculating interest, *simple,* and the more prevalent *compound* interest. *Simple* interest is really just a simple way of calculating interest. The method used to calculate it is actually quite inaccurate but it was fashionable before computers enabled more complex and more exact calculations to be performed. The use of simple interest as a measuring tool is quite ineffective in most cases and certainly is of no value for comparing today's sophisticated financial products.

Compound interest is the only mathematically correct method for measuring and comparing loan products. It is undoubtedly more fascinating but it demands more than a superficial understanding and it does require more thoughtful mathematical processes.

Simple interest - ignores capitalised interest

If you borrow £1,000 at 12% per annum *simple* interest without paying back any capital, the interest is £120 at the end of each and every year - twelve hundredths of the capital invested. Simple interest ignores the fact that interest can itself attract interest. See Figure 1 for an easy illustration.

I have used the term *principal* to identify the initial cash that starts any financial transaction. £1,000 is the *principle* in this example. Whilst this is probably an old-fashioned word, it distinguishes itself from future capital within any transaction sequence, which thereafter is simply referred to as C*apital.* These days you will more often hear the words *present value* instead of *principal* and *future value* as future capital.

Figure 1

Simple interest example over three years

£1,000 growing @ 12% per annum simple, with no repayments.

	Interest added	Amount owing	Notes
Principal		£1,000	Starting capital
End of year 1	£120	£1,120	12% of £1,000
End of year 2	£120	£1,240	12% of £1,000
End of year 3	£120	£1,360	12% of £1,000

Simple interest is calculated on the principal only. The total interest added over 3 years is 3 times £120 = £360.

Compound interest

If the interest earned is not paid out, it is added on to the capital owing. But there becomes a time when interest should be calculated on the new, increased capital, which then includes previous interest. Compound interest therefore recognises that interest is capitalised after a preset period. Future interest is then charged on the new, higher capital for the next period.

If this is repeated, with no capital repayments, the capital will grow more and more quickly. In short, the interest increases because the capital on which it is charged increases, which then increases future interest even more. Interest is then *compounding* as illustrated in Figure 2.

Figure 2

Compound interest example over three years

£1,000 growing @ 12% per annum compounding annually, with no repayments**.**

	Interest added	Capital owing	Notes
Principal		£1,000	Starting Capital
End of year 1	£120.00	£1,120.00	Add 12% of £1,000
End of year 2	£134.40	£1,254.40	Add 12% of £1,120
End of year 3	£150.53	£1,404.93	Add 12% of £1,254.40

Interest is added to the capital owing at the previous year-end, so it is capitalised. The following year's interest is then charged on the higher capital amount owing at each year-end. The total interest charged is £404.93, significantly more than the £360 shown in Figure 1.

The longer the compounding period, the more dramatic is the effect. Over 100 years for example, an initial £1,000 at the same 12% interest rate would grow to over **£83 million.** Without compounding it would worth just £13,000. Clearly, given sufficient time, compound interest can have a surprisingly large outcome: simple interest is totally inappropriate.

Compounding frequency

When describing an interest rate you need to define the time period for when interest is capitalised or compounded. This vital second ingredient is called by various different names. Sometimes we simply refer to the total number

Figure 3

Compounding monthly instead of annually

£1,000 invested (or borrowed) @ 1% per month interest, compounding *monthly* with no repayments.

	Interest	Capital	Notes
Principal		£1,000.00	Starting capital
End of month 1	£10.00	£1,010.00	Add 1% of £1,000
End of month 2	£10.10	£1,020.10	Add 1% of £1,010.00
End of month 3	£10.20	£1,030.30	Add 1% of £1,020.10
End of month 4	£10.30	£1,040.60	Add 1% of £1,030.30
End of month 5	£10.41	£1,051.01	Add 1% of £1,040.60
End of month 6	£10.51	£1,061.52	Add 1% of £1,051.01
End of month 7	£10.62	£1,072.14	Add 1% of £1,061.52
End of month 8	£10.72	£1,082.86	Add 1% of £1,072.14
End of month 9	£10.83	£1,093.69	Add 1% of £1,082.86
End of month 10	£10.94	£1,104.62	Add 1% of £1,093.69
End of month 11	£11.05	£1,115.67	Add 1% of £1,104.67
End of Month 12	£11.16	£1,126.83	Add 1% of £1,115.67

After 12 months the principal has increased by £126.83, which is **12.683%** in one year. With annual compounding it would have increased by only £120 or 12%.

of periods but we need to know the compounding time interval – monthly, quarterly, yearly and so on. Technically we are referring to the *compounding frequency*, sometimes called *accrual rate,* or more often, the number of *rests* per annum.

For example, instead of paying 12% per *annum*, let's see what happens to our typical £1,000 principal if interest is compounded at 1% per *month* – a twelfth of 12%. The table in Figure 3 shows that after 1 year (12 monthly

periods) the end result, or future capital, is £1,126.83 as opposed to just £1,120 with the annual rests used in Figure 2.

True Rate

We can now see from these figures that a rate of 1% per month produces the same end result as a rate of 12.683% per annum – not 12%. We can therefore say that the equivalent interest rate expressed per *annum* is 12.683% pa. This is called the *true* annual rate of interest and is exactly equivalent to saying the *true monthly* rate is 1%.

If we continue compounding over three years, the end result would be as follows:-

End of year 1	£1.126.83 (as in Figure 3)
End of year 2	£1,269.73
End of year 3	£1,430.77

I know I promised to avoid too much maths apart from a special section, but the following bit is quite fundamental and I cannot resist telling you about it now.

The basic formula used to calculate the figures shown above is quite simple and is this: -

$$\text{Future Value} = \text{Present Value} \times (1 + i)^{n}$$

where the superscripted n means "to the power of". In other words we multiply (1 + i) by itself n times. i is the fractional interest rate and n is the number of time periods.

So the future value after 36 months is: -

$$£1{,}000 \times (1 + 1\%)^{36} = 1{,}000 \times 1.01^{36} = £1{,}430.77$$

Instead of calculating 1% for 36 months, the same result can also be calculated as 12.683% per year for 3 years: -

$$£1{,}000 \times (1 + 12.683\%)^{3} = £1{,}430{,}77$$

Either way the result is the same. But using the annual rate requires fewer calculations, once you know what the true annual rate is.

In short compounding the true annual rate over three years produces the same answer as compounding the monthly rate over thirty-six months.

The magic term which pops up in all compound interest computations is $(1 + i)^{n}$. Not all pocket calculators can do this with one key press. But you can work it out by simply repeating the multiplication of (1 + i) n times.

Nominal Rate - is not *true*

Whilst it is tempting to say 1% per month is the same as 12% per annum, clearly it is not true. However lenders do use the term *Nominal* rate. 12% pa nominal *can* mean 1% per month provided it is stated as such. It could equally mean 3% compounded quarterly. The effect of more frequent compounding is higher overall interest, so we need to know more than just a rate. Whilst financial Institutions often quote a nominal interest rate, without knowing the compounding frequency, it means very little.

So a correctly defined interest rate must also indicate the compounding frequency or the number of rests per annum. 12% per annum nominal, compounding monthly (ie twelve *rests* per annum) means 1% per month true and is mathematically equivalent to 12.683% per annum true. Since the true rate is always more than the nominal rate, lenders are naturally more likely to talk about nominal rates. The nominal rate is more likely to be a nice round number, so it is convenient to just say 12% pa *nominal* payable monthly.

Lenders are seldom precise about this. In short, be sure you know just what it means when an interest rate is quoted. Why do we want to know the true annual rate? Why is it so important? The practical answer is for comparison purposes. We need a consistent standard to compare all loans, regardless of their compounding frequency. Quoting true rates on an *annual* basis is the most familiar standard and common usage has made it prevalent. The later section on *Technical Bits* provides more details about the mathematics.

The importance of the compounding frequency

Interest can compound at many other frequencies as well as monthly. The *Nominal* rate used in all of the earlier examples was 12% per annum. Figure 4 illustrates the true annual rates for various other compounding frequencies, but where the nominal rate is the same in every case @ 12% per annum.

This table highlights the fact that unless one knows the compounding frequency, the nominal rate is meaningless. Moreover the difference is certainly not trivial.

Figure 4

12% per annum nominal interest with different compounding frequencies.

Compounding Frequency	Rest Periods per annum	True annual Rate	£1,000 over 30 years
Annual	1	12.000000	£29,960
Half-yearly	2	12.360000	£32,988
Quarterly	4	12.550881	£34,711
Monthly	12	12.682503	£35,950
Daily	365	12.747462	£36,577
Hourly	8,760	12.749592	£36,597
Continuously	Infinite	12.749685	£36,598

The true rate rises more slowly at the higher compounding frequencies and fortunately trends towards a maximum. The practical effect of growing £1,000 over 30 years is shown for perspective.

Over 100 years the difference between daily and annual compounding is even more staggering:

£1,000 @ 12% pa compounding *annually* produces £83,522,266

£1,000 @ 12% pa compounding *daily* produces £**162,434,128**

That is a difference of almost **£79 million**, using the same nominal rate, but with different compounding frequencies – almost double the annual figure! You can now see the importance of identifying the true rate.

Capital repayment loans

As mentioned in the introduction, there are two main methods of loan repayment:

(i) *Capital repayment loans*, where capital is repaid gradually throughout the loan term as part of a regular payment. They are also called annuity mortgages. The term re-payment is used to signify a capital element is included.

(ii) *Interest-only loans*, where only interest is paid during the term, and the amount owing is settled at the end with a lump sum, obtained from selling a separate asset, sometimes an endowment policy or an ISA, or more often the house.

We will first look at capital repayment loans, and take as an example a typical £50,000 level repayment mortgage over 20 years, assuming 8% pa nominal interest compounding monthly. The complete repayment schedule is illustrated in Figure 5.

The monthly repayment is made up of two components; interest on the capital owing at the start of each period, and a capital repayment element, which reduces the amount owing.

In the early years, when little capital has been repaid, the monthly repayment mix is mostly interest. As time goes on, more capital has been repaid so the interest element reduces. There is then more of the monthly repayment available to repay capital. So capital is repaid faster and faster until it is all repaid and that's the end of the mortgage – it has been amortised, or killed off.

Figure 5

£50,000 level repayment mortgage over 20 years @ 8% per annum compounding monthly.

Year	Monthly Payment	Interest Element	Capital Element	Debt Year End
1	£418.22	£333.33	£84.89	£48,943
2	£418.22	£326.29	£91.93	£47,799
3	£418.22	£318.66	£99.56	£46,559
4	£418.22	£310.39	£107.83	£45,217
5	£418.22	£301.44	£116.78	£43,763
6	£418.22	£291.75	£126.47	£42,188
7	£418.22	£281.26	£136.96	£40,483
8	£418.22	£269.89	£148.33	£38,636
9	£418.22	£257.58	£160.64	£36,636
10	£418.22	£244.24	£173.98	£34,470
11	£418.22	£229.80	£188.42	£32,125
12	£418.22	£214.16	£204.06	£29,584
13	£418.22	£197.23	£220.99	£26,833
14	£418.22	£178.88	£239.34	£23,853
15	£418.22	£159.02	£259.20	£20,626
16	£418.22	£137.51	£280.71	£17,131
17	£418.22	£114.21	£304.01	£13,346
18	£418.22	£88.97	£329.25	£9,247
19	£418.22	£61.65	£356.57	£4,808
20	£418.22	£32.05	£386.17	£0

Note that the interest and capital element shown are for the first month in each year, because in practice the mix changes month by month.

Figure 6

£50,000 20 year repayment mortgage @ 8% pa with monthly rests

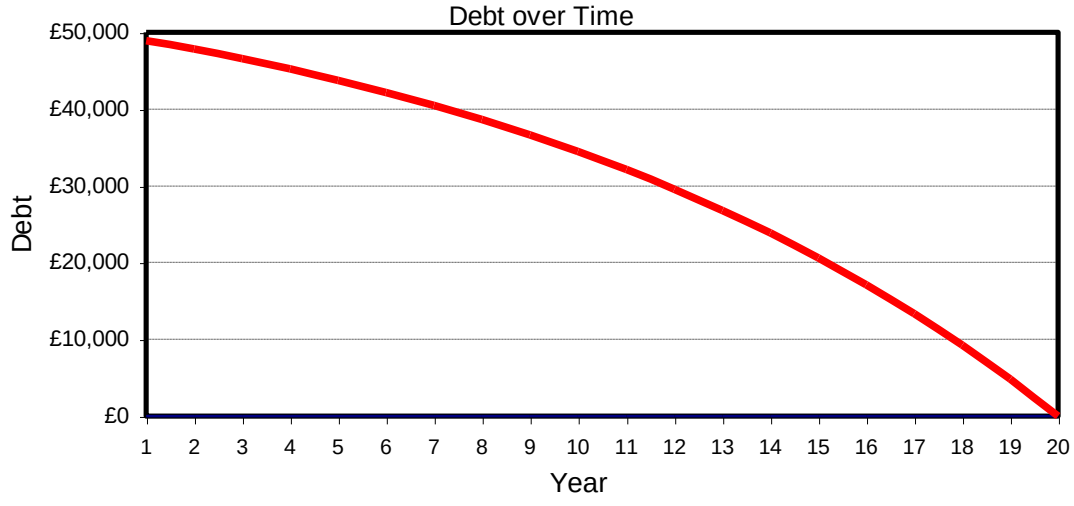
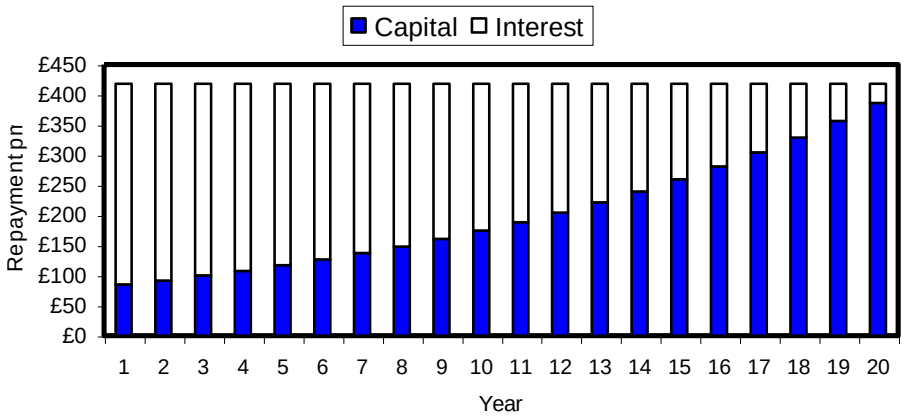


Figure 6 graphically reflects the gentle convex curve of the capital owing over time. For longer terms it is flatter to start with since the capital element is smaller and so it pays off the loan more slowly. Figure 7 shows the year-by-year mix within each monthly repayment between capital and interest.

Figure 7
Capital & interest elements of a mortgage repayment over 20 yrs



The 'Flat Rate' trap

Before computers were used regularly, lenders had to rely on hand-calculated figures, and so they often looked for easy short cuts. One such approach is still seen today and can be very misleading for short term loans unless you are wary. It is the use of the so-called *flat* rate of interest.

Let us say a lender provided a loan of £1,000, to be repaid monthly over one year and simply quoted 14% pa as the interest rate, compounding annually. You might be forgiven if you thought the following lender's explanation of his calculation to seem fair.

> *14% of £1,000 is £140. So in one year, the amount lent including interest is £1,140. If the loan is repaid in 12 equal monthly instalments, that works out to a twelfth of £1,140 each month which is £95 per month exactly, since 12 x 95 = 1,140.*

This sounds like a straightforward loan @ 14% pa. But the true annual rate in this example is actually **27.96 %**, which is almost double the quoted rate. This is because part of the monthly payment is actually repaying capital each month, so the capital debt is not £1,000 for the *whole* year. The facile, flat rate calculation assumed interest was always charged on £1,000 as if it was outstanding for the whole year, when on average only about half of it was owed over the period. Thus, the 14% quoted rate is about half the true rate.

The rate of interest of 14% used in this example is a *flat* rate. The table in Figure 8 illustrates the schedule that amortises the loan if the true monthly interest rate is 2.0757 % or 27.96% pa true rate.

In reality, the interest each month is equal to the monthly rate (2.0757% pm) applied to the debt at the end of the previous month. The debt at the end of each month is equal to the previous month's debt plus interest for the month, less repayments made in the month. Alternatively, current debt is the previous month's debt less the capital element repaid – the calculation works out the same either way.

Figure 8

£1,000 loan over 12 months at 14% pa flat rate.

Month End	Repayment Made	Monthly interest rate	Interest Element	Capital Element	True Debt
Principal					£1,000
1	£95.00	2.0757 %	£20.76	£74.24	£925.76
2	£95.00	2.0757 %	£19.22	£75.78	£849.97
3	£95.00	2.0757 %	£17.64	£77.36	£772.62
4	£95.00	2.0757 %	£16.04	£78.96	£693.65
5	£95.00	2.0757 %	£14.40	£80.60	£613.05
6	£95.00	2.0757 %	£12.73	£82.27	£530.78
7	£95.00	2.0757 %	£11.02	£83.98	£446.80
8	£95.00	2.0757 %	£9.27	£85.73	£361.07
9	£95.00	2.0757 %	£7.49	£87.51	£273.57
10	£95.00	2.0757 %	£5.68	£89.32	£184.24
11	£95.00	2.0757 %	£3.82	£91.18	£93.07
12	£95.00	2.0757 %	£1.93	£93.07	£0.00

The true rate is 2.0757 % per month or **27.96%** pa.

Early redemption or settlement - the 'Rule of 78'

Flat rate loans sometimes suffer from another impediment: the so called "rule of 78". Lenders using this rule (and they should state so in their literature) calculate the redemption figure (ie, the amount paid on early settlement) as simply the outstanding repayments. So after month one in the example illustrated in Figure 9, there are eleven payments left: so the actual amount owing is eleven times the monthly repayment of £95, which is £1,045 – yes it is actually more than you have borrowed! It then reduces by £95 each month thereafter.

The actual redemption amount owing for a "Rule of 78" loan - the same as that illustrated in Figure 8 - is shown in Figure 9 and compared with the proper, normal way of calculating redemption, by depreciating the balance as in Figure 8. Clearly the rule of 78 disadvantages borrowers who redeem early and its only justification is its so-called "simplicity". Lenders who still use it for short term loans justify its use as covering the expenses of an early redemption, or early settlement.

The method used is described in the Technical Bits. But suffice to say its name is derived from totalling up the first 12 numbers of a twelve month loan, ie 1 + 2+ 3 + 4 + … and so on: it comes to 78. This is also called the "Sum-of-the-Digits". The interest elements are then calculated as initially twelve seventy-eights, then next month as eleven seventy-eights and so on.

Figure 9

Rule of 78 redemption compared with normal for £1,000 loan over 12 months at a flat rate of 14% pa.

Month	Monthly Payment	Rule 78 Redemption	Normal Redemption	Difference
1	£95.00	£1,045.00	£925.76	£119.24
2	£95.00	£950.00	£849.97	£100.03
3	£95.00	£855.00	£772.62	£82.38
4	£95.00	£760.00	£693.65	£66.35
5	£95.00	£665.00	£613.05	£51.95
6	£95.00	£570.00	£530.78	£39.22
7	£95.00	£475.00	£446.80	£28.20
8	£95.00	£380.00	£361.07	£18.93
9	£95.00	£285.00	£273.57	£11.43
10	£95.00	£190.00	£184.24	£5.76
11	£95.00	£95.00	£93.07	£1.93
12	£95.00	£0.00	£0.00	£0.00

This rule is another hangover from the quill pen era. Nevertheless the Office of Fair Trading has outlawed this method for longer-term mortgages, particularly non-status loans where one lender in particular abused it. The OFT will probably ban its use altogether eventually. However, a separate spreadsheet is included called “Rule of 78” for those interested in the technical calculations. Different lenders may interpret the calculations differently, often allowing an extra month or two to settle.

Using spreadsheets to calculate true interest

How was the interest rate in Figure 8 calculated? Unfortunately, there is no known formula for calculating interest rate directly, by substituting all the other known variables, ie the principal and the repayment schedule. The only way available to us is by trial and error. This is why comparison exercises between various loan products have proved so difficult before the advent of computers.

Fortunately, spreadsheets have come to the rescue. Every serious student of finance should familiarise themselves with this vital tool, which fortunately is very easy to learn and use.

The disk attached to this book includes all the key examples in spreadsheet format. Some spreadsheets are essential to achieve a solution, for example when comparing any two repayment schedules, in order to identify which one is the best value for money.

What is a spreadsheet?

For the sake of any spreadsheet novices, it consists of a matrix of cells – rather like a noughts and crosses game but with many more cells, similar to the tables shown earlier. Letters along the top, and numbers down the side, are used to refer to each cell. So A1 is the top left hand corner, A2 is the next cell down and B2 the next cell right and so on.

You can then enter figures, text or mathematical formulae in any cell. But the components of a formula can be referred to by their cell addresses. If you enter say the number 5 in cell A1, and enter 4 in cell A2, then cell B2 could contain the formula A1 x A2, which will display 20, ie 5 x 4. If you change cell A1 from 5 to say 8, all the other cells are automatically recalculated and B2 will instantly display 32, which is the product of A1 and A2, 8 x 4.

Spreadsheets contain dozens of really useful tools and features that enable you to construct a complex schedule quite quickly. They are fun to build and invaluable for getting fast and meaningful results.

Goal Seek

So back to how the true interest rate in Figure 8 was calculated. One of the tools available to a spreadsheet user is *Goal Seek* (as called in Microsoft's latest spreadsheet named Excel; it is called *Backsolver* in Lotus 123). This is a totally automated trial and error process. We need to find an interest rate that amortises the final capital to zero after 12 months given the fixed monthly payment. Goal Seek will do this in a flash.

The hard way is to simply enter a succession of trial figures, recalculating each time and then improving your next trial figure, until you reach the end capital you want – usually zero but not always. The formal way of doing this is called *iteration*. This is a structured trial and error process that constantly recalculates a given formula, making finer adjustments to the required parameter on each recalculation, until a result of sufficient accuracy is achieved. *Goal Seek* does this automatically.

There are some other very useful spreadsheet functions that make use of a built in iterative process so all the thinking and the action is done for you. Please see the *Technical bits* for further details. For the moment, please trust the figures until you prove them for yourselves using one of the example spreadsheets provided or by creating a spreadsheet of your own.

The Building Society mortgage trap

One of the facts of life in the mortgage world is that mortgage repayments are nearly always collected monthly, no matter what the compounding frequency. Logically one would expect payments to be collected on the same day as the interest is compounded but tradition, emanating from the non-digital quill pen era of Building Societies, dictates a more bizarre arrangement. Many Building Societies, even today, collect monthly but compound annually.

Interestingly, this means that for a repayment mortgage, the true rate of interest is actually different every year. Like a flat rate loan, the fact that there is a capital element in your monthly payment is ignored until the year end. The higher the capital element, the greater the true interest rate.

This is dramatically illustrated in Figure 10, particularly in year 20, where a true rate of 15.5589% is the surprisingly large result from a nominal rate of just 8%.

The overall true rate will increase with shorter terms, as illustrated in Figure 11. The overall rate is the true rate taking all the monthly payments for the actual life of a mortgage rather than just for any one year.

If the number of rests per year (the compounding frequency) were the same as the number of collections per year, then the true rate would remain

constant throughout as shown in the last column. The true rate for an interest-only loan is the same as for monthly rests – 8.3% in this example.

Figure 10

A £50,000, 20 year repayment mortgage @ 8% pa nominal interest, compounding annually, but collected monthly, and showing the true rate each year.

Year	Nom.Int % pa	Monthly payment	Debt year end	True rate in year
1	8.00	£424.38	£48,907	**8.3858%**
2	8.00	£424.38	£47,727	**8.3948%**
3	8.00	£424.38	£46,453	**8.4051%**
4	8.00	£424.38	£45,077	**8.4167%**
5	8.00	£424.38	£43,590	**8.4301%**
6	8.00	£424.38	£41,985	**8.4456%**
7	8.00	£424.38	£40,251	**8.4636%**
8	8.00	£424.38	£38,378	**8.4848%**
9	8.00	£424.38	£36,356	**8.5099%**
10	8.00	£424.38	£34,172	**8.5402%**
11	8.00	£424.38	£31,813	**8.5772%**
12	8.00	£424.38	£29,265	**8.6232%**
13	8.00	£424.38	£26,514	**8.6820%**
14	8.00	£424.38	£23,543	**8.7594%**
15	8.00	£424.38	£20,333	**8.8655%**
16	8.00	£424.38	£16,867	**9.0192%**
17	8.00	£424.38	£13,124	**9.2611%**
18	8.00	£424.38	£9,081	**9.6955%**
19	8.00	£424.38	£4,715	**10.6995%**
20	8.00	£424.38	£0	**15.4489%**

Note the true rate increases to almost double the nominal rate in the last year. The reason for the difference is that capital is being repaid before interest accrues, but no credit is given. The later year's repayments include a higher capital element and hence reflect a higher true rate. The overall true rate is 8.5125% pa if the mortgage is kept running for 20 years.

The extra interest paid in this example is £1,479 more than for monthly rests at the same nominal rate. Why Building Societies continue with wacky arrangement is put down to "computer systems" but I suspect the extra profits made in the later years are not unwelcome, and most borrowers are quite unaware of this anomaly.

Figure 11

A £50,000 repayment mortgage @ 8% pa with monthly repayments: comparing the overall true annual interest rate for different terms and compounding frequency, or rests per annum.

Term years	Payment per month	True rate with annual rests	True rate with monthly rests
1	£4,500.00	15.4489%	8.3000%
5	£1,043.57	9.6334%	8.3000%
10	£620.96	8.8806%	8.3000%
15	£486.79	8.6329%	8.3000%
20	£424.38	8.5125%	8.3000%
25	£390.33	8.4433%	8.3000%

Avoiding the trap

Note that this inconsistency **only** affects capital repayment loans and not interest-only loans. Moreover, just because lenders compound annually, or sometimes quarterly, it does not mean they are necessarily poorer value for money. The overall true rate may still be lower than that for a lender using monthly rests. The problem is in making the calculation, and the answer is term dependent. The methods discussed later solve this.

How can you avoid it? Firstly, if you want a repayment loan, particularly a short term one, favour lenders who compound at or below the collection frequency. In other words, a lender requiring monthly repayments should charge interest with monthly compounding or better. Commercial lenders often collect quarterly. Provided they compound quarterly or more often, there is not a problem but beware those that don't. By *beware,* I mean ensure that the true rate is competitive for the term in question.

If you are already with a lender who compounds annually, try to repay the loan before the last few years when the true rate is at its highest. A switch to an interest-only loan would also result in a lower true rate. Alternatively, switch (re-mortgage) to another lender, with a competitive true rate, but who compounds monthly or better.

There are some benefits. If you are in arrears with an annual compounding lender, you may not have to pay interest on outstanding payments within the lender's charging year. In theory you can default for eleven months and pay the entire years payment as a lump sum just before the year end, and still not pay any extra interest. Whether a lender will allow this or not is another matter, and it would certainly not improve your credit worthiness.

Interest-only loans

From the lenders standpoint these loans are straightforward and there are none of the traps associated with the repayment method. Suffice to say that the *collection* frequency is the most relevant parameter. A monthly interest-only payment implies the interest accrues monthly; the true interest rate is then calculated the same way as with a repayment loan with monthly rests. Indeed one can look at an interest-only loan as a capital repayment loan where the term is infinity, or at least a very large number.

In the 60's and 70's some Building Societies charged a higher nominal interest rate for endowment mortgages than for repayment mortgages, to compensate for the lower return achieved when capital was not repaid monthly. That is rare today but the anomaly still exists, when rests are annual, where for the same nominal rate, interest-only borrowers enjoy a lower true interest rate than that for repayment borrowers.

The key to the value-for-money measurement of an interest-only loan is the performance of the separate repayment vehicle and this is discussed in Part II, along with the reasoning behind choosing this method.

Glossary and summary so far

Before summarising some of the basic principals of compound interest discussed so far, let me first list some definitions: -

Principal Initial lump sum of cash or capital borrowed or lent. It can also be referred to as the *present value* in a financial formula.

Interest An additional amount of money arising over a set period of time measured as a percentage of the capital amount owing at the start of the period.

Rests The number of times a year interest is accrued. Also called compounding frequency or accrual rate.

Periods The number of time intervals in which interest accrues over the term of a loan. A 5 year loan with monthly rests would have 60 periods in total.

Nominal Rate The interest rate often quoted by a lender. It is usually the periodic true rate multiplied by the number of periods in a year. Thus 12% per annum nominal is a true rate of 1% per month, equivalent to a true rate of 12.6825% per annum.

True Rate An accurate interest rate that takes account of compounding frequency. It can be quoted per period, e.g. 2% per quarter, or converted to a true annual rate.

Flat Rate A simple interest rate added on to the principal for each year of a loan. The periodic payment is calculated by dividing the total capital plus interest by the payment frequency. It is a misleading rate used originally to simplify loan calculations but is seldom used by reputable lenders.

Rule of 78 A bizarre rule to ensure that outstanding debt always equals outstanding payments - a practice that ensures a higher

	redemption amount than with a conventional, decreasing balance calculation. Lenders operating under the rule of 78 must inform borrowers of the fact as it is like suffering an extra early redemption penalty.
Payment Frequency	The number of payments made/collected during a year. This is **not** necessarily the same as compounding frequency. Building Societies often compound annually, but collect monthly, leading to some anomalies. Some calculate daily and compound monthly which makes more sense.
Repayment	The amount required to amortise a loan over a given term. Amortise means reduce the loan to zero - to literally "kill" the loan. A repayment usually contains both a capital and an interest element. Interest is calculated first, at the given rate times the capital owing. The difference between the total repayment figure and the interest element is the capital element, which is then used to reduce the total capital owing. Repayments can be made either at the start of a period (in advance) or the end (in arrears) of the period. Loans are usually repaid in arrears whereas some investments, such as annuities, can be paid in advance.
Future Value	This is any future amount owing consequent on capitalised interest less any repayments. The fundamental formula for future value at the end of every period is always the previous amount owing, plus interest, less repayments made in the period. This is a general-purpose relationship and applies even when the interest or the repayments vary every period.
Redemption	Terminating a loan earlier than the full term. Also referred to as early settlement.

Comprehension check

Now let’s summarise what we have discussed and highlight the main discoveries so far.

- Simple interest is a waste of time for proper comparisons since it does *not* take account of capitalised interest: compound interest does.
- Compound interest requires us to know the compounding frequency, in other words, how often interest is capitalised.
- Compound interest is charged on capital owing at the previous period.
- The true rate of interest, usually calculated annually, is an accurate way of comparing different schemes for value for money. There is no formula for it and it needs special trial and error procedures to calculate it.
- Compounding annually but collecting monthly (like some Building Societies) is an anomalous method for repayment loan calculations, which ignores capital paid before the year end, and results in the true interest rate being larger the higher the capital element.

- Flat rates of interest can significantly understate the true rate. Lenders using the Rule of 78 inflate the early redemption, or settlement amount.
- The nominal rate per annum is most often quoted, but you need to know the compounding frequency to determine the true rate.
- Just because lenders compound at different frequencies does not necessarily mean they are better or worse value-for-money. The true rate, calculated over the anticipated life of the loan, is the only ultimate criteria.
- Interest-only loans do not suffer from compounding anomalies but the true rate of interest depends on the payment frequency.

Daily Interest

One final footnote: some lenders say they “calculate interest daily”. This does not necessarily mean they “compound daily”. Most likely this means monthly compounding (i.e. monthly rests) but a simple interest calculation for any transactions made during the month. These transactions quite properly take account of the day in the month it took place, but there is no formal daily compounding. This is a sensible and fair method of calculation and should be adopted by every lender seeking transparency.

- oOo -

The Internal rate of Return - IRR

In the real world, interest rates are seldom fixed for long. There are also fees, charges and penalties to consider. As if compound interest wasn't complicated enough, we now have to consider a whole new set of variables.

Fortunately all is not lost as there is a very important and quite straightforward mathematical function called the *Internal Rate of Return*, or the ***IRR***, which is basically like the true rate of interest but it can cope with varying interest rates and varying payments during the repayment schedule as well as the occasional fee.

Take the £1,000 loan illustrated in Figure 12, which displays different interest rates each month. The repayments are re-calculated each month to amortise the loan from that point assuming the new rate is unchanged.

Figure 12

A £1,000 loan over 12 months at varying interest rates.

Month End	Interest rate pm (varying)	Repayment Schedule	Debt
Start		-£1,000.00	£1,000.00
1	1.0000%	£88.85	£921.15
2	1.5000%	£91.46	£843.50
3	1.4000%	£90.98	£764.33
4	2.0000%	£93.64	£685.98
5	1.0000%	£89.65	£603.19
6	0.5000%	£87.90	£518.30
7	0.7500%	£88.67	£433.52
8	1.0000%	£89.32	£348.53
9	1.2500%	£89.87	£263.02
10	1.3500%	£90.05	£176.52
11	1.7500%	£90.58	£89.02
12	1.5000%	£90.36	£0.00

The Internal Rate of Return is 1.2257% per month or 15.7414% pa true

Now, let's guess what the interest rate would have to be if it was fixed, but where the monthly repayment schedule still stayed the same as in Figure 12, amortising the debt to zero after twelve months. It comes out to 1.2257% per month or 15.7414% true rate per annum. Figure 13 over the page, illustrates why.

The table shows the identical monthly repayment schedule as shown in Figure 12. But, the interest rate column is now a fixed rate. The only column that has changed is the theoretical monthly debt, which differs because the monthly interest rate is different, although it still amortises to zero. The borrower makes the same payments and still repays the loan, but the interest rate is fixed instead of variable.

This fixed interest rate is called the *Internal Rate of Return,* and is expressed as a true interest rate, usually annually. It is a very powerful tool when used to compare two different schedules, one of which might be more favourable than the other.

Figure 13

This is the same repayment schedule as in Figure 12 but with a fixed interest rate equal to the Internal Rate of Return – the IRR.

Month End	Interest rate fixed = IRR pm	Repayment Schedule (no change)	Theoretical Debt
		-£1,000.00	£1,000.00
1	1.2257%	**£88.85**	£923.41
2	1.2257%	**£91.46**	£843.26
3	1.2257%	**£90.98**	£762.62
4	1.2257%	**£93.64**	£678.32
5	1.2257%	**£89.65**	£596.98
6	1.2257%	**£87.90**	£516.40
7	1.2257%	**£88.67**	£434.07
8	1.2257%	**£89.32**	£350.06
9	1.2257%	**£89.87**	£264.48
10	1.2257%	**£90.05**	£177.67
11	1.2257%	**£90.58**	£89.27
12	1.2257%	**£90.36**	£0.00

The IRR is a fixed interest rate that would amortise the actual repayment schedule to the same final result – zero in this case. Only the payment schedule is needed.

The IRR is a single number that represents the whole payment schedule, regardless of variations caused by numerous actual interest rate changes. The IRR looks *only* at the payment schedule, and ignores the variable interest rates that produced it. So this one rate can represent many.

You will need to use a spreadsheet to calculate the IRR or use a specially written program. There are two main ways of calculating it. If you have laid out the schedule as in the third column of Figure 13, you can use the spreadsheet function IRR (*range, guess*) to produce the answer. A more general approach is to use the Goal seek function which will calculate the rate required to amortise any given schedule, even if the schedule is defined by formulae rather than having to lay out the whole schedule – difficult for a 25 year mortgage with 300 different monthly payments. The techniques are easier to see with the sample spreadsheets in front of you.

It is important to use a sign convention when working with IRRs. Cash coming out could be negative with cash going in as positive – there must be at least one positive and negative figure in the range. Note the initial loan is shown as a negative figure whereas the repayments are positive.

Adding Fees and Charges

In summary, the IRR is the theoretical fixed interest rate required to amortise any given loan repayment schedule, regardless of how that schedule was derived. It is now really quite easy to add in any additional numbers in the schedule, such as fees and charges, at the appropriate point in time.

Take the example in Figure 12 and 13. Suppose the lender charged a £50 up-front fee. The starting cash payment was originally minus (-) £1,000 to reflect the initial £1,000 loan being received by you (remember the sign convention). We now simply change this to -£950 to take account of the £50 fee. We do not change the scheduled repayments in any way. In other words, of the £1,000 you applied for, you had to give the lender £50 so you only benefited from £950. But the actual repayment schedule is still calculated as if you borrowed £1,000.

The new IRR in this case is 27.6239% pa, up from 15.7414% pa, all because of a £50 (5% of the loan) up-front fee. If the fee were charged at the end of the loan instead of the beginning, the new IRR would be 25.08%, lower than when charged up front, illustrating the importance of timing. It can make quite a difference over a longer term.

The total amount paid out over the term, including all costs, will be the same whenever the fee is charged. But the IRR uncovers the truth and indicates that a later charge implies a cheaper loan. Although regulations insist on this total payable figure being quoted, it is not helpful when comparing one loan with another; only the IRR (and its cousin the APR) accurately reflects the important effect of cash flow timing.

The IRR is a potent tool

So to summarise, the IRR is the most potent tool we have available to analyse and compare different sets of loan schedules. It takes into account varying interest rates and repayments as well as fees and charges along the way and importantly, *when* they are made. The IRR comes from the same family as true interest rate. But the IRR is a much more sophisticated and thorough measure, as it can account for *any* cash flow schedule, and is therefore particularly good for loan comparisons.

APR

The 1974 Consumer Credit Act (known as the CCA and now amended) aimed to bring “truth in lending” to the attention of the public and to businesses providing credit. This Act first introduced the concept of the APR to the UK, which stands for Annual Percentage Rate. It was meant to be the layman’s version of the IRR. It was designed to be a comparison tool and was calculated on much the same principles as the IRR. The CCA laid down how and when the APR was to be used when advertising loan products, and indeed any credit agreement.

But, until April 2000, the APR suffered from a number of important weaknesses as far as the mortgage business was concerned, the foremost being its incomprehensibility – the rules were complex and the average person didn’t really understand it. But at least it forced lenders to quote a figure that took account of fees, costs and their timing as well as sorting out the true interest rate from the various anomalies we discussed earlier. But it also produced some dangerously erroneous results.

The CCA previously required lenders to calculate the APR in the same way as the IRR but the method imposed required two critical assumptions: -

1. The interest rate used in the calculation of the payment schedule must be assumed to be fixed throughout the entire term of the loan (even if it isn't) and must be the same as the initial rate. So if a lender offered a loan at 2% pa nominal for the first year followed by 8% pa for the remaining 24 years, the APR was calculated as if the interest rate was only 2% pa fixed for the entire 25 year term! Clearly this makes a total nonsense of today's mortgage products where early rate discounts are common.
2. The term over which the calculation is made is the full contractual term. In practice, most mortgages last around 6 years before people move house or re-mortgage. Moreover, there can be redemption penalties for stopping a loan early. Without taking into account the expected life of the loan, the APR can produce a misleading result.

The accuracy rules for the APR were also bizarre. When quoting it one had to "truncate" to one decimal point, not round. So an APR of say 7.69% had to be quoted as 7.6% and not rounded to the more sensible 7.7%. It could also be quoted up to 1% too high but no worse than 0.1% too low.

In fairness to the original drafters of the legislation, the CCA was conceived in a period when PCs and spreadsheets had yet to be invented, and so they attempted to make it easy to calculate by producing sets of tables. Regretfully, both the public and the lenders themselves soon lost faith in the accuracy of the APR because of examples above. So, what started out as an excellent and fair concept, originally billed as "truth in lending", turned out to be "untruthful" in many cases, and the whole Act ended up giving quite the opposite effect to what was intended, ending up mistrusted as a result.

In reality, interest rates *do* vary and loans *are* repaid early.

The New APR

In early 2000, a new definition of the APR was introduced. The main breakthrough is that the new APR must now take account of any interest rate changes during the term. This move rectified the most important anomaly and as a consequence of this one step, we can now have significantly more confidence in the APR as a comparator for today's' loan products.

The truncating nonsense has also been removed and normal rounding is in. One decimal point is considered sufficient but lenders are still strangely allowed the same 0.1% tolerance (lee-way) as before for under quoting. So an accurate rate of 7.44% can still be legally quoted as low as 7.3%. On a 25 year interest-only mortgage of £50,000, this can be a "lee-way" of £1,750 overall. Lenders can also over-quote by a full 1%. A 7.44% accurate APR could also be quoted legally as 8.4% although why anyone would want to do this is unclear. Unfortunately, this relaxed attitude over accuracy is sufficient to camouflage some of the subtleties of many loan products. It is a pity to define an intrinsically very accurate methodology, now easy to calculate, and then hobble the answer that it produces, thus rendering it as significantly less useful as an accurate comparison tool.

The Act is now clearer on what additional charges need to be included by defining the TCC – the Total Charge for Credit – which states exactly what charges are to be included with the payments, and what charges need not be included, before calculating the APR. For example, if payment protection insurance (PPI) is compulsory, it should be <u>included</u> in the TCC, but not if PPI is optional.

Comparing TCC's is not recommended, as it is merely a total to prove the charge inclusions and the total gives no clue on the timing of any payment.

Less happily, the full loan term must still be used to calculate APR regardless of the actual life expectancy of the loan. In practice there is little the legislators could do about this since they cannot predict ones personal choice, so at least it is consistent. But it can produce erroneous results.

As an example, take a hypothetical 25 year interest-only mortgage where the interest rate for Scheme A is 7% pa (with monthly rests) throughout the term, and there are no additional costs or fees, to keep it simple. I have used the "Loan Comparator" spreadsheet to produce the following.

<u>Scheme A</u>

The APR over 25 years is ***7.2****%*

The IRR over 6 years is ***7.2****%*

If the initial interest rate was 5% pa for 24 months, increasing to 7.5% thereafter (Scheme B) the following picture emerges: -

<u>Scheme B</u>

The APR over 25 years is	***7.3****%*	*(higher APR)*
The IRR over 6 years is	***6.8****%*	*(lower IRR)*

If one relied on the APR alone, it would tell us that scheme A is cheaper. But if the borrower was to move in 6 years time, the 6 year IRR indicates significantly better terms with scheme B: so Scheme B is cheaper for most people. The APR, while insisting on using the full contractual term, is producing misleading signals to the prospective borrower.

In short, one must still look to the IRR for an accurate appraisal, which takes account of ***all*** the relevant factors including the likely product life. Although the new APR is a lot better than the old, it is still not accurate enough for a proper comparison. The IRR remains the paramount tool.

The Net Present Value – NPV

This function is similar to IRR but calculates the equivalent present value of a range of future cash flows, given an interest rate. In other words, what would all those cashflows be worth today assuming a required IRR if you had a single lump sum instead, replacing the future streams of incomes and outgoings.

If the cashflow schedule is the same one as that used for calculating the IRR, and the IRR is used as the interest rate in NPV, the NPV will be exactly zero.

One can compare and evaluate different cash flows by comparing their Net Present Values. In some ways, the NPV as a cash lump sum is easier to visualise, and is particularly useful when evaluating the costs of switching mortgages as you must do before making a re-mortgage decision. It can be

likened to a cashback calculation. But you must be careful to use the correct, relevant interest rate assumption.

Some examples of the NPV in action are shown in the "Loan Comparator" spreadsheet and in Part II. But as another example, lets us look at the same two schemes described above, comparing IRRs and APRs.

The results in the table below show that scheme B is better value over six years because the IRR is lower as before, despite the APR being higher.

Scheme	IRR (6 yrs)	APR (25 yrs)	NPV over 6 yrs (Cashback)
A: 7% pa throughout the term	7.2 % pa	7.2 % pa	£1,100
B: 5% pa for 2 yrs, 7.5% thereafter	6.8 % pa	7.3 % pa	£-1,105

But the NPV of scheme **A** over six years compared to scheme **B** is £1,100. This means that if there was a cashback of £1,100 with scheme A, the IRR would then be identical to scheme B. Alternatively, if there was an additional lump sum fee of £1,105 on scheme B, (ie a negative cashback) it would equate to the IRR for scheme A.

So you can visualise scheme **A** being around £1,100 more expensive – an easier figure to imagine than the IRR difference. Another way of looking at the comparison is that you would need a monthly payment reduction of £18.51 for the six years with scheme A to make it comparable: this monthly alternative is also shown on the spreadsheet.

Accuracy warning

And now some words of caution. Any *future* interest rate data that you enter in these calculators, such as the "Loan Comparator", is usually just a guess as to what those rates will be in practice. In real life, interest rates are hard to predict; in fact impossible over a long period unless fixed at outset. So any comparison tool is only as good as the guesses made for the relevant variables.

Fortunately, in most cases, while the actual numbers, such as the IRR, may turn out to have been inaccurate in practice, the *comparisons* might well remain valid. In other words, if future rates turn out to be higher or lower than predicted, the difference should be fairly consistent on each comparison if the margins remain consistent, so the value-for-money ranking should therefore not change.

Where this may not be true is with loans with an initial fixed rate, changing to a variable rate later, when comparisons include both these rates within the life range of a calculation. A different variable rate guess can then easily change the value-for-money order.

Margin lock or linked rates

Some newly launched lenders offer attractively low variable rates and incentives just to get noticed, but may increase their margins later on, once they have grown large enough and become established. After a loan has

been started, most borrowers become complacent, and seldom re-check the validity of their first decision later on and rarely notice wider margins.

This somewhat cynical observation tends to apply to most new product launches in order to attract public and media interest. An exception would be where the interest rate is specifically linked (usually by a fixed margin) to an independent base rate, such as Bank of England Base Rate, or LIBOR, the London InterBank Offered Rate. With such linked rates, the lender's margin is effectively locked in throughout the loan, so whatever happens to rates in future, the interest rate formula will always remain the same.

For example, a lender might advertise a rate that is always a fixed 1.5% above 3 month LIBOR. You can look up this rate in the newspapers, as it is independently set. The only downside is that your payment will then alter every time the linked rate changes, which could also be every three months. On the other hand, the lender is then committed to that margin. This might seem attractive but improving new digital technology is constantly enabling lenders to reduce their administration costs. It could well turn out that some lender might offer an even lower margin in future.

In summary, although the calculation results are themselves very accurate, real life may turn out to be different. Market forces may eventually lower the projected variable rates, which, at worse, could invalidate your initial analysis of the best-buy. You can minimise this happening by trying a range of guesses before finally making up your mind. Life wasn't meant to be too easy.

- oOo -

Louis' Law: "One and one does not necessarily make 11".

The Technical Bits

This section is for those who wish to delve deeper into the maths and to understand the formulae connected with many financial questions.

Firstly, it will be helpful to list some of the key financial formulae that can be used in computer programming or when using spreadsheets, many of which can also be worked on a normal hand calculator.

The principle questions about either a loan or an investment can be answered using a maximum of just five key mathematical variables: -

- n The total number of time periods. A two year loan with monthly compounding would have 24 periods of one month each. The standard formulae assume n is also the number of payments
- i The true interest rate **per period** (expressed as a fraction - ie the % rate divided by 100) and assumed to be constant for n periods.
- pmt The payment **per period**, normally constant although it can vary by prescribed rates, such as annual increases.
- pv Present value or the Principal or the capital as at today.
- fv Future value of capital after n periods.

Loan repayments

When the payment made to a lender includes both capital and interest, it is referred to as a re-payment. To calculate the repayment figure (pmt) per period, given interest rate, initial & final capital & the total number of periods:-

$$pmt = pv \times i / (1 - (1 + i)^{-n}) - fv \times i/((1 + i)^{n} - 1) \quad \text{---------- (1)}$$

where i is the fractional interest rate per period, n is the total number of periods and fv is any future value: these variables are the same ones listed in the previous paragraph. If the loan amortises to zero, which is normal for a repayment mortgage, fv is zero so the second term can be ignored and then:

$$pmt = pv \times i / (1 - (1 + i)^{-n}) \quad \text{----------} \quad (2)$$

Note that $(1 + i)^{-n}$ is the same as $1 / (1 + i)^{n}$

Instead of using the ÷ sign for division (which might be confused with a minus sign) it is clearer to use / as a division sign.

So a loan of £10,000 over five years @ 9 % per annum nominal interest compounding monthly (ie 0.75 % per month true rate over 60 months) requires a monthly payment of : -

$$10{,}000 \times 0.0075 / (1 - (1 + 0.0075)^{-60}) = £207.58 \text{ per month.}$$

The payment calculated with this formula is always the payment made *per period* (in arrears) but which may not necessarily be the same as the desired payment frequency.

So, to calculate a loan where repayments are made monthly, but interest is compounding annually (i.e a typical Building Society mortgage), formula (2) above will calculate the *annual* payment. This is because these formulae all

require the payment frequency to be the same as the compounding frequency. Having calculated the annual payment, you simply divide it by 12 to get the monthly payment.

Suppose a Building Society lends £50,000 over 25 years and charges a borrower 6% pa compounding annually. What is the monthly repayment?

The annual payment is: -

$$50{,}000 \times (0.06 / (1 - (1 + 0.06)^{-25}) = £3{,}911.34 \text{ per annum.}$$

Dividing by 12 gives us £325.94 per month.

These answers can be checked out using the "Loan Comparator" spreadsheet supplied.

Another general-purpose monthly repayment formula that takes a nominal rate and produces a monthly repayment is: -

$$pmt.pm = pv \times Nom / 12 / (1 - (1 + Nom/p)^{-(y \times p)}) \text{ ---------- (3)}$$

where p is the number of periods or rests per annum, Nom is the nominal rate as a fraction (ie the true rate per period x p), y is the total term in years so y x p is the total number of periods. Whilst formula (2) is more fundamental, formula (3) is actually more useful for mortgages as it automatically deals with different compounding frequencies and always produces a monthly answer.

Calculating true rate per annum from the nominal rate

In general, the kernel within most formulae for compound growth calculations is $\mathbf{(1 + i)^n}$ where i is the fractional interest rate per period and n is the total number of time periods and repayments.

£1 will grow in 12 months @ 1% per month by the factor $(1 + 1/100)^{12}$ which works out to 1.12682. This is because we first add on 1%, ie 1.01 times the initial capital. Next month we add on another 1% of the new, higher amount now making it 1.01 x 1.01 of £1. In twelve months that will be 1.01 x 1.01 x 1.01 and so on 12 times. This is the same as saying 1.01 to the power of 12, written as 1.01^{12}. If we were dealing with simple interest the growth factor would be 1.01 **times** 12 instead of 1.01 to the **power** of 12.

To convert a monthly true rate of interest to an annual true rate, use the formula below where m is the monthly rate expressed as a fraction: -

$$\text{True Rate pa} = (1 + m)^{12} - 1$$

The answer is expressed as a fraction so multiply by 100 to get the percentage.

Using this formula, 1% per month is equivalent to a true rate of 12.6825 % per annum. If you do not have a calculator that performs powers, you can use an ordinary calculator and repeat the multiplication 12 times.

The more general formula used to calculate the true rate from any nominal rate is

$$\text{True Rate} = (1 + Nom / p)^{p} - 1 \text{ ---------- (4)}$$

where Nom is the nominal rate per annum (expressed as a fraction) and p is the number of periods per annum. This is the same formula used earlier but with Nominal rate per annum being used instead of the true rate per period.

Suppose a lender charged 8% per annum compounding quarterly so p = 4. The true rate is $(1 + 0.08 / 4)^4 – 1 = .082432 = 8.2432$ % pa true.

This formula applies to any loan or investment where any payments, if they are made at all, are at the same frequency as the interest compounding frequency. The true rate formula therefore applies to interest-only loans, like endowment mortgages, as well.

But the true rate calculation is different if repayments are made say monthly but interest is compounded annually. It is then necessary to look at the actual cash flows and use a trial and error method, an iteration process or a special spreadsheet function, as used in the example in Figure 8.

Natural growth

Note that in the example shown in Figure 4, the true rate for 12% pa nominal is tending to maximise at 12.749685. The higher the frequency you compound at, the nearer true rate will approach a maximum, but never quite reach it. There is an analogy here to natural growth. Living cells might grow continuously rather than in monthly spurts, and compounding continuously is perhaps the most natural way for all compound interest calculations. But it is not so easy to write it all down so as to follow the calculations period by period, as required in a simple monthly statement.

For pure maths students it is interesting to note that when i is 100% and the period approaches infinity, the formula $(1 + 1/p)^p$ is approaching 2.718281. This is one of the few magic, irrational numbers in mathematics like $\boldsymbol{\pi}$ (pie), which is the circumference of a circle divided by the radius. This one is called ***e*** (After Euler- a great classical mathematician) and is essential in many areas of pure mathematics and is the base for natural logarithms.

The growth analogy is relevant for cells which double continuously (ie a nominal growth rate of 100%). ***e*** is like $\boldsymbol{\pi}$ and is an *indeterminate* number where the decimal figures go on for ever to whatever accuracy you desire.

Interestingly ***e*** is linked to $\boldsymbol{\pi}$ by another strange number called ***i***, which is the square root of –1 and is an *imaginary* number. (This ***i*** should not be confused with the **i** for interest used in financial calculations).

The remarkable formula that connects all three with the two other special numbers, **0** and **1** is: -

$$\mathbf{e}^{\boldsymbol{\pi}\, \boldsymbol{i}} + \mathbf{1} = \mathbf{0}$$

…but that is another, fascinating story.

- oOo -

Murphy's other law: "If mathematically you end up with the incorrect answer, try multiplying by the page number".

Other Formulae – still in the Technical Bits

(Please move directly to Part II if it gets too heavy!)

Cash flow sign conventions

It is helpful to set a convention when dealing with positive and negative answers to financial formulae. One convention is to assume that all payments **in** are negative and all payments **out** as positive. You can put it the other way round but you just have to remember what a negative or positive result actually means.

Future Value

In a repayment mortgage, it is often useful to know what the capital owing will be after a set time period. You have already met the somewhat trivial formula for calculating *Future Value* (fv) from *Present Value* (pv) assuming no repayments. This simple calculation is: -

$$fv = pv \times (1 + i)^{n}$$

But there are usually regular payments involved and then the following general formula is more useful: -

$$fv = pv \times (1 + i)^{n} - pmt \times (((1 + i)^{n}) - 1) / i \quad \text{---------- (5)}$$

As before, this formula requires the pmt frequency to be the same as the compounding frequency so i is the fractional rate per period, n is the number of periods and pmt is the repayment per period: pmt is negative if investing.

As an example, let us take a mortgage of £50,000 over 25 years at the rate of 6% pa compounding monthly. The monthly rate, i is then 0.06/12 = 0.005 % pm. The period, n is 25 x 12 = 300 months.

We must first work out the repayment, if not already known, using the earlier formula (2): -

$$pmt = pv \times i / (1 - (1 + i)^{-n})$$

This gives $50{,}000 \times (0.005 / (1 - (1 + 0.005)^{-300}) = £322.15$ per month.

Now suppose we wish to calculate the capital owing in five years time or 60 months. Using formula (5) gives: -

$$50{,}000 \times (1+.005)^{60} - 322.15 \times (((1 + .005)^{60}) - 1) / 0.005 = £44{,}966$$

That is obviously a long-winded calculation. Clearly the use of spreadsheets is a great advantage here, as you need only enter a general-purpose formula once. You then simply enter the variables to produce an instant answer.

If pv is zero, formula (5) simplifies to: -

$$fv = - pmt \times (((1 + i)^{n}) - 1) / i$$

Why is the result negative? The answer is because if there is a zero principal, any further payments will start to overpay the debt – the debt is negative. One would normally use this formula as an investment rather than a loan. In this case one would start with nothing (pv = 0) so: -

$$fv = pmt \times (((1 + i)^{n}) - 1) / i$$

If one invests say £100 per month at 1% per month for 12 months the resultant capital is given by: -

$$100 \times (((1 + .01)^{12}) - 1) / .01 = \text{£}1,268.25$$

Repayment vs Endowment

One of the false arguments often put forward to support endowment mortgages (interest-only plus an endowment policy) is to consider what happens when you move house in a few years time. The argument goes as follows. An endowment mortgage theoretically always finishes on the same date, which is whenever the endowment policy matures, regardless how often you move because you use the same endowment policy for each new mortgage. So if you borrow the same amount, the monthly cost remains the same despite the new term of each new mortgage being shorter.

This argument is quite correct so far. But then it goes

> "With a repayment mortgage, so little of the loan has been repaid in the early years that you have to borrow virtually the same amount again when you move. So to keep the cost down to the same level as before, the mortgage term has to be the same as it was, so projecting the mortgage end date further into the future: any shorter term would increase the monthly repayment. But the wonderful endowment mortgage does not need extending to keep the cost the same!"

This argument is quite wrong, and we can see why when we apply some basic mathematics to the repayment mortgage.

Suppose you have a £50,000 bank mortgage over 25 years @ 6% pa compounding monthly, as in the last example. We worked out that it requires a payment of £322.15 per month.

If you then move house after say 5 years, we have already calculated the amount you have to pay to redeem the mortgage in five years time as being £44,966. So, supposing you wanted to borrow £44,966 again but over 20 years this time to end on the same date as before – as you would with an endowment mortgage. What is the monthly repayment?

Applying formula (2) we get: -

$$44{,}966 \times (0.005 / (1 - (1 + 0.005)^{-240}) = \text{£}322.15 \text{ per month}$$

This is precisely the same figure you were paying before. When you think about it is has to be so: when you redeem, you pay back with a lump sum but an instant later, you borrow precisely the same amount again, so the schedule should not change in any way. There is no payment difference over the new shorter term and so no term increase is required to maintain unchanged monthly costs. What is different is that you need to borrow *less* each time you move with the repayment mortgage. But now you can prove it!

Term

Given the payments and the interest rate it is possible to work back to the term (n) of the loan (pv). The following formula uses logarithms to any base:

$$n = - \log(1 - pv \times i / pmt) / \log(1 + i) \quad \text{---------- (6)}$$

So reversing the earlier bank mortgage calculation where pv is £50,000, i is .005 and the pmt is £322.15, this formula produces n = 300 months (25 years) as expected.

Present Value

Occasionally one needs to calculate the Principal (*Present Value*, or pv) given certain other variables. Fortunately by rearranging the formula (5), pv can be readily derived. Take formula (5): -

$$fv = pv \times (1 + i)^{n} - pmt \times (((1 + i)^{n}) - 1) / i)$$

By rearranging

$$pv \times (1 + i)^{n} = fv + pmt \times (((1 + i)^{n}) - 1) / i)$$

So $$pv = (fv + pmt \times (((1 + i)^{n}) - 1) / i) / (1 + n)^{n}$$

You can tinker with this formula to improve the look but the result is the same however it looks. If fv is zero, pv is equal to the Principal for a repayment mortgage. The formula is then better arranged to: -

$$pv = (pmt \times (1 - (1 + i)^{-n})) / i$$

An application might be to calculate what size loan one can afford given the monthly payment and the interest rate. Say you could manage £500 per month over 25 years and the rate of interest is 6% pa throughout, compounding monthly as before. The Future Value (fv) is zero as the loan amortises to zero. So the Principal is given by: -

$$(500 \times (1 - (1 + 0.005)^{-300})) / 0.005 = £77,603$$

This means that £500 per month could support a £77,603 mortgage given the 6% interest rate. In practice, interest rates are seldom fixed for long and it is necessary to make a guess as to the future average interest rate. This task is almost impossible but there is a way round it using flexible payment mortgages, as discussed in Part II.

Increasing payments

This is a more complex formula, and is used for any annuity calculations where the monthly payment increases annually by a fixed amount: it was also used for the original Flexible Payment Mortgage in the eighties.

Assume the initial loan/investment was pv and the final debt was fv, (ie zero if it was a repayment mortgage or an annuity. Nom is the nominal interest rate per annum, t is the true interest rate per annum and j is the percentage payment increase rate every 12 months. Rates are **not** expressed as fractions in this formula.

$$Pmt = (\mathbf{A} * pv - \mathbf{B} * fv) * (Nom * (t - j) / (1200 \times t))$$

Where A and B are factors calculated as follows: -

$$\mathbf{A} = 1 / (1 - (1 + (t - j) / (100 + j))^{-y})$$ where y is the term in years

$$\mathbf{B} = 1 / ((1 + t / 100)^{y} - (1 + j / 100)^{y})$$

An example would be an annuity type mortgage of say £100,000 amortising to zero over 25 years at 7% pa nominal, compounding monthly, and with payments escalating at 5% per annum. The true rate, t , comes out to 7.2290% pa, j is 5, **A** is 2.44774 and **B** is 0.42752. Note that **B** is not actually required if fv is zero.

The initial payment is then £440.27 per month, escalating by 5% pa.

This calculation produces the same result as an investment of £100,000 into a 25 year temporary annuity, with monthly payments of £440.27 per month, escalating by 5% per annum.

Flat rate loans and the 'Rule of 78'

For a flat rate loan L at f % pa over M months, the total interest payable, T is given by: -

T = Loan x f% x M / 12 and the monthly payments, P = (T + L) / M

The interest element in month **n** of a loan of M months max is given by

I = T x 2 x (M + 1 - n) / M x (M + 1)

The remaining interest R still due is T minus all the I's for each month to date or from the following: -

R = T x (M + 1 –n) x (M – n) / M x (M + 1)

The redemption (early settlement) capital owing is P x (M – n).

So for a £1,000 loan over 12 months at 14% flat, T = £140

P = 1,140 / 12 = £95 per month.

In month 6 (n = 6) the interest element is 140 x 2 x 7/ (12 x 13) = £12.56.

The capital element is 95 – 12.56 = £82.44

The redemption figure is 95 x 6 = £570 which includes outstanding interest.

The true monthly interest in this example is 2.0757%, calculated by any of the methods described herein.

Spreadsheet solutions

All the above formulae are made much easier by using spreadsheet functions and for the sake of completion, the main Excel functions are summarised below but using the same classical variable definitions we used before.

Excel is the spreadsheet application created by Microsoft and is used by around 80% of all spreadsheet users. It is often bundled in free with new computer applications or included in the "Works" suites. Lotus sells their 123 spreadsheet, which does read Excel spreadsheets except some of the more exotic functions (which sadly often include the financial functions). The layout can also need adjusting in some cases.

Functions use a series of parameters in brackets, some of which can be omitted. As with the formulae, the assumptions are that the interest rate is fixed, that the periods are of equal time and the payments are also constant and coincide with the rest period.

Payment (pmt) is given by **PMT (i, n, pv, *fv*, *type*)**

where *type* is either 1 for payments in advance or 0 (or omitted) for the more normal payments in arrears. Alternatively you can remember the simple rule that you can convert from advance payments to arrears by simply multiplying or dividing the result by (1 + i).

The *fv* variable is also optional but is useful where the loan does not amortise to zero but to a positive *balloon* payment. It is also useful for a mixed mortgage, which is part repayment and part endowment where the future value is the endowment element.

It is important to remember the sign convention for positive or negative cashflows. Substituting positive figures in PMT will always produce a negative result to indicate that you make the payment (outwards movement) as opposed to the pv which is the sum you receive (inwards movement) and so it is positive.

Excel defines n as *nper,* which means both the number of payments and the number of periods. This forces the user to accept that these formulae assume the payment frequency to be the same as the compounding frequency. We can still think of n as the number of periods provided we remember that the result is a payment per period, which is not necessarily per month.

If we are calculating a Building Society repayment where the interest is compounded annually, i must be the annual rate, n is then in years and PMT calculates the annual payment. The monthly payment is then obtained by dividing the annual payment by 12. We have seen earlier that this produces a true interest rate anomaly where the true rate differs every year.

Future Value is given by: **FV(i, n, pmt, *pv*, *type*)**

Present Value is given by: **PV(i, n, pmt, *fv*, *type)***

Term (n) is given by: **NPER(i, pmt, pv, *fv*, *type)***

Deriving the interest rate

As stated earlier there is no way to rearrange any of the earlier formulae to obtain interest rate. You are of course welcome to try! But there are several approaches of which the easiest is to use a spreadsheet with a RATE function or similar.

i is given in Excel by **RATE(n, pmt, pv, *fv, type*)**

This looks so simple, but there is a lot of iterative computation going on underneath the bonnet. Fortunately we do not need to open the bonnet to use the function. Remember that this function assumes fixed interest, fixed payments made at the same time as interest compounds, and constant time intervals.

The old Hewlett Packard financial calculators produced excellent results and I still, to this day, use a 15 year old HP12C. It has the five main financial keys i, n, pmt, pv and fv. You enter any four known ones (with zero if relevant) and press the fifth key for the calculation of the unknown variable. Calculating the interest takes some seconds, as the calculator goes through its iterations (automatic trial and error) to eventually hone in to as accurate an answer as possible.

The Internal Rate of Return – IRR

All the formulae & functions up to now assume that the interest rate is fixed, that the periods are of equal time and the payments are also constant and coincide with the rest period.

But the IRR is the theoretical *fixed* interest rate that can apply to *any* cash flow schedule however caused (by varying interest rates, payments or additional fees or bonuses) and produces the same end result. The only stipulation is that the time intervals are constant although you may have a zero entry for any time period.

The IRR is the most valuable financial tool we have to compare and evaluate loans and mortgages with differing interest rates, and it is used in Part II and in the example spreadsheets.

The spreadsheet function is **IRR**(**cash-flow range, *guess*)** where the range is a list of cells like A1 to A12 (written as A1:A12) that contain the numbers for which you wish to calculate the IRR. This could be the repayment schedule for a loan, including interest rate changes and fees.

The *guess* is optional (assumed to be 10% if omitted) but since the process is a 20 stage iteration, sometimes the default guess will not produce a final answer, so it is best to start with as near a guess as possible, particularly for large or negative answers.

The cash flow range of figures must include at least one positive and one negative figure, and it must be listed in the correct chronological order. The examples given earlier in Figures 12 and 13 were calculated using the IRR function and are replicated in the spreadsheet supplied.

APR – Annual Percentage Rate

The formula used to calculate the APR uses the same principles as the IRR although the assumptions about the term are forced by the legislation, as is the resulting 1 decimal place rounding and 0.1% variation. The Consumer Credit Act lays down the fundamental formula for calculating APR, slightly simplified as follows:-

$$\text{Loan} = \text{Initial Fees} + P_1 / (1 + i)^{a} + P_2 / (1 + i)^{b} + P_3 / (1 + i)^{c} + \ldots$$

Where P_1, P_2 etc are the periodic payments and a, b etc are the periods, usually 1,2 etc up to say 36 for a three year loan. The payments include fees and costs where relevant, as prescribed by the Act.

The trick is to find **i**, which is the APR per period, and an iterative solution is essential. If you assume the periods are months, **i** will give you the monthly APR, which is then easily changed to the annual APR with formula

$$(1 + i)^{12} - 1$$ where **i** is the monthly rate.

The iterative procedures used to calculate IRR rely on a formula similar to this same, fundamental formula. The results for the IRR and the APR are identical, given the same assumptions and accuracy restrictions.

I would not recommend you use this ‘official’ formula to calculate the APR in practice, because the simpler, automatic spreadsheet functions come up with the same result.

Net Present Value - NPV

This function is similar to IRR and calculates the net present value of a range of future cash flows, given an interest rate. In other words, what would those cashflows be worth today to you today if you had a lump sum, instead of the future stream of incomes and outgoings. It is given by **NPV(rate, cash-flow range)** where you enter an assumed fixed rate and the NPV produces a value equating to the projected cash flows range. If the range is the same as for the IRR above and the IRR is used as the rate in NPV, the result will be zero.

One can compare and evaluate different cash flows by comparing their Net Present Values. In some ways, the NPV is easier to visualise and is particularly useful when evaluating the costs of switching mortgages as is

necessary before making a re-mortgage decision. It can be likened to a cashback calculation. But you must be careful to use the correct, relevant interest rate assumption.

The next step

We now have at our disposal all the proper tools so we can investigate actual loan products in some depth. In Part II we look at these real life situations where interest rates are variable, fees are charged, options are offered and most importantly, we might have to choose a product from literally thousands of alternatives.

We will also see how to create wealth by borrowing.

- oOo -

George Bernard Shaw: “Lack of money is the root of all evil”

Part II - The Practice

Introduction

The objective of Part II is to apply the science learnt in Part I by applying it to real schemes, and to enable the reader to have a clear idea on how to choose a mortgage, and how to exploit a mortgage to make money.

The aim throughout has been to explain fundamental concepts, and to encourage thinking from first principles so that the reader can go forth as a wiser person, rather than simply produce an instantly forgettable list of empirical rules, with little explanation. As a consequence, the book should not date too much, since the basic principles described can be applied to more or less any new fangled scheme – at least as far as I can predict.

The main aspects discussed in this part are as follows: -

- Establish that there are subjective views on which scheme to choose and it is not all just hard logic.
- How to decide whether to buy or rent a home.
- Pros & cons of interest-only loans and an explanation of the endowment mortgage ‘scandal’ exposed first in 1999.
- Identifying different mortgage schemes as groups, such as cashbacks, discounts, fixed rates, flexible mortgages, with full explanations.
- Presenting some criteria for choosing a scheme to suit an individual’s attitude and experience. Introducing a “wizard” to help you choose.
- Having now understood the basic structure of a mortgage, use it to make money by buying and renting, exploiting the concept of gearing.
- For those wanting more, how to use a geared portfolio of commercial mortgages to make over a million pounds.
- The Lender’s perspective and how they would design a mortgage.
- For the retired homeowner, an overview of Equity Release schemes, Home Income Plans and Reverse Mortgages.
- The Epilogue summarises and peeks into our digital future.

Then there are some Annexes for general interest.

- Annex A outlines the birth of the original flexible payment mortgage concept out of an index-linked mortgage in 1979.
- Annex B summarises the still unstable status of mortgage regulation, including the mortgage code and a summary of CAT standards.
- Annex C is a list of the largest thirty lenders as at May 2000.
- Annex D lists the spreadsheets included on the disk supplied (or on the web site).

The spreadsheets available from the website are really very useful and easy to use. I urge even rank beginners to give them a go. At a stroke, you can then become a mortgage connoisseur, able to analyse many different scenarios and get instant answers to all your "what if…" questions.

Emotions triumph over intellect

Many years ago, I read a leaflet explaining the art of salesmanship, which was written for the Chartered Insurance Institute. At one point, it stated, "the emotions are a far more powerful motivator than the intellect". At first, I thought it was a mistake – how can the heart rule the head?

But soon after my early sales experiences, the penny gradually dropped. People did actually seem to judge a book by its cover, or favour a car by its colour and prefer clothes in vogue with the latest fashion fad. Whether the book was a good read, the car was well built or the clothes were functional was often quite secondary, despite a consumer reticence to admit it.

An early client of mine once listened to my carefully worded, mathematically correct argument proving (beyond all doubt I thought!) that it was better to **borrow** to buy a house and invest her cash separately, especially when tax relief was at its maximum in those days. She admitted that my proposal was probably quite correct, but she just did not feel comfortable owing all that money and much preferred to use her cash to buy the house outright.

The emotions triumphed over the intellect: I was distraught at the time since she refused the mortgage and even felt good about it. Had the mortgage interest rate been zero, she might possibly have changed her mind – some deals do have their price. But the moral of the story is that people do not always decide solely on an objective, mathematical proof: attitudes and feelings are important too. So while comparative tools are useful, in reality, the cheapest is not always perceived to be "the best". With experience, I later began to identify some of the reasons behind such emotional concerns and was able to address them more fully.

Pricing a feeling and separating the logic.

In Part I, for those readers who stuck it out, we looked at some of the basic tools used to compare the true cost of one loan product compared with another. In particular, we identified the Internal Rate of Return, or the IRR. This single, fixed interest rate figure represents the true value of a whole schedule of varying cash flows, including fees and costs and, more importantly, when they occur.

We also briefly described the use of the NPV, or Net Present Value, which calculates value as if you had a single lump sum today, in exchange for a future stream of varying incomes and outgoings. The NPV can be easier to visualise in certain situations, particularly when comparing the subjective features of a mortgage.

The principal use of the IRR and the NPV is as a comparative measure. Given that we can rely on the rates and figures entered in any loan repayment schedule, the product with the lowest IRR is the best value-for-money. But that is not the only story: if we wanted the cheapest form of transport we would all go to work on scooters. Although you still arrive at the same destination, the ride may not be all that comfortable, particularly if it rains, so it may be worth paying extra for a little protection or functionality.

Some mortgage products offer more subjective value and therefore might be worth paying more for in terms of a higher IRR. A flexible payment facility is very useful to some people; some like the stability of fixed interest rates; others may prefer capped rates and so on. They may be happy to pay more provided they know *how much* more. There remains a need for a value-for-money analysis so that these more subjective features can then be priced and compared by using an accurate and consistent measure. You may prefer, say, a fixed rate mortgage, but is it worth paying an extra £1,000 up-front for it? Some might say yes, if it meant stable payments. In short, while the best choice might not always be just the cheapest, we still need to know the real cost.

For comparing loan products we looked at the new APR (Annual Percentage Rate) as being a better measure than the older pre-April 2000 APR definition. But it only measures IRR over the full contractual term, even though most mortgages finish well before their full term: moreover the APR accuracy rules are insufficient for a precise comparison, so we still need to use the more specific IRR for accuracy.

Preliminaries

Ultimately, we all want to know how to select the best mortgage to suit a particular set of personal circumstances, and such a method will hopefully be self-evident by the end of Part II. Borrowers may still need help from a professional adviser, but they will be better able to ask the right questions if they are better informed. But before looking at the more emotionally related factors, let alone starting to compare products mathematically, we need to look at a few other aspects of loans as useful products. Perhaps the most fundamental question is whether renting is a better alternative to house purchase?

So we will first be looking for answers to the following questions: -

1. Is it better to rent a house or buy one with a mortgage?
2. What are the advantages and disadvantages of interest-only mortgages, and what is the so-called endowment mortgage scandal in the UK all about?
3. What are the various types of mortgage schemes, and how does one select the best one?

To set the scene, let's first add a few more basic definitions: -

Mortgage Better known as a loan secured on land or property, but more precisely it is the actual legal deed setting out the lending terms. A lender can force a sale if you breech the loan conditions.

Re-mortgage A mortgage that replaces an existing mortgage without moving house. A re-mortgage can be for a larger amount than the old mortgage. It is always worth considering a re-mortgage from time to time to see if you can obtain a better deal. See the "Remortgage" spreadsheet.

Loan-to-Value % The LTV is a ratio of the loan to the value of the property, expressed as a percentage. A £90,000 mortgage secured on a £100,000 property represents an LTV of 90%. Most lenders limit the maximum LTV to 95% but

	some will go to 100%, which means no deposit is required at all. See Indemnity Policy.
Equity	The difference between the sale value of the property and the total of the loan charges, ie mortgages. This is usually the same as the deposit for a purchase.
Income Multiples	Most lenders base the maximum advance that they are prepared to offer on what they think you can afford. A commonly used simple rule of thumb is a multiple of your gross annual income. Typically, many lenders will consider a loan of up to three times your gross annual income. If you have a partner joining in the mortgage, their income can be taken into account as well, although at a lower multiple.
Affordability	As an alternative to using the coarser income multiple measures, more lenders are now using an affordability calculation. The maximum loan they think you can afford depends on factors such as how many children you have, what your spending habits are and so on. Lenders apply different models so it is difficult to predict the outcome of a mortgage application in advance.
Indemnity Policy	The higher the LTV, the greater is the risk to the lender of making a loss, since the equity is smaller. Not only does smaller equity provide less cover, but also borrowers are more likely to default, as there is less for them to lose. Lenders set a maximum LTV, typically 75%, which they consider "normal". Any higher loan can require a lump sum premium to pay for a mortgage indemnity guarantee policy (MIG), which covers the excess lent over 75% in the event of a loss on a forced sale. Most lenders will allow the premium to be added to the loan. Some lenders now take the risk themselves, or alternatively pay the MIG premium themselves. In fairness, the higher LTV is undoubtedly more risky for the lender, and borrowers should not be surprised if lenders charge high LTV borrowers more, in one way or another.
Second Charge	Several lenders can take a charge on your property. Any one of them has a legal right to sell the property if you have defaulted on their particular loan agreement. The first lender has the first charge. This means they have the first pick of the sale proceeds before any other lender. Lenders can have a 1st, 2nd or even 3rd or more charge on your property. From the lenders point of view a second or subsequent charge is less secure as the prior charge has control. After the 1st lender has taken its due, there may be insufficient money left for any later lender. As a consequence, interest rates are usually higher for 2nd or more charges**.** A property with no charges is referred as "unencumbered".

Mortgagor The borrower. Note that the borrower still owns the property and not the lender. Any equity belongs to the owner, even if the lender forecloses – the lender can only take what it is owed. The owner is responsible for the upkeep of the property. The lender can only force a sale through the Courts and only then if there have been serious arrears or other breaches of the loan agreement.

Mortgagee The lender, who takes out the legal charge on your property, usually a first charge but sometimes a second or third charge.

Covenant Most loan agreements insist that you covenant to repay the loan regardless of any security deficiencies. If your house sale, forced or otherwise, still leaves a shortfall, the lender is still entitled to be repaid out of your income and any other assets you may have.

Redemption Fee Some lenders charge a fee if a mortgage is redeemed (repaid or settled) earlier than contracted. Most would waive this fee if the borrower stayed with that lender, and took out another mortgage at the same time of at least the same amount. The charge is justified when an initial discount is offered. Lenders hope to recoup that discount over a period, and if you redeem early, they rightfully would wish to charge you for the shortfall. Redemption fees can also rightly apply when a fixed rate mortgage is redeemed early to compensate the lender for having to break its fixed rate contract with third parties.

Some lenders charge a redemption fee even after any special discount or fixed rate period has expired. This is often called a tied-in redemption fee. The Office of Fair Trading (OFT) felt that was unfair, because the lender could in theory increase the future variable rate to an unfair figure. Nevertheless, such tie-ins can still be valid if they mean a better IRR and, if you intend to stay with the lender in question, the fee is seldom charged anyway. The OFT assumes that all borrowers need protecting from unscrupulous lenders, although it would never be in a lender’s long term interests to exploit this situation – otherwise every variable rate borrower would be vulnerable at all times.

Freehold The legal right to hold land or property as the absolute outright owner, free of payment or any other duty owed to another party. As a freeholder, you can then offer to rent your land or property to parties with whom you'll have a legal agreement.

Leasehold Holding a 'leasehold' gives you the right of possession, but not ownership, of a property for an agreed period of time. Ultimately, ownership remains with the freeholder. The duration of the right of possession is usually a fixed

term granted by the lease. The lease will set out details of rents and obligations such as repairs etc. Leasehold is in direct contrast to freehold where ownership is absolute.

Tenant A person or company who rents or leases property for a short period of time: also called the lessee (the landlord is the lessor). During that time tenants can occupy the property as if they were a temporary owner, in exchange for paying a regular rent. The terms and conditions are set out in a lease or rental agreement. Most residential tenancies these days are *shorthold* and are for terms of at least 6 months but not often more than 12 months. Most landlords are now very much more flexible now the law is generally more supportive of the rented sector.

One can also acquire a property (typically a flat in a block) on a *long* leasehold (say 100 years) and pay a modest *ground re*nt to a landlord: this is virtually the same as owning the freehold. A long lease however often includes terms for the upkeep of the "common parts" such as gardens, staircases, lifts and so on.

MIRAS Mortgage Interest Relief at Source – abolished since 6th April 2000. Before that date, successive governments have subsidised house purchase by allowing tax relief on mortgage interest. MIRAS did not change the relief, only the way it was collected: borrowers paid a net figure to the lender and the lender reclaimed the relief from the Inland Revenue. Before MIRAS was introduced in the early 80s you had to claim the tax relief by an adjustment to your PAYE code.

But governments have gradually eroded the relief (and how it is applied) over a long period, first restricting it to basic rate tax, then only on the first £25,000 loan (subsequently raised to £30,000) and then cutting the rate of relief down to 10% of the interest up to £30,000 and finally abolishing it.

A mortgage can be an investment

To many people, a mortgage seems to be more of a burden than an investment and they need a house more for nesting than investing. Nevertheless, a well-chosen property bought in conjunction with an equally well-chosen mortgage can prove to be a fine, long term investment. There are over a hundred different lenders offering a plethora of diverse mortgage schemes and products and there are thousands of different combinations.

There is no one single best buy for everyone, just as there is no single best buy product for investors. Much depends on personal attitudes to aspects like risk and reward. Some people are quite comfortable with a safe and secure investment return of say 4% pa, and would question the logic of trying for a 10% return if there was a chance of loosing their capital. Others might

say what is the point of accepting a paltry 4% when it is possible to go for 20% - it's a chance worth taking. Either philosophy carries its own lifestyle risk. A ‘safety first’ approach may result in a lower, but consistent, standard of living, whereas a speculative approach might create a millionaire - or a pauper.

A mortgage considered on its own is a sort of negative investment and the property it intrinsically supports provides the upside. We need to make the optimum choice for both components to ensure we get the best value for money overall.

Fortunately it is possible to set down a method to arrive at your own personalised "best buy". Once you have some knowledge of the individual ingredients that make up this best-buy decision, it is then fairly straightforward to come to your own conclusion.

But before looking at the mortgage schemes themselves in more detail, we must first consider a fundamental question.

Is buying a house better than renting one?

Everyone needs a home once they have departed their parent's nest; most people want to build their own nest anyway.

All home hunters have an initial choice between renting and buying. It is helpful to look at the financial pros and cons of each option to see if one approach is a better than the other. The short answer is that renting is probably better for a person likely to want to move within about two years. Buying a house, with a mortgage, is probably the best bet for the longer term. Let us see why.

Renting usually requires no more than a month’s rent as deposit, a regular rental payment in advance and, depending on the tenancy terms, the landlord usually looks after major repairs. Renting is straightforward, quick and easy and can be for short or long term. But the money expended on rent is gone forever.

Buying your own home usually requires a deposit, some cash for professional fees and a mortgage. House purchase can be quite a frustrating process over a period of months. However, houses do tend to increase in value. They can of course fall in value too, and have done so. But in the long term, houses have always risen in value, usually in line with wages.

Thirty years ago I remember a colleague saying to me "Buy land - they don't make it anymore, but they do make more people. A constant supply and increasing demand mean only one thing - prices go up!” Manhattan Island in America was bought for just $24 in 1626 – that’s now the whole of New York - worth probably $24 per square millimetre today!

Well that prophecy has proved right in the long term but it was pretty uncomfortable for many people when house prices fell continually for 5 years in the early 1990's. Have a look at the graphs in Figure 14 and 14a, which illustrate the last 30 years of house prices, wages and inflation.

Figure 14
Average UK House Prices, Wages & Inflation 69-99

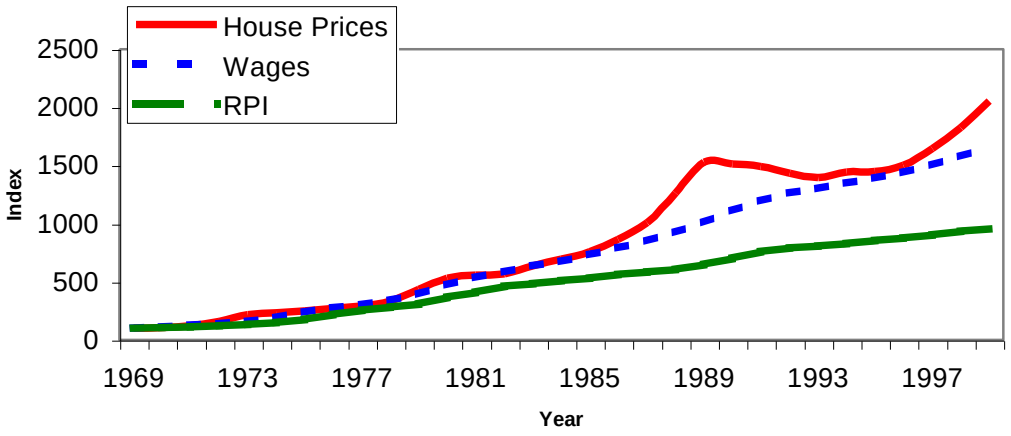
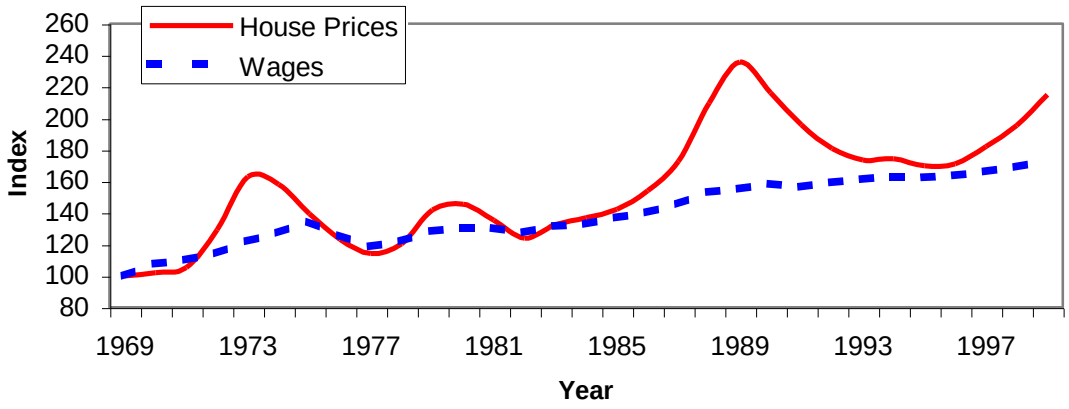


Figure 14a - Average UK House Prices & Wages 69-99
Adjusted for inflation



One of the causes of the fall in house prices in 1990 was the previous five years boom. This boom culminated in an almost indecent rush to buy a house in the late 1980's. Everyone wanted to make money out of the attractive increases in house prices regardless of personal affordability. Moreover the government had disclosed that they intended to reduce MIRAS (Mortgage Interest Relief at Source) for couples unless they obtained their mortgage before a given date.

This simple indiscretion seeded the frenzy that was to follow, with some couples buying houses with no forward planning apart from greedy profit sharing. The following economic recession significantly reduced confidence in the job market at a time when many wanted to take their profits. People do not like buying houses when confidence is low. The consequent downward adjustment in house prices was inevitable.

The depressing house price figures throughout the early 1990s were a correction of the earlier stampede. A useful statistic to determine the state of the housing market is the ratio of average house prices to average wage earnings. In a "normal" economy this ratio is around two and a half to three

and a half. In the late 1980's, it rose to five in some regions, indicating that people were buying houses at almost any cost.

The future of house prices

It is also remarkable how different areas of the UK experienced quite different growth and decline pictures, each with their own local reasons. See the "House Values" spreadsheet for a regional history. But a home is so fundamental to life that it is likely to remain everyone's desire for the foreseeable future. One might conceive of different community lifestyles in years to come, but basically everyone needs their own independent space. The need for homes should ensure that their market value would match what people can afford. At least, that is the theory, which has operated in practice for the last 500 years of record keeping.

As our standard of living improves, our capacity to buy a decent house rises also. Houses are not wasting assets like cars. They last a long time if they are well built. Property prices tend to increase in line with what we can afford to buy – this is basic supply and demand economics. While the price of new goods like cars and TVs moves with price inflation, new and "second-hand" houses tend to move with wage inflation. In an economically growing society, wage inflation outstrips price inflation by the economy's growth rate. Therefore property prices should rise by more than inflation in the long term, and indeed has done so in the past.

So, assuming that property prices are likely to rise over the long term with perhaps occasional dips, but probably not as dramatic as those in 1990, let us compare the cost of renting with the cost of buying over a period of say seven years. The average life of a mortgage is five to seven years, which reflects people's need to either move to another job area, or simply to move up the price range to match their improving income and prospects. Mortgages seldom last throughout the initial full term, typically 25 years. On the other hand, tenancies tend to be very much shorter.

The cost of buying compared with renting?

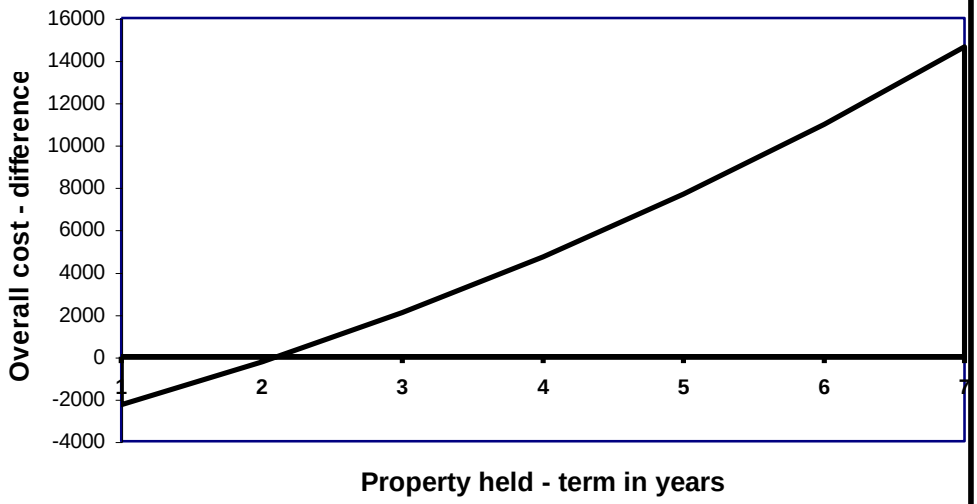
We can compare the overall costs of the two methods and then graph our findings. I have made the following assumptions: -

Initial house value:	*£80,000 whether bought or rented.*
Increase in house value:	*4% per annum on average.*
<u>House bought with a 100% mortgage</u>	
Mortgage interest rate:	*6.25% pa on average over ten years.*
Maintenance costs:	*2% of initial house value, rising by 2.5% pa*
Buying & selling costs:	*2% of value on purchase, 3% on sale.*
<u>House rented unfurnished</u>	
Rent:	*6% pa of current property value (rising)*
Maintenance:	*0.5% of house value, rising by 2.5% pa*

Suppose you live in the house for a period of years and then sell it, if you own it, or simply move out if you rent it. Then add up the total cumulative costs of each method. Whichever is the lower is assumed to be the cheapest method overall. If you subtract the total cost of owning from the total cost of renting and the answer is negative, then renting is cheaper.

The graph in Figure 15 illustrates this difference assuming you stay in the house for the time period indicated and taking into account any profit (after fees) of selling the house. A negative difference (ie below the x-axis) indicates that renting is cheaper.

Figure 15
Buy or Rent? Cost difference
Positive figures mean buying is best.



Using the given assumptions, renting is obviously cheaper for around two and a bit years. So if you intend to move in under two years, it may be better to rent rather than buy, particularly since the expenses of buying and selling are quite heavy.

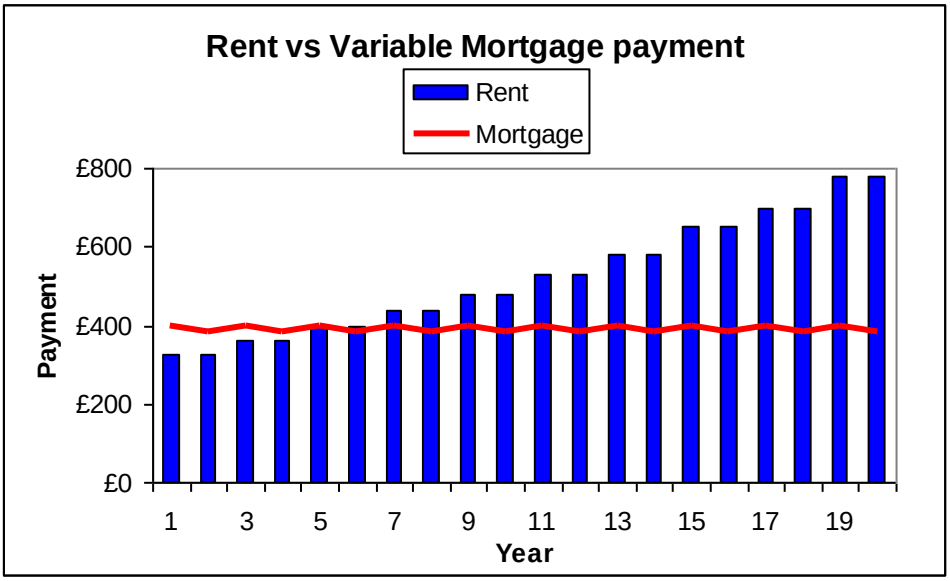
But the break-even point depends on the initial assumptions. The rent assumption of 6% of value is considered low in some areas. An older property might require more maintenance. Your particular house may rise in value by more or less than 4% per annum. If the assumption of house price growth is reduced from 4% to 3% per annum, the breakeven point extends from two-and-a-bit years to about three-and-a-half years.

Even a 3% per annum increase in house prices might turn out to be optimistic. Also, inflation is assumed at 2.5% pa - who knows what it might be in future? The final outcome of just where this break-even point occurs depends entirely on the input. The “Buy or Rent” spreadsheet included allows you to enter all your own assumptions, so you can see your own personalised graphical comparison and break-even point. But remember the old maxim about computers: rubbish in - rubbish out!

I have assumed a 100% mortgage (that means no deposit) in the example, for the sake of simplicity. If, in practice, you assume a deposit of say £10,000 and a lower mortgage of £70,000, you must also accept that the tenant has the same deposit and would invest it to offset any costs. The effect is not great, but it is relevant if the return on the deposit differs from the return on the house.

Rents staircase – mortgage payments are flat.

Despite being able to personalise your buy/rent assumptions, you can still come to some general conclusions. The most important principle is that rents are fundamentally linked to the property value, and both are expected to increase over the years. Rents may not increase gradually. Sometimes they can be fixed for a year or two and then jump up – sometimes areas can go bad and property values and rents go down, but that is more the exception than the norm. On average, rent is still related to the value of the landlord's asset and increases over a period like a staircase.



Conversely, a mortgage payment is based on a fixed initial debt that cannot be altered and does not increase over time, assuming you keep up the repayments. The payments themselves may vary, but the debt is fixed at the outset. The interest rate might move up or down in line with the economic situation in general, but the interest payments move in a generally level direction: rents move upwards and are ultimately related to house prices.

Inflation cheapens debt

Not only is a mortgage a fixed pound-note debt until it is repaid, but inflation actually cheapens it over time. You effectively borrow expensive pounds but you pay back with cheaper pounds in the future. The interest rate may fluctuate, but the mortgage payment burden in real terms is likely to reduce with inflation. Rent on the other hand is likely to increase with inflation since it rises with house values, which rise by more than inflation.

If you measure the overall rental payments made by tenants over say a 25 year period, and compare them with the overall mortgage payments someone might have paid if they had owned the same house, you will find that the average tenant has paid out more money overall, even Council house tenants. Moreover, although the tenant may start out with a lower month-by-month payment than an equivalent mortgage payer, after a period, increasing rents will overtake the mortgage payments. In short, a tenant will eventually end up paying more month-by-month and more overall.

The long-term tenant is the ultimate loser

In 25 years time the tenant has nothing to show for his larger outflow, whereas the owner has a house, and after 25 years, the mortgage could well be at an end with the house unencumbered. Even if the house has not

increased in value at all, it is at least worth something, and you thereafter live in it for free. But the tenant owns nothing, yet has laid out more money.

Furthermore, while the homeowner's mortgage repayments stopped after 25 years, the tenant must continue to pay rent forever - and it will still continue to increase over time. The property owners may be dead by the time they enjoy the final proceeds of the sale of the property, but far better to have the choice to leave some legacy than leave nothing at all, even if it just keeps a cat happy. Besides, many people would consider moving down to a smaller home when they retire and use any surplus equity gained on their earlier homes to put into income-producing investments.

So in the long term, common sense tells you that buying is better than renting unless you intend to move about a lot. But even then, it pays to buy a house and rent it to someone else: we talk about buy-to-let later on.

Technical Note

In strictness, for readers of Part I, who now understand the vital concept of the Internal rate of Return, the graph in Figure 15, showing overall buying costs and rental costs, should illustrate the IRR or the NPV since when comparing cash flows, it is timing that is important. This is quite true, but over the periods in question, the difference between NPV and cumulative costs are similar. Calculating the NPV would have introduced an unnecessary level of complication, when all we want is an approximate break-even point. The assumptions themselves can actually be more wide ranging than the need for absolute accuracy and purity in the calculation methodology. So I am simply being a pragmatic engineer rather than a dogmatic mathematician.

Nevertheless, it is interesting to measure the combined IRR effect of buying a house on a mortgage. Suppose you bought a £50,000 house with a £50,000 mortgage costing you say £330 per month (6.25% pa repayment). If the house grew by 5% per annum to about £169,300 in 25 years time, the effective IRR of the “investment” of £330 pm to produce £169,300 in 25 years is about 4% pa, ignoring all other costs. So even if the house grows by less than the mortgage interest, you can still achieve a positive investment return from buying, and you live rent free as well.

Set of rules for choosing a scheme

Getting back to the plot, remember we are ultimately trying for a set of rules to help choose one mortgage product. We have now established that for many people, buying is indeed the best choice, in the long term at any rate. We now need a mortgage, and what a choice we have - thousands of schemes with around 100 lenders. Let's look first at the major subdivisions.

Mortgage or Re-mortgage?

Are you moving house or staying put, but changing lenders to get a better deal? With a remortgage, lenders are more cautious about the valuation since there is no actual sale to prove the market price. But the legal fees are lower since there is no conveyance required.

Methods of repayment

Capital repayment or interest-only, or a combination of the two. Often borrowers have an endowment policy, which was taken out for a

previous, smaller interest-only mortgage, but is not enough to repay a larger new loan. But it is possible with some lenders to have a mixed mortgage, where part is interest-only to match the endowment policy, and the remaining part is a capital repayment mortgage.

Methods of repaying interest-only loans

An endowment policy, ISA, pension lump sum, unit trust etc. or indeed no separate investment at all – just the house itself.

Fixed or variable interest rates

Usually a fixed interest rate is only for a pre-set period, then changing to a variable rate or another fixed rate.

Capped, floored or collared interest

A guaranteed maximum interest rate (sometimes coupled with a minimum) for a pre-set period.

Cashback or Discount

As an incentive, some lenders provide an upfront cash sum or a lower interest rate for a pre-agreed initial period, such as 3 years.

Flexible Payment

You choose the repayment schedule. In simple terms, you can overpay and underpay without penalty, but arrangements vary with different lenders.

Current Account mortgage

A sort of mortgage "overdraft", combined with your current bank account – the ultimate flexible payment mortgage. Any occasional surplus on your account will reduce your total loan and so reduce the interest charged. You can borrow right up to the agreed limit at any time, as long as it is repaid at the end of the pre-agreed term. So you can also use it as an investment account with money going in and out as you please.

When you put money in, you are saving interest at the full mortgage rate so your savings are effectively earning interest a much higher rate than for a conventional deposit – and there is no tax to pay either. If the mortgage rate is say 7%, the "deposit rate is 7% too – equivalent to 11.67% pa gross for a top rate taxpayer.

Special Cases

For example, this can mean a special focus on impaired credit applicants (ie those with bad credit histories), or buy-to-let, or elderly applicants, or non-status, or those wanting 100% mortgages etc.

Shortening the list

With all this choice, where do you start? You need to shorten the lender list.

Decide first if you are moving or buying for the first time, or remortgaging for a better deal. Then identify if you are a special case and then you can eliminate lenders who do not offer a product that fits. For example, not every

lender offers a buy-to-let scheme. If you have had a County Court Judgement (CCJ) or have been in arrears with your previous lender, you may not be accepted on normal terms by another lender. Obviously it may be worth keeping your existing lender in the frame if you are moving house, as they may prefer the devil they know and give you better terms than any new lender.

You may now decide to go to a specialist mortgage broker at this stage, now knowing what questions to ask, or simply search on the Internet or read the various publications that list practically every lender's products, such as Money Facts. There are a fast-growing number of web sites that provide independent tool-sets to search the marketplace. It would be a waste of time to list all those web sites that are now current, so simply ask your favourite search engine to locate say "mortgages". Try www.find.co.uk, which is a directory explicitly for financial services.

But there is more to consider before rushing to a broker or to the web.

Interest-only or capital repayment method?

You should also give careful thought as to whether you are going for an interest-only mortgage or capital repayment mortgage. The capital repayment mortgage was fully described in Part I, and you will doubtless recall the various anomalies due primarily to how many rests there are per annum. However, we can leave that aside for the moment, as in the final analysis of our short list of products, we will include a calculation of the IRR anyway - the single figure which can be used to compare any mortgage schedule for the likely best buy.

An interest-only loan does not require any capital repayment to be made to the lender until the end of the mortgage or on earlier sale of the property. The capital is found from either selling the house itself, or from a separate investment scheme, such as an ISA or an endowment policy. It is not essential to have a savings scheme to start with. Most people move every six years or so, and they repay their mortgage out of the house sale proceeds, hopefully providing a sizable deposit for the next home. Usually a higher mortgage is negotiated on each move to match ones increased capacity to borrow. There is obviously a requirement to repay the loan eventually, probably on retirement, but it is difficult to know what you might eventually owe at that time.

Interest represents a very significant amount of money, particularly on the huge loans required for house purchase. So why not repay the loan as early as possible by using the shortest capital repayment mortgage you can afford?

There is only one reason. If, instead of repaying capital to the lender early, you can invest it first and achieve a higher percentage return on the investment than it costs to borrow the capital, it is clearly worth doing, since you are making money out of – well, thin air. This is the essence of gearing but it requires careful study to understand it properly.

The endowment mortgage "scandal"

Many people who took out endowment policies to repay their mortgages in the last decade have been significantly disappointed. To understand this problem properly, please be patient and follow the steps below: -

1. Understanding the basic anatomy of an interest-only mortgage.

2. Looking at the past history of the endowment mortgage.
3. Analysing why some endowment policies have not worked out as promised.
4. What to do about the problem if it has hit you.

We must first understand the basics of an interest-only loan. We will return to discuss other aspects of the "scandal" later once we comprehend it better.

Comparing the costs of interest-only with capital repayments

Let's first look at a simple example. Take a £50,000 mortgage with a lender who charges a nominal 7% pa interest with monthly rests, and for simplicity, assume the interest rate remains unchanged for 25 years. MIRAS (Mortgage Interest Relief at Source) no longer operates as from April 2000, so it can be totally ignored: the gross cost, before tax relief, is now the same as the net costs.

Payments to the lender	**£ per month**
25 year repayment mortgage	£353.39
Interest-only mortgage	£291.67
Difference	£ 61.72

So you pay less to the lender with an interest-only loan, but the capital to repay the loan at the term end must be saved up from a separate investment plan. Supposing you take an interest-only mortgage, but invest (in some monthly investment plan) the £61.72 "saved" by not taking a capital repayment mortgage.

Payments to lender & investment	**£ per month**
Interest-only mortgage	£291.67
Monthly Investment plan	£ 61.72
Total monthly cost	£353.39

We have made the *total* monthly costs the same as that for a capital repayment mortgage.

Suppose the investment plan achieves a growth rate of exactly 7% pa, compounding monthly after any tax and fees, precisely the same rate as the mortgage interest. What will £61.72 per month for 25 years @ 7% pa achieve?

The answer, as you probably suspected, is £50,000, exactly sufficient to repay the loan. The two methods have not only cost the same month by month, they produce exactly the same end result, accepting some rounding. Mathematically it is obvious that they would, since the cashflows are identical and the IRR's are identical.

Higher or lower growth than the mortgage rate

Now, instead of growing at exactly the same rate as the mortgage, suppose the investment grew by more, say 8% pa: it would then be worth £58,697 in 25 years time which is a surplus of £8,697 over and above repaying the mortgage. This surplus has been achieved without having to pay out any more per month than an equivalent repayment mortgage, so it is a genuine windfall, tax-free.

But, if the investment only made 6% pa overall, it would mature for only £42,771 leaving a shortfall of £7,229 from the £50,000 needed to repay the debt - not exactly a good deal. Equally as important, even if the investment grew by more than 7% pa, but the amount saved each month was insufficient, you could still not achieve the required amount in 25 years time. This is the kernel of the endowment mortgage scandal – the monthly investment proved insufficient to even repay the mortgage, let alone provide a surplus.

Compare the IRR

Note also that any surplus or shortfall from the investment is only relevant at the end of the mortgage, 25 years in this example, when it is eventually realised. To put this timing aspect into context we can calculate the IRR of the mortgage taking into account the surplus (or shortfall) from the policy at the end. These can be done using the "Loan Comparator" spreadsheet supplied and entering a negative redemption charge for the surplus. The lower the IRR the better.

If we work out the IRR for these four cash flows, each with identical month-by-month costs, it would be as follows: -

Mortgage type & investment rate (total per month is £353.39)	**Surplus in 25 yrs**	**IRR % pa**	**Comments**
Repayment mortgage @ 7% pa	£0	7.229 %	Base
Interest-only + investment @ 7% pa	£0	7.229 %	No difference
Interest-only + investment @ 8% pa	£8,697	6.847 %	0.382% better
Interest-only + investment @ 6% pa	**-** £7,229	7.514 %	0.285% worse

In this example, a 1% pa difference in performance on the investment return is very roughly equivalent to around a third of a percent off the nominal interest rate of a repayment mortgage when you look at the deal as a combination of cash flows.

Compare the NPV

Another way of comparing returns is to look at the equivalent NPV, or Net Present Value, of the interest-only figures compared with the repayment mortgage. The table below reflect the same figures as before.

Type of mortgage & investment rate (total per month is £353.39)	NPV	Comments
Repayment mortgage @ 7% pa	£0	Base
Interest-only + investment @ 7% pa	£0	No difference
Interest-only + investment @ 8% pa	£1,661	Better
Interest-only + investment @ 6% pa	£-1,181	Worse

So a capital repayment mortgage would have the same value-for-money as the interest-only + 8% investment provided you also received a £1,161 cashback. Conversely, if the investment made only 6%, it was as if you threw away £1,181 at inception.

A spreadsheet entitled “Investment and Mortgage Calculator” is included to make this mathematical point for any chosen set of circumstances.

Investment returns must exceed mortgage interest

In general, to be worthwhile, an investment set up expressly to repay an interest-only mortgage must outperform the mortgage interest over the full term - net of tax and charges. What is the chance of that happening in practice? How do you go about selecting an investment scheme, particularly one likely to beat mortgage interest?

Investment choice depends on attitude to risk

There are three investment aims that most people would aspire to: -

1. **Safety**. You want the investment to be as safe as the Bank of England. Words like "guarantee" feature highly.
2. **Performance**. You want it to grow massively by at least 20% a year, preferably 100% pa!
3. **Flexibility**. You need to be able to cash it in without penalty at a minute's notice.

I think it was Woody Allen who said, "Life’s a bitch and then you die". Financial products are a bit like that. You just cannot have everything you want in life and you certainly cannot achieve all three of these aims at once, so compromise is inevitable.

For example, a Building Society deposit scores highly under security - no one has ever lost a bean in the last 100 years or more from a Building Society deposit and there is even a government sponsored guarantee for 90% of your investment up to a maximum figure.

However, you certainly won't get a return of 20% per annum. You would be lucky to get a return of just under bank rate and then there is income tax to pay. 4% to 5% pa net might have been just possible in mid 2000 when base rates were around 6%. Whenever the word “guaranteed” appears in investment literature, the performance will always be lower than normal.

Banks and Building Societies obtain the money they lend to their borrowers from their depositors. The interest rate paid by borrowers must therefore always exceed the gross return to depositors to cover tax and administration expenses, at least in the long term. So it is obvious that in terms of beating

mortgage interest, safe deposit type investments are non-starters – it's just structurally impossible.

Nevertheless, you would be able to cash in most deposit accounts very quickly, so such deposits are flexible as separate investments. When measuring up a deposit type investment with our three Aims, aims one (Safety) and three (Flexibility) score high but aim two (Performance) scores badly.

Conversely, investing in stocks and shares can provide very high potential performance but not much in the Safety department. Over a long period of time, a portfolio of shares has not only beaten inflation, but by a good margin. But, as they say in the advertisements, shares can go up and down and the past is not necessarily a guide to the future.

Property in general, including commercial property such as offices, shops, and warehouses has also proved to be a good investment in the long term and is probably safer than stocks and shares, certainly less turbulent. However, you can't cash in a house as quickly as a share. You can't cash in a part of a house either. Consequently, property scores low on Flexibility but it's not so bad on Performance and less risky than shares in general.

Conservative investments are no good for mortgage repayments

Unfortunately, the safest investments are clearly unsuitable to repay a mortgage since the return is more or less guaranteed to under perform to mortgage interest.

To recap, the criterion for an effective interest-only mortgage is that the net return from the investment must exceed the gross mortgage interest over the full term. For example, to match a 7% pa average long-term mortgage rate, you need a gross investment return of at least 8.75% pa to cover basic rate tax before any charges are considered. In practice, you probably want at least a 1% pa *better* return than the mortgage rate to make the effort and risk worthwhile, so you are most likely looking at 10% per annum minimum gross return for a taxed fund after charges, or 8% pa for a tax free fund. Where are you likely to find an investment to achieve that with any reliability?

Put another way, is it worth the risk just to achieve a third of a percent reduction in your overall effective mortgage rate?

Cautious people choose repayment mortgages

The answer depends on your attitude to risk. If you are risk adverse then there is no point in choosing a safe investment alongside an interest-only mortgage since it will never work out. So for security conscious people, a capital repayment mortgage is the safest of all since there is no investment to risk.

On the other hand, if you are happy to invest in more speculative equity funds, which, over the long term, could well produce above average performance, then an interest-only mortgage is worth considering alongside an investment in equities or property.

The past is not necessarily a guide to the future

An endowment policy used to be an excellent way of repaying a mortgage, and life insurance was built in, unlike a repayment mortgage when it was an extra cost. What changed? There were three main sorts of policy: -

1. **Full with-profit endowment**. This is where the insurance company *guarantees* to pay out the initial sum assured at maturity regardless of intervening performance. Bonuses (an amount added to the final maturity value of the policy to reflect the performance of the insurance company and its underlying investments) were added annually which, once added, could not be removed, so the investment only got better, never worse. The monthly premium on such a policy was quite expensive: with the mortgage interest as well, the overall monthly mortgage costs was prohibitive for most first-time purchasers. Not many people took them out.
2. **Low-cost endowment**. To reduce the monthly premium, insurance companies roughly halved the size of endowment policy. A £50,000 mortgage needed only a £25,000 full endowment policy (approximately, depending on the mortgage term) assuming that future bonuses should be sufficient to cover the initial shortfall by the end of the term, judging by the past.

   Importantly, this required a projection of future bonuses yet to be paid and so which were *not guaranteed* at outset. An extra element of life insurance was added in to ensure the full loan was paid if you died at any time during the mortgage. With its lower premium, the overall monthly cost of the mortgage, including the interest, was now similar to that of a repayment mortgage, after MIRAS.
3. **Unit-linked endowment.** The premium is invested directly into one or more of many different *specific* funds, equities (UK and overseas), property, gilts or even cash. The policyholder may switch from one fund to another at any time. This concept, in theory, enables the investor to choose between strategies of being adventurous or cautious by simply selecting the appropriate funds. In practice, you need to know what you are doing to make it effective and clearly no performance guarantees are available. Life insurance is also included. The monthly premium is higher than a low-cost endowment but not as high as a full endowment.

The low-cost endowment became a best seller. The projected returns provided by the insurance company even predicted a surplus at the end of the mortgage. It was seen to be a no-brainer, since if the monthly costs were the same or lower *and* you got a bonus too, why have a repayment mortgage? And because it was based on the with-profits principle, it seemed to be very "safe". The full life cover and the words "with-profits" encouraged people to think it *was* a full endowment, forgetting it was actually only half the size.

What went wrong? The answer lies in the bonus rates used to project the estimated maturity figures and the consequent premium calculation. After a decade of high inflation, the bonuses rose to record levels: equity based funds (stocks & shares and property) were always expected to out-perform inflation given enough time, and indeed they did. Even with-profits funds invest in some equities. But the higher the bonus projection, the *lower* the premium required on the policy to repay the mortgage. In the event, many over confident companies quoted too low a premium.

Falling Bonus Rates

When inflation started to fall in the 1990's, so did the expected returns on equities, and so bonus rates dropped too. Insurance companies found it difficult to advertise a lower bonus and many retained their projections at unrealistically high levels. The consequence, as time moved on, was that it became increasingly clear that the low monthly premiums, set when bonuses where projected at higher rates, were just not sufficient to even repay the mortgage, let alone provide a surplus.

The brokers and salesmen were not entirely to blame. Whilst some salesmen failed to highlight the lack of a guarantee, the life insurance companies themselves provided the future projections, and they also calculated the premiums. Life insurance companies were always thought to be "conservative institutions", so it was not unreasonable to assume that there were sufficient "hidden reserves" to match their heady projections. Sadly, for many companies, this was untrue.

Scandal

Sales-led insurance companies, in a highly competitive market, just could not bring themselves to bring the bonus rate projections down and the premiums up. Worse still, the regulatory authorities at the time accepted that the projections that were being made were "reasonable". Even the press failed to identify the seeds of scandal until it was too late. The companies eventually had to write to their policyholders and admit that their premiums were insufficient to repay the mortgage. The saga was and still is a travesty, it need not have happened had product providers projected with more care, and that is why the word "scandal" applies.

Moreover, even if the premium was increased to a level sufficient to repay the loan, the overall net return for the more conservative endowments is now unlikely to be sufficient to make a with-profits endowment mortgage worthwhile, because mortgage tax relief had gradually disappeared.

Ironically, with-profits endowment policies on their own can, and do produce reasonably good returns. But if they are used specifically to repay an interest-only loan, the return still may not beat the net (now the same as gross) mortgage rate because their fundamental design is too conservative.

Tax relief in the past

The most important current scenario change has been loss of tax relief on mortgage interest. In the early 1970's, when I was starting out as a mortgage broker, you could get up to 83% tax relief on mortgage interest. If the mortgage interest rate was 10% pa gross, it only cost an effective 1.7% pa because 83% of it was subsidised by the taxpayer.

In the 1970's, an endowment policy also enjoyed tax relief on the premiums, tax privileged status on its internal funds and tax-free maturity benefits. For an investment to improve on a net mortgage interest rate of only 1.7% pa was just no contest. It was crazy <u>not</u> to have an endowment mortgage in those days, particularly for the higher rate taxpayer. Ironically, life insurance premium relief (LAPR as it was called and was once some 17.5 % of the premiums) was introduced to encourage the less well-off to take out life insurance. In practice, it enabled the richer cognoscenti to exploit the rules to their significant benefit.

To further compound the advantages of home ownership in those days, mortgages were particularly worth having during inflationary times, such as the double-digit inflation experienced during the 1970's and some of the 1980's as well. You could actually borrow money at a net rate of interest substantially lower than even the inflation rate.

Even if you simply bought goods with the borrowed money you made a profit. Since you were enjoying tax relief, the net borrowing rate was effectively only around 6% pa for a standard rate taxpayer, but inflation was running at around 20% pa, so you were making 14% pa just by borrowing the money and spending it! In other words you could buy something for £100 on borrowed money and you could repay £106 in a year's time @ 6% net interest. The same goods would have cost £120 the following year because of inflation, but had you tried to save £100 @ 6%, the resultant £106 would never be enough! There was never any point in saving if the net return is less than the inflation rate.

When you buy a house with borrowed money, you have purchased a “real” asset, that is to say, one intrinsically linked to the inflationary process, like equities. The house would appreciate eventually by more than the already high inflation rate but since the debt is untouched by inflation, the equity rose significantly. Furthermore, when you sell your own home there is no capital gains tax to pay and you have lived rent-free in the meantime - you can't live in a share certificate. The adage in those days was to “borrow today's expensive pounds and pay back with tomorrow's cheap ones”; “get the largest, longest, cheapest mortgage you can afford”.

In summary, for the mortgaged homeowner in the 70' and 80's, it was win, win all the way to the bank: win on the low net mortgage rates, win on the endowment mortgage gearing, win on house prices and more win on inflation which shrunk the mortgage debt. It was no surprise that MIRAS was eventually phased out and life insurance premium relief was removed. The tax payer was subsidising an activity which was profitable enough without any subsidy being necessary. The changes were not sudden but gradual. Moreover, endowment mortgage sales had already gained such a high momentum that it was difficult to reverse a conceptual idea that had been perfectly valid for decades earlier.

But what a shame that the previously so conservative life insurance industry let down their customers, and their salespeople, so badly in the last decade by simply not quoting realistically conservative premiums, and by not recognising the obvious signs for the demise of the with-profits endowment method as mortgage tax relief slowly sank into oblivion. They should have known better.

Do you have an under-performing with-profits endowment policy?

If you have received a letter from your insurance company to say that your policy might not have sufficient funds to repay your mortgage at maturity, as many people have, independent advice is recommended before taking any action. If you have had bad advice you may be able to claim compensation.

But both the borrower and the adviser could consider the following points: -

1. Establish the size & scope of the problem – what is the likely shortfall at the end of the term? How long to go?

2. If you intend to move house before the mortgage ends, you could simply do nothing, since the house sale will repay the mortgage. Your next mortgage can then be a different type.
3. Surrendering the policy early is not a good idea as the value-for-money is poor; if you really have to, *selling* the policy will produce a higher figure using one of the many specialist agents.
4. Increasing the premiums may be a bad idea as you are simply compounding the problem, depending on the projected performance from today. But ask what the realistic growth rate of the policy from now would be (as a % pa after tax and charges or, better still, an IRR). If you really believe this might out-perform your projected mortgage rate, it may then be worth increasing the premium.
5. Switching the policy to a better performing scheme such as a unit-linked endowment or an ISA may improve the performance albeit at an increased risk.
6. Converting your mortgage to a repayment is probably possible, but the monthly costs will inevitably rise. Converting it in full would immediately take away any risk. The endowment policy, regardless of the maturity value, then becomes a separate savings scheme and life insurance policy.
7. You may consider a part repayment and part endowment mortgage – effectively only converting the *shortfall* into a repayment mortgage. This is probably the cheapest option but you still need to be sure that the policy will still perform for the reduced endowment part.
8. In either of the last two options, consider extending the term of the repayment mortgage part.

The Future

In the year 2000 it seems we are set for lowish inflation for the foreseeable future, possibly lower interest rates as well, and house prices rising. There has already been a mini housing boom, which may well be followed by a minor downward correction in some regions, mirroring what happened a decade previously but hopefully not so sharp.

There is now no longer any tax relief at all on residential mortgage interest, unless it is used to buy an investment property, when it can be offset against rental income. Any investment used alongside an interest-only mortgage must now make a net return of more than the *gross* cost of borrowing – a harder target. But if the investment fund is itself tax exempt, there is a much better chance of the arrangement working. However, as we have proved, it cannot be a “safe” investment, since by definition, it is designed *not* to beat gross mortgage interest.

The Individual Savings Account - ISA

There are two main investment products that currently remain tax privileged. One is a pension scheme and the other is an ISA. The ISA is the most flexible, and you can choose a range of equities to invest into. For those with an attitude that accepts risk as part of life, the combination of tax exemption and the ability to speculate over the long term in stocks and shares to maximise growth, makes the ISA (and its forerunner, the PEP) ideal as a mortgage repayment vehicle.

In the past, equity based funds (eg stocks and shares) have always had the best chance of good performance in the longer term – this is exactly matches the sort of term one needs to save to repay a mortgage. Although you may move house and even switch lenders, you can still use the same, growing ISA each move, increasing the contribution where you can, subject to the government imposed maximum.

If for some reason the theory changes, say the government re-imposes tax on the underlying funds, as they did with pension funds, you can simply cash in the investment, revert to a repayment mortgage and knock off some of the outstanding debt at the same time.

Often, retirement means you buy a cheaper house to release funds to augment income, so a restructuring at that point is inevitable. When you get near to retirement, you can switch the ISA funds to something less risky. If you retire when the fund values are down, you could apply to extend your loan or convert it to a repayment mortgage.

If you can afford it, you can have a repayment mortgage *and* an ISA as well. This may mean belt and braces and a lower overall gain but a significantly lower risk; at least the mortgage will be repaid and it is only the profit on the ISA which is dependent on performance. Another compromise is a repayment mortgage but a more modest contribution into the ISA.

The simple spreadsheet “Investment and Mortgage Calculator” provides a guide as to what sort of contribution is needed to repay a loan at any time in future, given your own estimate of growth rates. It is important to remember that past investment performance measured over a period of inflation (like the last 25 years performance of an endowment policy) is totally irrelevant when projecting over a more modest inflationary period.

Life Insurance

Unit-linked endowment policies do have certain aspects going for them. Unlike conventional with-profits endowments, they invest directly in a chosen range of equities – an even more extensive choice of speculative equities and property funds than an ISA. These life insurance funds are taxed at only standard rates and are therefore tax privileged for the higher rate taxpayer. Also the life insurance is built in – if you died during the mortgage term, the mortgage is paid off.

If you took out a repayment mortgage and needed the same protection against premature death, you would need to take out a separate policy, albeit a cheap term policy. Depending on your age and habits, this might add costs the equivalent of around a half to one percent pa of the loan. The life insurance costs within an endowment policy are lower than for a separate term policy. One reason for this is that the amount actually “at risk” is falling as the investment builds up. There is no such reserve in a term policy, and the running expenses of even a “cheap” policy are little different to the expensive, but perhaps better value for money, endowment policy.

For the avoidance of doubt, I am referring here to unit-linked endowments as opposed to the classic with-profits endowment policies. While with-profits policies are capable of producing reasonable returns, their conservative investment strategy means they have a lower chance of beating the mortgage rate than a unit linked investment. That is not to say they won’t, as much of their fund is equity and property based and the returns usually beat deposits

and life insurance is included. But ironically, because you need to speculate a bit more to validate the interest-only mortgage concept, the “with profits” policy might be just too secure.

Pension schemes

Pension funds linked to equities and property are more likely to out-perform mortgage rates in the long term because of the tax-breaks they enjoy. The higher your marginal tax rate, the better deal they become, since the state provides tax-relief on your contribution. Moreover, there is no internal tax to pay apart from dividend income and then only at standard rates. A good proportion of the fund is also available as a tax-free lump sum.

But the prime object of a pension scheme is to provide income in retirement. It cannot do two jobs – pay off your mortgage and provide a pension without one or the other suffering as a result. While in theory a pension lump sum is mathematically likely to be a better deal when used to repay a mortgage, in practice the ISA is far more flexible, as you can get hold of the cash at any time. This decision may well be a matter of personal choice.

Term and Life

Remember that the monthly cost of a capital repayment mortgage depends on the initial maximum term agreed with the lender – the longer the term, the lower the repayment. But the “life” of the loan may well be much less as few borrowers stick to the same initial mortgage for the whole term, However most borrowers cannot afford the higher payments required for a shorter term, which is why most terms are over 20 years, even 35 years in some cases, although the actual mortgage life is nearer five or six years.

The monthly *interest* costs for an interest-only mortgage are the same regardless of the term. But the savings scheme is term dependent – the longer the term, the lower the monthly savings required.

Since borrowers selecting a repayment mortgage expect to pay it off as soon as possible, they should pick the shortest term they can afford, whereas interest-only borrowers expect to profit from the mortgage, so they would want the largest, longest mortgage.

Interest-only summary

In summary, your attitude to investment risk will dictate whether or not you should take an interest-only mortgage. The method can produce better value than a repayment mortgage but only if you are prepared to take a risk. The risk is lessened if you invest long term and in tax privileged funds, but you cannot pursue a conservative strategy. An ISA, a unit-linked endowment, and possibly a pension fund, all equity linked, would all be suitable candidates. But you really should know what you are doing and professional advice for the amateur is essential, at least in the early days.

If you do decide to go for an interest-only loan, you might as well make the term for as long as possible – perhaps up to your retirement date. If you are going to make some extra money on the investment you need the largest, longest loan you can get. On the other hand, a repayment mortgage is best repaid over as short a time as you can comfortably afford.

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The Mortgage Products

At this point in the story you may have decided to buy and not rent, and you have also decided between an interest-only loan and a repayment mortgage, depending on your attitude to risk. If you chose an interest-only mortgage, you must also decide on the investment scheme. You have eliminated the lenders who cannot help with any special status and it is now time to consider the products themselves.

Incentives and redemption penalties

Most lenders now offer initial incentives to buy their products, particularly for the first time purchaser. Lenders still need to balance their books: the interest they receive from their borrowers must go to pay their depositors *and* cover all the administrative expenses as well. Market forces ensure that depositors can get the best possible deal, so lenders must be creative in attracting borrowers.

Typically these incentives take the form of either a cashback, an initial tax-free cash lump sum, or a lower initial interest rate (a discounted rate) for a specified period. Obviously a lender cannot afford to subsidise the early years of a mortgage in this way unless there is a compensating payback later on.

Any early incentives must be paid for out of the longer-term interest that the lender charges for the remaining life of the mortgage. If borrowers want to jump ship and settle early before those early incentives are paid for, they will be charged a redemption fee. It is not a penalty, as that word implies an excessive payment. For most lenders it is a compensatory payment.

The interesting point about such fees is that most lenders will waive the fee if you move house and simply take another mortgage of at least the same amount on with the same lender the new house. This is called *portability.* If you are happy to stick with your lender, it enables you to ignore redemption penalties. You might say that redemption fees are then optional.

In some cases redemption fees remain after any discounting period has finished. While this is perfectly valid mathematically, and indeed necessary with a cashback, the regulatory authorities dislike such “tie-ins”. They suspect that lenders may take advantage of borrowers tied in to a so-called variable rate by increasing it beyond the norm. In practice, this would be very unlikely as the whole point of the exercise is to attract borrowers with low, continuous rates. An exploitative lender would soon be spotted and penalised by losing custom. That is the normal way market forces operate.

Lenders want you to stay with them for as long as possible. It is an expensive exercise to gain a new customer for any business. Once gained, it makes sense, for both sides, to keep that customer happy. Having said that, customers remain promiscuous and loyalty in the end is only a matter of money. As a result, wise lenders will ensure that departing customers do not produce a loss.

Nevertheless, it is well worthwhile measuring the IRR to the point when there are no redemption penalties, typically 5 years or more. The APR, which assumes the loan runs for the full term, which mortgages seldom do, is not an appropriate measure. Once you are in a free redemption fee period, you will then have the opportunity of remortgaging (sometimes even with the same

lender) if there is a better product with a lower IRR than the IRR for staying put. The software for making these vital calculations is on the "Re-mortgage" spreadsheet.

The table below illustrates a typical example of a lender's discounted offerings, assuming a £50,000 interest-only mortgage with an on-going variable rate of 7.50% pa, compounding monthly, and ignoring any fees. The discount is expressed as, for example, "2.50% discount for the first 12 months", which means the initial 12 month's *chargeable* interest rate is the normal variable rate less 2.50% – ie 5.00% pa. If the variable rate moves up by 1% the discounted rate also moves up by 1% to 6.00% pa.

Discount period	Initial nominal rate % pa	Eventual standard rate	IRR over six years	Equivalent cashback
12 months	5.00 %	7.50 %	7.237 % pa	£1,204
24 months	6.00 %	7.50 %	7.154% pa	£1,397
36 months	6.50 %	7.50 %	7.174% pa	£1,350
48 months	6.75 %	7.50 %	7.193% pa	£1,306

The cashback is the alternative amount that can be paid initially but with the charging rate at the variable rate of 7.50% pa throughout. It has been calculated here to produce the same IRR as the discount, both measured over a 6 year period. Monthly rests are assumed.

Many newspapers quote the initial interest rate only, and "order" their table with the lowest first. You can see why that is misleading, since the best deal is this example is clearly the "6% for 24 months" scheme, which has the lowest IRR, or the highest cashback. Some lenders charge a very low initial rate, just to lead the table, but can then have a higher-than-average standard variable rate or compulsory insurances or a high redemption charge.

Cashback or discount?

When should you take a cashback and when should you take a discounted rate? The first step is to compare the IRR, so use the "Loan Comparator" spreadsheet or the on-line tool. If the calculations work out to be roughly the same (which they should if the lender has done its sums correctly), it is immaterial which scheme is chosen as far as value-for-money is concerned, so consider the following.

Take the cashback if you need to spend more money on the house, such as furnishings or home improvements generally.

Take the discount if your income might be a bit strained for a period. The reduced burden for a year or two might get you past the point when you get a pay rise. The term of the discount should cover the period of anticipated income-squeeze.

If the IRRs differ, clearly the scheme with the lower IRR is the one to go for unless you have a particularly overwhelming need for initial cash regardless of the IRR.

Interestingly, repayment mortgages score a slightly better on IRR than interest-only mortgages when initial incentives are involved. This is because by the time the higher on-going rates kick in, the amount owing on a repayment loan is slightly lower, as some capital has been repaid. Most lenders ignore this anomaly but for borrowers, choosing the repayment method in these cases will win them a little extra bonus. Experimentation with the "Loan Comparator" spreadsheet will illustrate this. The table below illustrates the differences between identical discounts and cashback equivalents for the interest-only and a 20 year capital repayment method. The standard variable rate is 7.5% pa in each case, with monthly rests.

Discounted rate and initial term	Interest only		Capital repayment	
	IRR (6 yrs)	Cashback	IRR (6 yrs)	Cashback
5.00% for 12 mths	7.237 % pa	£1,204	7.202 % pa	£1,196
6.00% for 24 mths	7.154% pa	£1,397	7.121% pa	£1,372
6.50% for 36 mths	7.174% pa	£1,350	7.145% pa	£1,309
6.75% for 48 mths	7.193% pa	£1,306	7.177% pa	£1,250

The difference is more marked the shorter the repayment mortgage term: the term makes no difference to an interest-only mortgage. Also note that some lenders offer a small cashback as well as an initial interest rate discount.

Fixed interest rates

A fixed interest rate mortgage provides the borrower with the comfort of a stable repayment schedule over the fixed rate term. In America fixed rate terms of 30 years are commonplace, whereas over here we are lucky to find a ten year fixed rate although a few lenders are starting to offer long term fixed rates. In most cases a fixed rate is only for a set period of a few years, typically two to five years, with a redemption fee for early settlement.

The main attraction is the fixed payment schedule rather than an attempt to get better value-for-money. Most UK lenders combine the fixed rate offering with a discount as well, so the true underlying fixed rate is often camouflaged. But you should expect to pay a little more for the added benefit of stable payments. There is another way of stabilising payments, which we will look at later, and where there are no early redemption fees.

Fixed rate schemes cost money

Most lenders raise money from short term, variable rate depositors. A lender offering a fixed rate to a borrower and matching it with a variable rate depositor is clearly taking a risk. Interest rates could rise, increasing the payout to depositors with no corresponding increase from the borrowers who have been promised no change: lenders could be seriously out of pocket and even go bust if the mismatch was bad. This actually happened in the USA during the last century forcing the government to step in with massive rescue schemes.

These days, the risk taken by lenders offering fixed rate loans is hedged. That is to say, they buy a financial instrument called a *swap*, which effectively

passes the risk on to a speculator, usually a large institution like a bank. The speculators take a professional gamble on future interest rates. If rates move as they think, they will win out – and they lose if not. On the whole, as professionals, they win more than they lose. So if a lender offers a fixed rate of say 6% (ignoring incentive discounts), the professionals think that market rates on average will actually be lower than 6% over the term in question.

This means that most underlying fixed rates usually turn out more expensive than accepting the fluctuating series of variable rates over the same period. In other words the IRR for a fixed rate scheme will usually turn out to be higher. But in return, the borrower is enjoying the comfort of a fixed, stable payment schedule, which must be worth something.

In the USA fixed rates are the norm and borrowers expect them to be more expensive than ARMs – Adjustable Rate Mortgages as they call them. If you want something extra, it usually costs money and fixed rates provide security – and security costs. But it may still be worth it, depending on your attitude.

The professional probably knows best

To hope that a humble borrower will outsmart the professional speculator requires an element of immodesty. That is not to say it never happens. Some fixed rates have turned out to be winners for the borrower. But on average they turn out to be winners for the speculator. The speculator is not necessarily the same as the lender who has paid someone else to lay off the bet. But if you as a borrower want to come out of a fixed rate contract early, be prepared to pay a fee, which reflects the additional cost to the lender of breaking his contract. It is not a case of the lender profiteering from a penalty but compensating from a real cost, at least in most cases it is.

Whenever the press reports rising interest rates, borrowers think they should now fix their rates. But, the lenders will already have adjusted the rate they offer to match the expectation. Only if a lender happens to have an old tranche of funds, hedged when rates were perceived to be lower, is it possibly a value-for-money exercise.

In summary, choose a fixed rate more for its payment stability rather than an attempt to beat the City at its own game. Those with a conservative attitude towards investment might well be candidates for a fixed rate repayment mortgage. But do not expect a fixed rate scheme to deliver better value-for-money: there is a cost to pay for fixed, stable payments.

Interest rates quoted for both fixed and variable rates themselves change daily. An example of what fixed rate was possible on 2nd June 2000 is shown in the table following, when 3 month LIBOR was 6.26% pa. LIBOR stands for the London Interbank Offered Rate and is the lowest rate banks can borrow at – often called the wholesale cost of money - for a set period. Wholesale lenders will be able to borrow at this rate plus a small margin, and then lend out at the same rate plus a bigger margin and call it the Standard Variable Rate. Fixed rates are obtained in a similar way but most lenders then apply a discount incentive as seen in the table below, assuming a margin of 1.25% and an incentive discount of about 5% in year one.

Term in years	Fixed rate base cost	Typical full fixed rate	Typical fixed discounted rate

1	6.68 % pa	7.93 % pa	3.00% pa
2	6.65 % pa	7.90 % pa	5.50% pa
3	6.67 % pa	7.92 % pa	6.25% pa
4	6.63 % pa	7.88 % pa	6.50% pa
5	6.57 % pa	7.82 % pa	6.75% pa
10	6.33 % pa	7.58 % pa	6.95% pa

Caps, floors and collars

There are many different financial instruments available to creative lenders to enable them to offer special products. The fixed rate product is funded with swaps. But it is also possible to obtain a capped rate using a similar instrument. To the borrower, this means that the interest rate charged couldn't exceed the capped rate over whatever term it is capped for, but it can fall if interest rates generally fall. On the face of it, it seems an excellent idea to the borrower – a safety margin if things go bad, without losing the option of lower rates if they occur, although there is an early redemption fee.

However, like the fixed rate, there is always an extra cost whenever extra security is built in. A capped rate would normally be higher than a fixed rate since the speculator behind it has less opportunity to make a profit. If it is security and stability you need, a capped rate is unnecessary since the fixed rate provides it more cheaply.

But when you look at floors, things become more interesting. A floor is when the interest rate can go no lower than a prescribed rate. A lender would pay *you* if you agreed to a floor. If you wanted a cap *and* a floor, the cost of the two might even cancel out, depending on the rate range you chose. Such an arrangement is called a collar. It is like a fixed rate scheme but which can move in a preset range – like a snake in a tunnel.

However, the most desirable collars, which provide the best protection against perceived rate rises, but some comfort when rates fall, are still usually available at a net cost. They may be attractive to some people: it is always best to calculate the IRR and NPV as described earlier to compare the scheme with other products and to identify just what you are paying for the security privileges. Only then can you judge if the facilities are worthwhile. Use the "Loan Comparator" spreadsheet for this purpose.

Flexible payments

In the early 80's, my company, Mortgage Systems Limited, was responsible for introducing the original concept of the low start, flexible repayment mortgage, a derivative of the unique index-linked mortgage. The story for those interested is included in Annex A.

The essence of a flexible payment mortgage is the ability of borrowers to vary their payments, up and down, to suit changing circumstances. Any unpaid interest is added to the loan. If you have a repayment mortgage, you would probably like to repay the capital as fast as you can afford. A flexible mortgage enables you to do this on an ad hoc basis, for example, using an occasional windfall to knock off some of the mortgage debt. But more

importantly, you can take back any earlier overpayments should you need to; perhaps to buy a new car, or to fund general living expenses.

In some cases, lenders might allow a repayment holiday when you pay nothing for a short period to perhaps help when you are between jobs or are ill and cannot work.

There is now a growing list of lenders offering these basic facilities, all with differing terms. If there are no additional administration charges made for over or under payments, the IRR will always work out the same. If you overpay, you will save interest; if you underpay, the debt will grow with unpaid interest. But the interest is charged at the same effective rate.

Variable income borrowers

If you are self-employed with variable income expectancy, a flexi-payment mortgage may be suitable provided you understand the way the scheme operates and are prepared to spend a little time "managing" your mortgage account.

One would naturally expect the IRR for a flexible mortgage to be higher than a conventional mortgage, since it offers desirable extra features. As before, the value of any such extras is put into context by comparing the IRR and NPV with an alternative product using the "Loan Comparator" spreadsheet. There is also a "Flexible Mortgage" spreadsheet included as a generic example of what is possible.

Stabilising payments with a flexible mortgage

One attractive use of a flexible payment mortgage is as a D.I.Y. (Do-it-Yourself) fixed rate scheme. Suppose your Flexible Mortgage variable interest rate was currently 7% pa, but you could actually afford to make monthly payments as if the rate was 7.2% pa. You could then keep those payments "fixed", and as long as the actual interest rate charged stayed below 7.2%, you could maintain fixed payments for as long as you like. But in the meantime, you would be repaying some capital, so accelerating the time when the mortgage finishes altogether. Alternatively, you could use this "fat" to ensure no increase in your payment is necessary even when variable rates exceed 7.2% for a period.

You have effectively achieved the best of both worlds – a stabilised payment schedule but without paying for a formal fixed rate scheme and still profiting in full from rate drops. And no early redemption fee!

The table below illustrates the first ten years of a typical interest-only flexible mortgage of £100,000 at variable interest rates, but assuming a stable payment of £600 per month - equivalent to 7.2% pa. In practice the loan has fallen by about £3,000 in ten years. If the rate was a genuine fixed rate of 7.2%, the debt would still have been £100,000, and there would have been an early redemption fee.

Year	Actual Interest % pa	'Normal' Pmt £ pm	Minimum Pmt £ pm	Actual Pmt £ pm	Debt Yr End
1	7.00	£583.33	£583.33	**£600**	£99,793
2	6.00	£500.00	£482.22	**£600**	£98,547
3	5.00	£416.67	£292.29	**£600**	£96,222
4	9.00	£750.00	£419.58	**£600**	£97,743
5	8.50	£708.33	£511.51	**£600**	£98,896
6	8.00	£666.67	£570.62	**£600**	£99,634
7	7.00	£583.33	£551.68	**£600**	£99,401
8	7.00	£583.33	£531.52	**£600**	£99,151
9	6.00	£500.00	£426.96	**£600**	£97,865
10	6.50	£541.67	£357.46	**£600**	£97,001

And so on…

After year one, because of the overpayment, the minimum payment that you *could* pay if you wanted, is lower than the 'normal' payment (ie without a flexible facility), because you have built up some 'fat', which has reduced the capital owing, although the lender has agreed to your maximum debt being £100,000 throughout, until the last year.

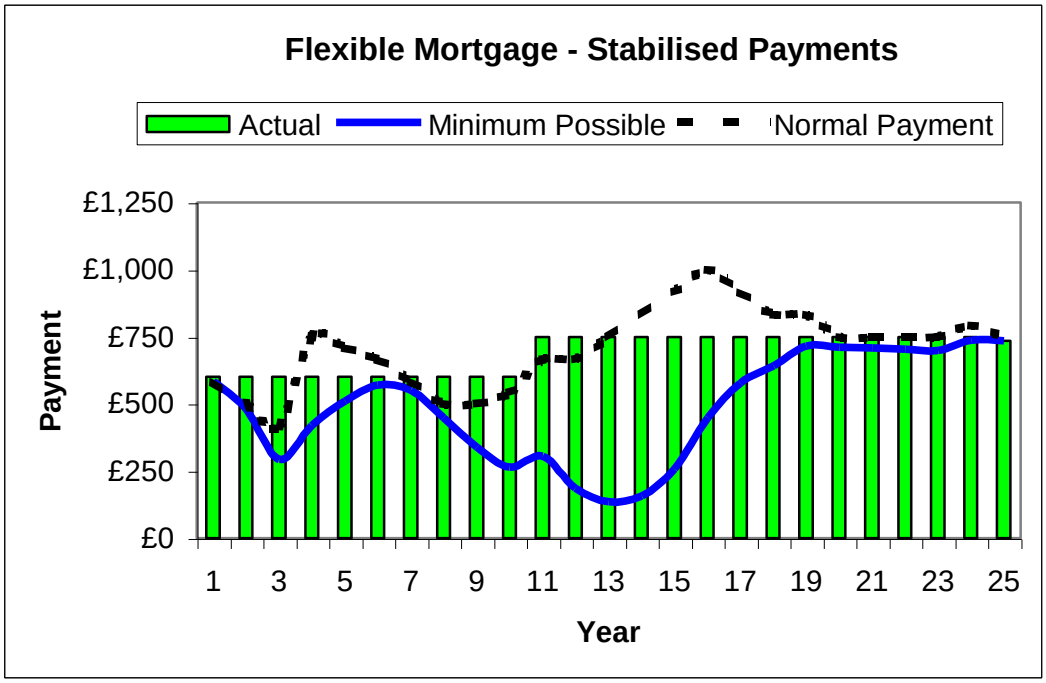
If you have been overpaying like this for several years, there will be sufficient fat to cope with an interest rate change of more than 7.2% pa for a short period, as illustrated in years four, five and six.

It is up to you to choose the effective "payment" rate at which to stabilise your payments – the higher the rate, the less likely it is to change, and the quicker the loan is repaid. The IRR is the same whatever schedule you choose, unless the lender makes additional charges for each change.

The graph below illustrates the whole twenty-five year term, showing how it is possible to reduce the payment at any time. After ten years, the interest rate is assumed to increase somewhat, so necessitating a payment increase.

Without the flexible payment facility, the 'normal' monthly payment would fluctuate much more in line with actual interest rate movements, as can be seen with the dashed line on the graph below.

Incidentally, at the time of writing, lenders still differ on the 'flexible' features they allow. The best ones allow you to borrow back overpayments at any time, allow payment holidays and account for daily interest. There should be no additional fee for payment variations and you should be able to view statements and vary payments via the Internet. Check before you commit.



In summary, a stabilised (but flexible) schedule is ideal for the conservative borrower but who's knowledge is good enough to understand the implications: it may also turn out to be better value-for-money than a fixed, capped or collared rate as there are no guarantees to be underwritten. Some lenders operate the stabilised repayment feature without the need to trigger a minimum payment. Instead they accept a flexible full redemption period or final amount owing: this is not expected to be significantly different to the normal period. In any event most mortgages terminate before their scheduled full term anyway by either a sale or a changed loan.

Increasing payments with a flexible mortgage

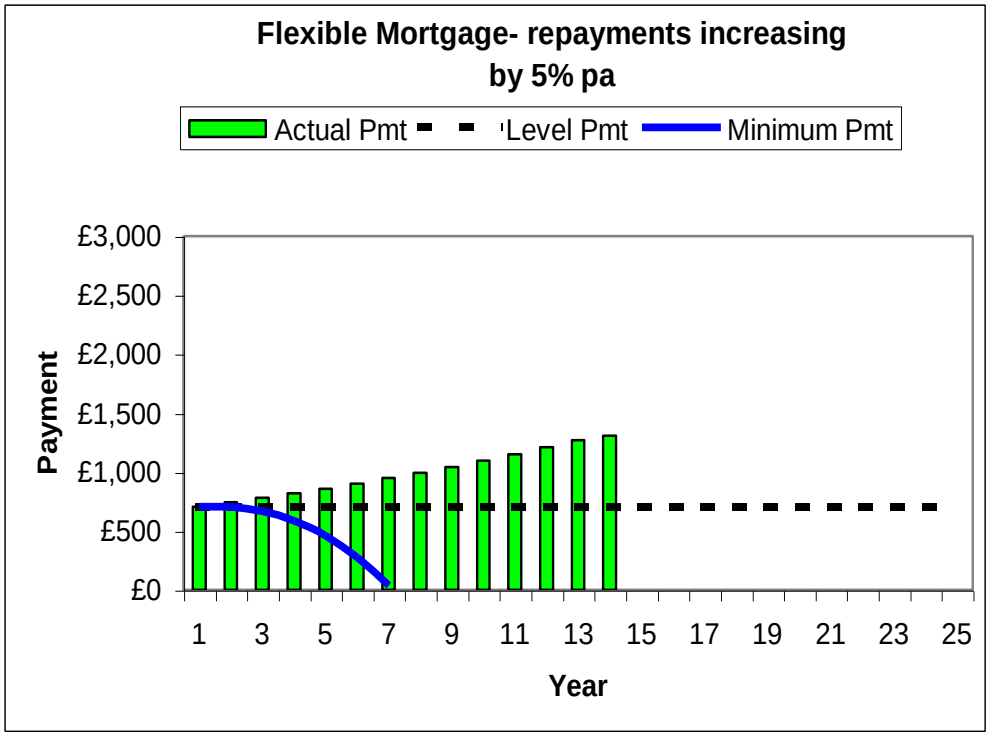
Most people could afford to pay more each month in the future than today. "Today" is always more expensive than "tomorrow" – your partner has given up work, you have kids to feed, furniture to buy, HP to settle, family holidays to pay for and so on. But the future gets easier. The kids leave home, your spouse goes back to work, you get a pay rise, even if it just keeps pace with inflation, and the HP is paid off… so paying for a mortgage gets easier over time – until the divorce that is!

For those wanting to repay a loan as fast as they can afford, they probably have a capital repayment mortgage anyway, but with a flexible mortgage you can accelerate payments at any time. So one schedule that might appeal is the *increasing* repayment mortgage. If you increase your monthly repayments every twelve months by 5% per annum, a 25 year mortgage @ 7% pa could be paid off in just under fourteen years, saving you thousands of pounds in interest payments: the saving is about £42,000 for a £100,000 loan.

Moreover, you are not committed to the excess payments. You have the choice at any time to revert to a lower level of repayments, and you can re-borrow any surplus capital you had repaid earlier, although a few lenders do not allow this important facility, so it's worth checking.

In short, for borrowers who don't mind spending some time on their financial affairs, the flexible payment concept is almost Utopia.

The graph following illustrates a twenty-five year £100,000 loan at 7% per annum throughout, finishing at year fourteen with payments increasing by 5% per annum.



A general-purpose example of the principle of flexible payments can be found in the "Flexible Mortgages" spreadsheet.

Current Account Mortgages

One of the principles of good financial planning is that it is not sensible to have both loans and investments in the medium term, unless you hope the investment will outperform any loan interest. If it doesn't, then you might as use the investment to pay off the loan, as you will "save" money instantly.

It always surprises me to see so many people with building society or bank deposits earning them paltry interest rates, when they owe their credit card company money, which costs them interest of over 20% in some cases. It is clearly more sensible to repay the credit card loan with the deposit, unless the deposit is for a special, short-term reason.

Virgin One first offered the current account mortgage in the UK, although other lenders claim to have similar schemes. It is a flexible mortgage scheme run from a current bank account. It is like having a cheap overdraft on guaranteed terms. The only stipulations are that the loan must not exceed the pre-agreed maximum and it must be repaid (by any method) by the end of the pre-agreed term. In between time, you can take money out or put money in however you like: interest is calculated daily. The "reserve" is the amount you could draw on if you wished.

A current account mortgage will provide the facility of managing your "quick access" savings as well as all your loans – mortgage or credit card. When your pay comes in at the end of the month, it is used to immediately reduce

your mortgage debt, albeit perhaps for a week or two only. The effective "deposit" rate of interest is the same as the mortgage rate. If you borrow at 7% pa, your "deposit" will earn 7% - tax free, equivalent to 8.75% pa gross for a basic rate (20%) taxpayer, or 11.67% pa gross for a 40% taxpayer. It is impossible to get a better deposit rate that the equivalent of the interest rate on your debt.

If everyone did this, there would be no conventional deposits left from a large cohort of borrowers: the banks would lose the "turn" they otherwise make on the difference between the deposit and the lending rates. If this idea was rolled out to everyone, it could be costly for the banks, unless they increase the lending rate, which they probably would. Moreover, there is an administration cost to such lenders, which must be covered by the lending rate.

Evaluating current account mortgages

It is very difficult to evaluate this type of loan. The IRR and the quoted APR are usually a bit higher than normal schemes, but it is only when you use the "investment" facility that it becomes worthwhile. Borrowers who are unlikely to be able to exploit this facility may be better off with a flexible mortgage.

You can look at it this way. Suppose you normally use a deposit account and also expect to receive investment interest on your current account too. First evaluate the likely interest you would conventionally earn overall, in say a year. Say this came to £1,000.

If your savings pattern remained the same, you would obviously earn a higher effective investment rate if you switched to a current account mortgage, say £1,500. So you could save £500 each year in this example.

If your mortgage was £50,000, this £500 saving is approximately equivalent to a 1% pa rate reduction. I must stress that this is a simple example, with deliberately simple figures. Every individual will have a different profile, and it requires a personal calculation. The "savings effect" reduction must then be offset by any "loading", or higher mortgage rate charged by current account lenders, compared with an alternative, competitive mortgage product.

As another way of looking at a current account mortgage, imagine you borrow £50,000. But because you "deposit" say £5,000 on average each month, due to your monthly pay, or from transferring from other lower-interest deposits, you pay interest on only £45,000 – 10% less.

There is always the risk that the projected pattern of savings does not actually arise and that any potential is not actually realised in the future. But if used correctly, and with some more competing lenders in the field to keep the rates competitive, this mortgage method has much to commend it, particularly if it can be managed over the Internet.

A Current Account mortgage is more or less automatic once it is set up as far as offsets with income are concerned, whereas a Flexible Mortgage that is separate from your bank account may need regular action on your part.

Special status loans

Some borrowers have had difficulty with credit: they may have arrears with current lenders and even a CCJ or a County Court Judgement over a debt. Every lender performs a credit search on every applicant, and so these details will be known to them.

It is a fact of life that borrowers who have to be taken to Court to satisfy a debt, are unpopular with lenders, since their attitude to debt is subject to doubt. This may or may not be true for individual applicants. Nevertheless, many lenders will not accept applications from those with CCJs.

But there are a number of specialist lenders who will consider such applicants. They will almost certainly charge a higher interest rate and will only lend on a lower LTV – Loan-to-Value percentage. Lenders differ as to what other references are taken. Some lenders rely only on the property as security, lending say 65% maximum LTV. If the loan is not repaid on time, the lender can foreclose and make a good return on the higher interest rates charged. There are clearly risks to this sort of lending and it is fair that the interest charge is higher.

Paragon Mortgages offer this type of loan (Year 2000) but where the initial interest rate premium falls away after a set number of years of scheduled payments without arrears: this is a "fresh-start" type of loan where borrowers who have suffered from problems in the past will not be penalised for ever.

It is still possible to select the best value-for-money deals using the IRR or the NPV but only among the lenders who specialise in this market niche.

Self-Certification

Some people find it difficult to prove their income for a variety of reasons, one of which is a simple need for privacy. More normal, is the businessman whose accounts may not totally represent his income. Such applicants can access a few lenders who allow borrowers to state (self-certify) their income without the need for double-checking.

Clearly there will be an extra cost to this type of loan in terms of higher interest rates, commensurate with the added risk of arrears. As with impaired status loans, the lender in this case is relying more on the property to repay the loan than your income: the maximum LTV is therefore likely to be lower as well.

100% loans

For borrowers with no deposit a few lenders will offer 100% LTV loans, but at a higher interest rates. It is occasionally worthwhile obtaining a lower rate loan at say 95% LTV and borrowing the balance from elsewhere, even your own bank. You effectively have two loans at different interest rates.

To check this out, work out the melded rate from both sources as follows.

$$M = (L_1 \times I_1 + L_2 \times I_2) / (L_1 + L_2)$$

where L_1 and L_2 are the two loans at interest rates of I_1 and I_2 respectively.

Now enter the M, the melded rate in to the "Loan Comparator" spreadsheet as if it was one product to compare it with any other.

Buy-to-Let

This is another specialist area where a mortgage is required to purchase a property not to live in, but to rent out to someone else. There is a longer section later on, which explains the special attractions of this sector.

There are a number of lenders who specialise in buy-to-let and, as with the impaired credit lenders, it is just as valid to apply the IRR and NPV measurements to those schemes as with any more conventional mortgage.

Compulsory insurance

Some lenders only offer what looks like a cheap interest rate provided you take out buildings and contents insurance or mortgage payment protection insurance through their agency. This is a valid method of marketing, although the authorities dislike it since they imagine consumers can be easily duped – although not now they have read this book.

Lenders gain commission from additional insurance policies they sell, and if they can offset some of this extra income against an interest rate reduction, it could still work out a good deal for the borrower, who still needs to take out the insurance with someone anyway.

To check this out in the Loan Comparator spreadsheet, you will need to enter the monthly premium. In strictness, you should only enter the extra premium you would pay, above what you would pay by going elsewhere, if at all. You can also compare two schemes with different insurance premiums.

The APR rules do not require buildings insurance to be included as part of the credit costs, even if it is compulsory, but they do require compulsory payment protection insurance to be included. So while the accurate IRR payment can be based on any extra premiums you wish to include, the APR illustrated by the lender may be *legally* accurate, but possibly misleading as only the *statutory* extras are included.

General features of lenders

There are some other features of the lenders themselves that are worth considering before making a final choice between those at the top of your final list. Lenders fall into the following main categories: -

Mutual Building Societies

Building societies, such as the Nationwide (at the time of writing), are owned by their members, without external shareholders. The advantage could be better rates for borrowers and investors, since all the profits are distributed to members and so, in theory, margins are smaller. On the other hand, they are denied some of the freedom of banks to enter other markets. The 68 or so remaining building societies are regulated by the Building Society Commission under the legal framework of the Building Societies Act.

Bank plc's

Most banks are owned by external shareholders and are supervised by the Bank of England. Banks can compete in broader markets denied the more restricted building societies. Many of the old Mutuals are changing to banks because of pressure from their members to obtain windfall cash on the conversion. Whilst banks have to make profit and pay dividends and so in theory operate with wider margins, they can, again in theory, profit from other diverse areas to offset that margin pressure. Listed companies are also under greater incentive to compete and to maintain efficiency.

Specialist

A few firms have been set up as specialist lenders and are often funded exclusively from wholesale money markets and have no retail depositors. Paragon is one example, who specialise in buy-to-let, and

Kensington is another who specialise in impaired credit lending. As with any publicly owned enterprise, market forces encourage efficiency. With no retail deposit base to administer, in theory, margins can be narrowed and lending rates kept competitive.

Other specialist organisations perform specific services, such as product design, marketing and packaging application from brokers and borrowers and administering third party mortgage portfolios. They are not themselves lenders, but assist lenders by focusing on service areas they do well. My old company, Mortgage Systems Ltd, was such a company and is now called Homeloans Management Ltd.

Clearly specialist lenders or organisations attract borrowers with specific needs. But for a straightforward mortgage application, a mutual lender may be able to offer a better deal, since they operate on thinner margins and there is always a chance of a windfall as well if they succumb to conversion.

How to pick a mortgage scheme - summary

We have now discussed a wide variety of mortgage concepts. While you are ultimately searching for the one mortgage product that offers the best financial value-for-money, as measured by the IRR, there are other factors affecting your final scheme choice that depends on personal circumstances and attitudes.

From our earlier investigation, we now know when an interest-only mortgage is worthwhile, who would pick a fixed rate and who would pick a variable rate. You recognise that your personal choice depends on your attitude to risk and your awareness of financial planning in general.

So, by way of summary, here is a short question and answer session, which might help guide you to your personal, optimum scheme choice. This "Mortgage Wizard" is also available as an included spreadsheet.

The preliminaries

Before answering the main questions, check out the following:

Buy or Rent?

Before deciding on a house purchase mortgage at all, be sure you are better off buying than renting. If you are likely to move within two years, renting may turn out better value for money, depending on the growth of house prices. See the "Buy or Let" spreadsheet to satisfy yourself.

Mortgage or Re-mortgage

Are you looking for a re-mortgage? This is required if you are not moving house, but have an existing mortgage, and you wish to switch to a better deal with a new lender or even the same lender, often increasing the loan at the same time. In this case, use the "Remortgage" spreadsheet to enter your current loan details to ascertain the cost of switching mortgage.

Credit History

Some lenders will not lend to you if you have an impaired credit history, such as a CCJ (County Court Judgement) or have arrears with other lenders. Fortunately there are some lenders who specialise in

lending to those with an impaired credit history. If you have had any credit or arrears problems in the last 6 years, you will need to disclose this to your selected lender: all lenders perform a credit check before lending, so they will find out anyway. If they are not prepared to offer you a mortgage, seek out a specialist lender, if necessary, enlisting the help of a specialist mortgage adviser.

Now please answer the following questions. In each case, the reasoning behind the question is stated first.

Question 1 – Income & Job

In general, employed people enjoy a more stable income than self-employed people. Those with less regular income might well be attracted to flexible payment features. Those with stable income might prefer fixed rate loans or level flexible payment loans. Those with increasing income might favour discounted rate schemes.

Which is correct?

11. My income is fairly reliable and stable.
12. My income varies and is not always predictable.

Write down the answer, either 11 or 12.

Question 2 – Attitude to Financial Management

Some people just want a simple, worry-free mortgage, whereas others might want to get that little bit extra out of their finances, using more sophisticated arrangements.

Which paragraph best describes you?

21. **Low Awareness.** Not really interested in investment or financial planning matters. Know very little about it. Just want the simplest, best deal.
22. **Medium Awareness.** Know a little bit about investment and try to keep my financial affairs organised. Prepared to involve myself in my finances when I have the time.
23. **High Awareness.** Very interested in investments and financial planning, and spend some time in ensuring my affairs are in the best possible order.

Write down 21 or 22 or 23.

Question 3 – Attitude to Financial Risk

Attitude to risk affects choice in a number of ways. Conservative people might prefer fixed payments, minimum sized loans and capital repayment mortgages that finish as soon as possible. More adventurous people may prefer to take their chance with variable interest rates, maximum sized loans and interest-only loans repaid by ISAs, and flexible payments. Some may go for a combination of factors.

Which paragraph best describes you?

31. **Conservative.** Cautious. Minimise risk wherever possible, even if it meant taking a lower return. Would probably not buy shares directly.

32. **Realistic.** Accept that occasional small risks are sometimes necessary to achieve better returns. Might consider an ISA investment.
33. **Adventurous.** Speculative on occasions. Recognise that high rewards come from taking high risks, and is prepared to take such risks.

Answer 31 or 32 or 33.

So now you should have written down three numbers, eg 11, 22, 32. From the following table, write down the paragraphs that relate to your answers. Think of a comma as reading "and", so "11, 21" means "answer 11 and answer 21".

Answer	**Paragraph number**
11 (stable income) and:	
21, 31 (low, conservative):	1a, 2a,
21, 32 (low, realistic):	1a, 2a
21, 33 (low adventurous):	1a, 2a or 2c(i) or (iii)
22, 31 (medium, conservative):	1a, 2a
22, 32 (medium, realistic):	1a, 2c(i) or (iii), 3
22, 33 (medium, adventurous):	1b, 2c(i) or (iii), 3
23, 31 (high, conservative):	1a, 2a or 2b
23, 32 (high, realistic):	1b, 2c(i) or (iii), 3
23, 33 (high, adventurous):	1b, 2c(i) or (iii), 3
12 (variable income) and:	
21, 31 (low, conservative):	1a, 2a
21, 32 (low, realistic):	1a, 2c(ii)
21, 33 (low adventurous):	1a, 2c(ii)
22, 31 (medium, conservative):	1a, 2a
22, 32 (medium, realistic):	1a, 2c(ii), 3
22, 33 (medium, adventurous):	1b, 2c(ii), 3
23, 31 (high, conservative):	1a, 2a or 2b
23, 32 (high, realistic):	1b, 2c(ii), 3
23, 33 (high, adventurous):	1b, 2c(ii), 3

Write down your "results" paragraphs, eg 1a, 2c(i) or 2c(ii), 3, and then consult the relevant paragraphs below, which now summarise the scheme

that should be particularly applicable to you. You can also read those paragraphs that may not have applied to you, which may cause you to re-think your attitudes. Please remember that this is only a suggested guide and is not meant to replace a full fact-find of the type obtained by independent advisers.

Results Paragraphs

1. Method of Repayment

a) Capital repayment mortgage

Monthly repayments include both capital and interest to the lender so the loan is gradually repaid over the mortgage term: the shorter the term, the higher the repayments.

If you select a capital repayment mortgage, you might want only the lowest loan you need to make a purchase, with the shortest term you can afford, allowing some leeway for possible future interest rate increases. In general, the planned mortgage term should finish before your planned retirement date. In practice, many people move house every 5 to 7 years. This means, for a repayment mortgage, you can easily re-jig the loan at every move.

b) Interest-only

You pay interest only to the lender so the monthly payment is the same irrespective of the mortgage term. The capital debt is repaid at the end of the term with the proceeds of a separate investment plan, which is built up from regular payments.

This method is only financially worthwhile if the overall return on the investment, after tax and charges, exceeds the overall interest rate charged on the mortgage. This is unlikely to happen if you choose a conservative investment plan. But it could be worthwhile if you invested sufficient monthly payments into tax-privileged funds linked to shares, such as ISAs. Those with a conservative attitude to investment might be better off with a repayment mortgage.

Those selecting an interest-only mortgage might want the largest loan possible, and to keep it going as long as possible, up to retirement date. The longer the term, the lower the monthly investment needed and the better chance the investment has of outperforming the mortgage interest, which is the objective of the interest-only method.

2. Schemes

a) Fixed rate

Some lenders will guarantee a fixed interest rate for an agreed period of time. The main advantage is a stable payment schedule for that period, regardless of what happens to interest rates generally. After the initial fixed rate period, the loan reverts to either a variable or a new fixed rate.

But lenders need to protect themselves should underlying interest rates move up, when they would lose out. This

protection costs money. So the overall value-for-money, compared with using a variable rate mortgage, might be higher, but you have bought peace of mind. Should you terminate the mortgage early, there is normally a redemption fee payable, usually waived if the loan is continued with another property.

Fixed rates should not really be used to "out-guess" the market. Lenders know more about the future of interest rates than the borrower: they are therefore more likely to quote rates on which they will win, rather than lose – but you could be lucky. Bargains are also occasionally available from old tranches, which were raised before new rate trends were established.

Many lenders also include a discount on a fixed rate loan as an incentive to make it more attractive. This camouflages the real fixed rate component, which makes these schemes harder to compare.

b) Caps, Floors & Collars

Caps and Collars are in the same family as fixed rates. A few lenders will *cap* an interest rate, so you know it cannot go higher than the specified rate, but it could change to a lower variable rate if interest rates fell generally. As with fixed rates, this added peace of mind costs money, and a capped rate is usually higher than a fixed or collared rate: an early redemption fee is payable, unless you take the loan with you if you move house.

A collar is similar to fixed rate *range*, a rate which can move up or down within a preset maximum of a cap and a minimum floor – like a snake in a tunnel. The narrower the range the lower the cap and the higher the floor, until they both ultimately approach the same value as a fixed rate.

If you are simply looking for stable payments, a straightforward fixed rate will provide that, without the need for capping or collaring.

c) Variable rates

A standard variable interest rate will move up and down during the mortgage term, broadly in line with interest rates in the economy as a whole. In the long run, lenders have to ensure that their lending rates cover the interest paid to their depositors and to cover expenses. Standard variable rates usually work out at about 1% to 2% above bank rates in general: some lenders even guarantee a bank rate link, say 1% over bank rate.

Lenders also offer **incentives**, which can typically be cashbacks, discounted rates for an agreed period or a combination of both. Some lenders will offer a lower variable rate throughout, with no initial incentives.

Such initial incentives almost always come with early redemption fees, but most lenders waive these fees if you move house and continue with the same, or a higher mortgage. The main types are: -

i) Cashback

A tax-free lump sum payable at, or soon after completion: ideal for those whose capital resources are stretched and who would welcome some extra cash for furniture or such like. This scheme is also probably easier to manage than a discounted rate, given equal value-for-money, since the monthly payment is level thereafter subject to future rate changes.

ii) Discount

A reduced interest rate for a specified number of years, sometimes changing in more than one step. A lower payment for a year or so is useful for those whose income is stretched initially, but who expect improvements later on. Be sure you do not get too used to the lower payment. The initial discount period to select depends on when you think your income will improve.

iii) Lifetime "discount"

This is not really an initial incentive but a straightforward level payment loan: the interest remains as low as possible throughout the mortgage, often with a guaranteed margin over a specified base rate or a promise to beat other specified rates. This scheme sometimes offers better long-term value than a cashback. Since there is no initial discount, there is seldom a redemption fee, so you can settle up at any time.

3. Flexible payment (including current account mortgages)

There are a growing number of schemes where you can choose your own payment schedule. You can pay in, or take out random lump sums and can take occasional payment holidays, if there is a sufficient "reserve", and there is normally no early redemption fee.

For those on variable incomes, such as the self-employed, this type of scheme may be particularly useful. There is also the added attraction of D.I.Y. mortgage management, for those interested enough, by setting your own payment schedule. For example, you can accelerate the termination of your mortgage by simply paying more each month: you might aim to increase your payment every year.

You could also have a D.I.Y. "fixed" rate by paying as if you were on a fixed rate schedule, assuming it is at a higher rate that the prevailing normal variable rate. But, unlike a real fixed rate, any such over-payment will repay a proportion of your mortgage. Note that most flexible lenders do not offer a **formal** fixed interest rate option, as there is no need, and so most are variable rate.

Scheme Choice Summary

Hopefully you should now have a better understanding of which scheme and method of repayment matches what type of borrower. Attitudes are important

but features such as extra security and flexibility come with a higher price or less flexibility if an early redemption fee is included. Having decided on the scheme, the measurement of which actual lender is simply down to a measurement of the lowest IRR, remembering that future interest rate projections can only be guesses.

Use the “Loan Comparator” spreadsheet for this purpose, or insist your adviser does, to sort out the true value of so-called incentives and the other costs of a mortgage. If you are re-mortgaging, use the “Remortgage” spreadsheet to identify the cash value of a switch.

Finally, if you chose an interest-only mortgage, use the “Investment and Mortgage” spreadsheet to understand how the investment must perform to be worthwhile.

Now you know a bit about mortgages, the next two sections will explain how you can use a mortgage to create wealth using the concept of gearing.

- oOo -

Buy-to-Let and the Magic of Gearing

One of the earliest scientific dreams was the perpetual motion machine; a theoretically continuous source of energy with no input ever being required. Perpetual motion is of course physically impossible, although it is easy to design a near utopian machine, which utilises the earth's abundances of free resources such as sun, wind and wave energy.

Our ancestors made particular use of a simple device called the *lever.* It enabled almost impossibly large weights to be raised with little effort by using a long pole with a fulcrum near the heavy end. The same effect can be achieved with pulleys or gears.

Interestingly, it is possible to devise a moneymaking machine that can apparently achieve a greater effect than the effort required and that can also mysteriously double or triple investment returns. The concept is called *gearing* or, for American readers, *leverage*, usually with the "lever" part pronounced to rhyme with "clever".

An easy example of gearing for buy-to-let properties

Say you had £10,000 to invest. You buy a £100,000 house using a £90,000 mortgage, so your initial £10,000 is the deposit. Ignore fees and costs for the moment.

Assume the house was let out and the rental income just covered the interest-only mortgage payments, so the ownership cost was zero - again forget maintenance costs for the time being.

Finally, let us say the house was sold for £105,000 a year later, which represented a property growth rate of 5% pa. After repaying the £90,000 interest-only mortgage, you are therefore left with £15,000. Your profit is £5,000, which is the amount left over after the sale less your original capital investment of £10,000.

Capital growth enhanced

In summary, you have invested £10,000 and after one year received £15,000 - a profit of 50%. But the underlying asset itself, the house, only appreciated by 5%. You have achieved an actual return on capital of ten times the underlying asset growth. The IRR (Internal Rate of Return) of your investment is 50% pa. Had you bought the house for cash with no mortgage, the IRR would be only 5% pa. This remarkable result arises as a direct result of gearing. You have geared up by a multiple of ten to increase a return of 5% to 50%, simply by borrowing.

Income yield enhanced

Now let us move one stage further. We first assumed there was no net income since the rent equalled the mortgage interest. But say the property was actually rented out for £7,300 per annum (about £140 per week) - that's a modest property yield of 7.3% pa and is easily accomplished in many areas of the UK.

If the £90,000 mortgage interest rate were 7% pa, the interest payable in the year would come to £6,300. Income £7,300, expenditure £6,300: the result is a net income of £1,000 per annum.

An income of £1,000 per annum on an initial investment of £10,000 means a running income yield of 10% per annum. So, not only have you achieved a

capital growth of 50% but there is also an income of 10% per annum as well - an IRR of 60% in total in year one!

Is this really true? Surely it is not that easy. What are the snags? Well, reality always involves some friction, which also frustrated the perpetual motion machine from realising perfect success. But despite some setbacks, the results from gearing can still be impressive.

The key to understanding gearing is to base your yield calculations on the actual capital invested, the deposit if you like, and not on the value of the house. It is only then that your calculations come to life. The investment income yield is the net income (rent less mortgage payments) divided by the capital invested expressed as a percentage. The property yield is the rental income divided by the value of the property only. The IRR is the total return including capital growth.

Friction reduces returns but does not eliminate them.

In the first example, we ignored costs and the effect of tax. Taking "friction" (ie all the costs) into account will inevitably bring down the eventual return. Say there is an additional £500 per annum to pay each year to cover maintenance and the general expenses of running the property. This brings the running income yield down to £500 pa - from 10% pa to 5% pa.

The expenses on the purchase and the sale of the property could well absorb much of the first year's profit, leaving only say £1,000 surplus out of the gross £5,000. But even £1,000 is 10% of the £10,000 invested.

After just one year, adding in the running yield of 5% pa, the IRR is now a more humble 15% pa gross, less than the dramatic 60% frictionless return from our first example but still three times bigger than the underlying 5% growth of the asset, so gearing still multiplies the return.

Tax

Income tax must be paid on any revenue profit, which is your rental income less any relevant expenditure. Mortgage interest counts as relevant expenditure so tax is levied only on your £500 pa profit. Your net income is the gross income less tax at your marginal tax rate. A top rate 40% taxpayer would pay £200 tax pa, reducing the net income to £300 pa - a 3% pa net-of-tax running yield.

Capital gains tax is also due on the capital profit less acquisition costs and selling costs. If the gain was just £1,000, capital gains tax at the maximum rate of 40% could whittle this gain down to a net £600, although many taxpayers would pay less tax, if any at all, if their total gains are lower than the annual allowance and taper relief is available over time.

With your net income of £200 and the £600 net capital gain, the eventual outcome from your £10,000 investment is £900 in total after all tax and expenses - possibly more if your tax rate is lower. This is a 9% net-of-everything profit in one year. A 40% taxpayer would be lucky to get 3.6% pa net of tax from a conventional deposit, so gearing has at least doubled, and could possibly triple the underlying growth rate. And we have only considered one year and absorbed all the initial expenses.

Buying & selling costs

The buying costs should strictly come out of the initial investment and the selling costs from the sale. Realistically, one needs to hold the property for at least two years to produce a return that exceeds that which could be achieved by paying cash, to cover the buying and selling expenses. The “Buy-to-let” spreadsheet included allows you to enter any set of variables. In particular, it compares the overall return both with and without gearing (ie paying cash) to highlight the advantages of gearing when relevant.

Risk of loss

Suppose the property fell in value by 5% instead of increasing in value, producing a £5,000 loss. You will still have costs to pay as well, so you could lose most of your initial £10,000.

Similarly, if the mortgage interest increased by more than the rent there could be a negative running yield - even more negative if the tenant leaves or goes into arrears. Voids in rental income are commonplace and must be expected.

So obviously the downside with gearing of this type is the risk of loss. As we have identified earlier, higher returns always imply higher risk. The higher the gearing, the greater the risk of loss - but the more exciting the gain if it all works out. Administration costs could well turn out to be more than expected.

Minimising the risk

The figures in the above example assumed a sale after just a year to keep the figures simple. In practice one would want to hold the property for a bit longer and in particular resist selling if the market is depressed. As we have seen earlier, property prices can fluctuate, although the general trend is very likely to be upwards.

Mortgage interest can fluctuate but fixed interest deals are available as we have seen and are particularly appropriate for the nervous investor.

A smaller mortgage can reduce the risk as it increases the running income although it reduces the yield since you have to put down more capital. The ratio of the mortgage loan divided by the property value is known as the LTV (loan-to-value percentage). The last example assumed a high LTV of 90%. The higher the LTV, the higher the running yield and the greater the potential capital return, but the higher the risk of both losing the capital and suffering a negative income over time.

Mortgage (LTV%)	Initial Investment	Gross Income pa	Yield % pa
£50,000 (50%)	£50,000	£3,800	7.6%
£70,000 (70%)	£30,000	£2,400	8.0%
£90,000 (90%)	£10,000	£1,000	10.0%

Individual investors can therefore address their own perception of the balance between risk and reward by choosing the most appropriate LTV. In most cases it is down to what deposit is available. An ideal balance of risk against reward might be an LTV of between 70% and 80% and most lenders would not lend more than 80% anyway as they like to see the rental income

covering the mortgage interest by a comfortable margin. But ultimately it is down to individuals, their cash situation and their attitude to risk.

The property yield will also affect the choice of LTV. In some areas property can be rented for yields of well over 10%. The best yields often come from the smaller, cheaper properties costing well under £100,000 and not situated in up-market areas. But higher yielding properties often grow by less and visa versa. The careful investor who chooses well could achieve a geared return well into double figures and 20% pa is quite possible.

Safety in numbers

For the serious, professional investor, it can be worthwhile buying a *portfolio* of properties. There is always an advantage in the economy of scale, since expenses can be distributed and the risk is spread. There is less likelihood of a void (ie no tenant) being so serious when you have a few other performing properties to bolster the income.

If you had £100,000 available to invest, you could buy one property for £100,000 for cash and enjoy a good rental income with low risk but a modest capital gain. Or you could buy ten similar properties with high gearing and achieve two or three times the return and with a higher running income than if you paid cash. But the risk, albeit on the higher side, is significantly lessened with the "safety in numbers" strategy.

A successful example of buy-to-let

A colleague of mine manages a portfolio of 35 flats in the West Country distributed over seven separate properties with five or six flats in each. Each flat fetches from £70 to £90 per week producing around £100,000 per annum gross income, allowing for 10% voids - so 3 or 4 flats may be unoccupied at any point in time. He is using some surplus income to refurbish some of the flats in order to improve chance of earning a higher future rent.

He invested initially about £200,000 and borrowed £500,000 from the Nationwide Building Society to buy the £700,000 portfolio, which initially yielded around 15% pa running income, based on the property values alone. The average LTV was just over 70%.

After mortgage interest, maintenance, refurbishment and management costs, he enjoys around £40,000 per annum income before tax, which represents 20% pa running yield on the £200,000 investment. The portfolio now, about 15 months later, is probably worth at least £800,000, which represents a capital profit, when sold, of £100,000 on an investment of just £200,000 - 50% in 15 months. Not bad!

Clearly he bought well and at a good time and luckily had a decent chunk of capital to start with. But it demonstrates the sort of exciting returns that are possible, in spite of "friction".

Commercial property

Many would-be landlords baulk at the prospect of finding and managing even one tenant let alone several dozen. There are many Agencies who will, for a fee, take on the burden for you. But for the investor with a sizable deposit of more than £100,000 and who wants to minimise the hassle, there is another alternative - the commercial property.

I am talking about offices, warehouses or even factories, let on a commercial tenancy basis. The concept of gearing described for buy-to-let residential properties is still equally valid. The difference is that commercial rents are usually for a longer period (5 to 20 years or more as opposed to a 6 month shorthold) and the tenant is usually responsible for repairs and insurance. Moreover, a good quality commercial tenant is far less likely to default and the rent usually rolls in every quarter with little aggravation.

Quality covenants

Like residential tenants, the quality of the tenant, in terms of their likelihood of paying the rent regularly, is critical. In commercial terms, it is referred to as the "strength of the covenant". A good quality covenant may mean a blue chip public listed company like a bank or an insurance company, or a well known high street store like Boots or Woolworth's, or one of the numerous government bodies. They are very unlikely to default and they also like the comfort of a long-term contract.

The downside is that the property yield for such good quality tenants may be lower than that for the less illustrious occupant. Nevertheless it is possible (Year 2000) to obtain property yields of 8% to 9% pa from first class covenants who provide a good, solid rental income stream.

There are many lenders willing to provide loans for commercial property. They will base their offer of mortgage primarily on the tenant's ability to pay the rent rather than just the landlord. Moreover, the better the tenant, and the longer the tenancy term, the lower the interest rate you can negotiate. There is no 'standard' rate: some commercial lenders set a fixed margin over a defined independent base rate such as LIBOR. Payments are usually collected quarterly to match the rents, which are also normally paid quarterly. So although you might receive a lower rent with a higher quality tenant, you may pay a lower interest rate and management costs are lower. The gearing advantage therefore remains intact and also, the better the tenant the lower the risk element. In short, it makes good sense to seek out investment property with the best possible tenants.

Syndicated purchases

Unfortunately, prime tenants normally like to inhabit expensive property. If you like this sort of investment property, you may have to join a syndicate of like-minded investors if your cash is insufficient to provide the deposit for a single property investment. There are a few specialist companies who deal in syndicated commercial property transactions, some even organising the mortgage on behalf of the syndicate. (See www.helmsley.co.uk).

It is also possible to build your own commercial investment by developing a commercial unit in a particularly desirable location, sometimes pre-let to a good tenant. Again, specialist syndicates are available and you are now very much in the professional sector.

In short, the gearing concept works very well with both residential and commercial property. As with any investment which promises a higher-than-average return, expect there to be a downside risk. But with common sense, such risk can be managed so as to be at an acceptable level.

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How to Become a Millionaire

This section is designed to encourage those who feel confident enough with the principles of gearing and of buy-to-let in general to make a major investment in the commercial mortgage sector.

If you would like to have a million pounds in say 25 or 30 years time, it essentially depends on what growth rate you can achieve from a reasonably small starting capital.

Growth Rate to achieve £1M	Starting capital needed for a 30 year term	Starting capital needed for 25 years term
10% pa	£57,309 (17.4)	£92,296 (10.8)
15% pa	£15,103 (66.2)	£30,378 (32.9)
20% pa	£4,213 (237)	£10,483 (95.4)
25% pa	£1,238 (808)	£3,778 (265)

The table above shows that it is possible with high growth rates and smallish capital or visa versa. The longer the term, the better: the extra 5 years makes a lot of difference. The approximate growth factor is shown in brackets – multiply any starting sum by this factor to see the end result. A million pounds may sound a tidy sum and it has that lovely sound to it, until you look at what inflation can do: -

Inflation rate	Value of £1M in 25 years	Value of £1M in 30 years
2% pa	£609,500	£552,000
4% pa	£375,100	£308,300
6% pa	£233,000	£174,100
8% pa	£146,000	£99,400

It's probably safe to assume that the purchasing power of £1,000,000 might well fall by 50% in twenty-five years time. Investing £1M for income, a 10% annual return can then produce £100,000 gross annual income – say £50,000 in real terms at today's prices. But it's possible to live quite well on that income, regardless of any other income you might have.

We have seen from the section on buy-to-let that it is possible to achieve good returns on both residential and commercial property, provided you are prepared to face up to the gearing risks. Let me restate the argument, but now using a good quality commercial property as a simple example, yielding say 9% pa. Suppose you have £50,000 cash available, or you can raise it with a remortgage on your own home.

Now follow down the line of figures hereunder to understand how you could gear up to achieve a return in excess of 25% pa.

Buy investment property	£200,000	
With a mortgage of	£150,000	(75% LTV)
Capital investment needed	**£ 50,000**	(initial deposit)
Income from property @ 9%	£ 18,000	pa
Cost of mortgage @ 8%	£ 12,000	pa interest-only
Net Income	£ 6,000	pa (re-invested @ 7%)
Running yield on capital	12% pa	(6,000 x 100 / 50,000)
Property grows by 5% to	£210,000	after one year
Profit on sale	£ 10,000	
Additional return on capital	20% pa	(10,000 x 100 / 50,000)
Total return in year one	**32% pa**	(12% + 20%)

Costs and expenses are ignored although commercial leases are usually fully repairing and insuring, and are far less trouble than residential shortholds. But let us say the gross yield reduced to only say 25%, and you could achieve this every year, your million pounds would be reached in less than fourteen years. In 25 years £50,000 could then be worth £13,000,000. It only takes seventeen years at 20% pa return to reach a million.

Tax

There is also tax to consider. But fortunately, mortgage interest and other management expenses can be offset against rental income for income tax purposes. Also, no capital gains tax is payable until you sell the property. So, if you arrange for the mortgage interest plus expenses to equal the rental income there is no income tax to pay. You can do this by picking a lower yielding but higher growth potential property and maximising your mortgage by raising a re-mortgage on your own property just after you have arranged the commercial mortgage. Although the extra mortgage is secured on a private residence, the taxman looks at how the money was used, not where it came from: if it was a commercial venture, it can generally be offset for tax.

Capital gains tax now enjoys taper relief. After 10 years the tax is down to just 20%, and then only when you sell the asset and is only payable on the gain less buying and selling expenses. But why sell? If you have picked a good asset, you simply increase the borrowing as it rises in value and rents are reviewed, and use such extra loans to purchase additional property.

Save the surplus

Any surplus rent, after charges, could also be saved up as deposit towards the next purchase. The best way of doing that is to enjoy the best short term return possible – a current account mortgage or a flexible repayment mortgage on your own home as described earlier is an excellent, safe short term investment, and is perfect for parking rental income.

You may think that using the surplus rent to repay part of capital owed on the commercial mortgage might be as good. But you are enjoying tax relief on that mortgage - it is as if MIRAS applies on the full loan and at the full rate. 8% pa gross interest only actually costs 5.6% net of 30% tax, or 4.8% at 40% tax. So the commercial loan is only worth repaying if you cannot achieve the

same net interest rate return elsewhere. A flexible residential mortgage at say 7% offers an investment return of 7% - net of tax.

Continuing the example, after 30% tax, the rental income surplus of £6,000 pa reduces to £4,200. Invested over five years at 7% pa produces £24,153.

Five years later

Let us continue with the example above and look at the position five years later. If the property grows at say 5% pa it will have increased from £200,000 to £255,000, a £55,000 increase. The more valuable property is now eligible for an increase in mortgage. The reviewed rent could now be increased to say £22,000 pa, so the situation after five years is as follows:

New mortgage now	£191,250	(75% of new value)
Mortgage costs @ 8%	£15,300	pa
New rental income	£22,000	pa (<9% pa)
New net income	£6,700	pa
Cash from new mortgage	£41,250	
Cash from saved rent surplus	£24,153	(after 30% income tax)
Total cash available	£65,403	deposit - next property

£65,000 is now a sufficient deposit to purchase another £260,000 property, assuming another 75% mortgage, and you double your assets.

Assuming yields were roughly the same, in another five years the exercise can be repeated again, only you can now buy two more new properties bringing the total to four.

In ten years time

If you sold up all four properties after ten years you could have about £328,000 after repaying the loans and before capital gains: all from an initial investment of £50,000. This represents a return of about 20% pa *after* 30% income tax on the surplus rent. Capital gains tax need not apply if you simply keep the property and re-gear to buy a further four properties.

In twenty years time

Repeating this exercise for another five years gives you eight properties in total, and sixteen properties in another five years. Ten more years in total at 20% pa would bring up the free capital in now sixteen properties to about £2M. It has taken just twenty years in total to do it. The rental income less the mortgage interest, if now simply taken as income, would be around £250,000 pa before income tax, assuming the 12% pa running investment yield is sustained. Again there is no need to sell the property: one could happily live on that income thereafter, enjoying regular rent reviews to combat inflation. If your children inherit the portfolio on your death there is no capital gains tax to pay. As a business asset there are also opportunities to mitigate inheritance tax, but you need separate advice for that.

I have not included several important items for the sake of simplicity, but they must be included in a real scenario. There is the question of stamp duty on a purchase, which can take as much as 3.5% of the property value, and also legal and mortgage valuation fees which can take another 2%. This could take out the entire first year’s growth of the property, so one should allow for

that in growth projections. One way is to simply knock one year off the growth term and project at the expected growth full rate. Another way is to project at a lower growth rate. For example, 5% pa over four years produces roughly the same end value as 4% pa over five years.

Interest-only, fixed rate mortgage

The mortgages have each been assumed to be interest only to enhance the yield. Lenders are usually quite happy to do this provided there is a sufficient term left on the lease. There is no point in repaying any capital while the gearing is making money – indeed, in theory, there is never any need to repay any loan whilst the overall growth (running income plus capital growth) exceeds the mortgage interest.

A fixed interest loan is quite appropriate for a portfolio of this nature to at least minimise the downside risks. Commercial rents are usually pretty stable and so an equally stable mortgage payment produces a stable surplus.

Remember the risks

Now while all the above has been very simplified, my aim is to hint at what is possible. An 8% mortgage rate may be a bit on the high side, but then I have ignored buying costs. I have ignored time differences when gross income is invested and tax is actually paid a year or more later. Obviously the property could grow faster or slower than 5%; it could even fall leaving you with a net loss. But these are the inevitable risks that need to be taken to achieve rewards of this magnitude. There is safety in numbers – better a larger number of smaller properties than the other way round, unless a really solid covenant is available from a larger property.

Spreadsheet tool

A spreadsheet is included called “Property Portfolio” and will enable you to play with various scenarios. The aim is more to develop the principles of the business model, rather than as an accurate plan. The end result is very sensitive to the LTV selected, and the property growth rate is important too. In real life, yields and growth rates vary from year to year: but since property is a real asset, it is linked to the inflationary process and therefore compensates to an extent for unpredicted inflation.

I also suggest you become familiar with the “Investment Property Return” spreadsheet, which enables all the costs to be entered for a specific property transaction in order to calculate the possible return on capital (expressed as an IRR).

Summary

In short, a carefully selected, geared portfolio of good quality commercial property, such as warehouses could produce a sizable profit over the medium to long term, and provide a good source of income thereafter. £1M is fairly easily possible before you retire provided you get cracking in your early 40’s at the latest.

I have used an example of £50,000 to achieve £2M in twenty years. In theory you could scale down with a lower starting capital, but good commercial property requires a sizable commitment and even a £200,000 property is somewhat light. One way to build up to this deposit is your own home and a remortgage at the right time. A house costing just £100,000 today would

grow to about £160,000 in ten years at 5% per annum. That's a £60,000 increase for a start.

Finding and selecting the commercial properties themselves is clearly crucial. You will need to bone up on the intricacies of commercial property and perhaps take on a professional commercial mortgage broker and a buying agent to guide you. It is worth explaining your amateur status to start with since on the whole, people in the professional sector are very helpful to beginners who may become substantial clients in the future.

Buying property is probably less risky than attempting to make money out of the stock market, although it is less easy to take out cash quickly. Investing in property does entail a long-term commitment: add in some careful management and the results can be quite startling. My own modest portfolio is, so far, performing as it should but one must never be too complacent. There is the ever-present risk of a vanishing tenant, of interest rates soaring beyond the rental income and the maintenance of the property being higher than planned. Caveat emptor – buyers beware.

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From the Lender's Perspective

A lender is in business to make money; even a mutual building society must operate so that it at least does not lose money. All lenders borrow from either the retail market (e.g. people making deposits) or the wholesale markets (e.g. Institutions buying portfolios). Some lenders use both sources. The retail market is less sensitive to interest rates but is expensive to manage, whereas the wholesale market is relatively efficient to those who understand it.

Wholesale lenders are themselves highly geared. By carefully enhancing the credit rating of their wholesale products, they can make do with capital as little as 2% in some cases – that is rather like borrowing on an LTV of 98%.

Securitisation

Securitisation is an increasingly common way of raising cost effective finance for a wide range of different assets that were previously difficult to finance. It was originally developed in the USA and the idea came to the UK market in the 1980s. The process, the parties involved and the documentation, as well as pricing, can appear mysterious to the uninitiated.

The securitisation process is effectively the bundling together of a group of individual mortgages such that they may be treated, for funding purposes, as a single entity and made available to prospective investors in mortgage debt.

Mortgage debt is seen as a relatively attractive and safe investment by many institutions, such as pension funds. Securitisation allows lenders to raise money in the money markets, then lend it on to residential property purchasers and finally sell the resulting tranche of mortgages on to other institutions in bulk. This is also known as "off balance sheet lending" since the debt does not form part of the lender's assets. This process does not affect the terms and conditions of the individual borrowers in any way, and most people are quite unaware that their mortgage cash may have actually started off in someone else's pension fund.

Sales Channels

Most lenders sell through two main channels: *direct*, via branches, telephone sales or web sites, and *indirect* through mortgage intermediary introducers such as brokers and estate agents. These days it is common to pay intermediaries a commission for completed business, since brokers can no longer rely on commission from endowment policy sales as an income source. They are expected to market and sell the lender's products and rightly expect a commercial reward for doing it successfully.

The Internet shows great promise for the financial services business in general, not just as a sales channel, but as a highly efficient process that can be easily automated and integrated with a lender's back-office systems.

The Internet is a worry to some intermediaries, as they fear many prospects who would otherwise use them, can now more easily go direct to lenders on the web. But the truly independent brokers such as John Charcol can themselves operate successfully on the web and add value to their services, since the choice to most people is still bewildering – apart for my readers thus

far, naturally. An on-line broker can more easily locate the optimum product to suit their clients and this area will certainly grow.

Interest Margin

Whichever way lenders obtain funds, they all need to lend at a higher interest rate than they borrow – called the margin – to cover their marketing and administration expenses for both borrowers and their own investors, and still leave a profit.

Lenders have to include the costs of processing new applications, valuing the property and investigating the credit worthiness of the applicant. Some of these costs are recovered directly from the borrower through valuation or administration fees, which can themselves be added to their loan. Once the case completes, on-going administration is required to collect the monthly payments and manage such activities as producing statements, dealing with rate changes, redemptions and arrears and so on. There must also be a reserve for possible losses and the administrative costs of funding the operation.

Some lenders also obtain additional income from other sales activities, typically commissions earned on household insurance policies, payment protection insurance and indemnity guarantee insurance. All the net costs and supplementary income streams must be considered in order to decide just what the overall margin must be. Individual mortgage products can then be designed and marketed in the best way to suit the brand of the lender, their sales channels and their speciality.

Designing the products

Most lenders would consider a model rather like the loan comparator spreadsheet to ensure that their offerings achieved the right return. The initial expenses to a lender will differ to that of the borrower so the lending IRR will not be the same as the borrower's IRR. For example, the borrower may pay for the house valuation and the legal fees, which will increase their IRR, whereas the lender does not pay for these fees. On other hand, the lender has to pay a processing cost, which is not directly paid by the borrower.

The mortgage market is very competitive. There is an oversupply of funds at the moment, which has trimmed margins on standard mortgage products right to the bone. Consequently, lenders devise all sorts of methods to attract business, even launching loss-making products in the hope that the margins can be relaxed in the future when no one is looking. The spreadsheet entitled "Mortgage Product Design" is for lenders and other professionals to use to help ensure their designs make the appropriate margin. Borrowers might also like to have a peek, as it will help them better understand the lender's position.

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Pope's Rule: "Blessed is he who expects nothing, for he shall never be disappointed"

Equity Release and Home Income Plans

Once you have retired, and the mortgage is paid off, you may reflect on the fact that you are house rich but cash poor. You own a nice house but your pension is just not sufficient to bathe you in the luxury you know you deserve.

What you might need is some sort of Home Income Plan – a scheme that enables you to still live in your house, but you give up a part of its equity on death in return for an immediate cash sum, or income. They are also called equity release plans.

As a safeguard to protect investors, the main specialist home income plan providers devised a collective initiative called "Safe Home Income Plans" (SHIP). Participating companies must observe a code of practice, which obliges them to provide fair, simple and complete presentation of their schemes. As a further safeguard, a solicitor must check your plan before you sign up.

There are two main types: -

Mortgage

You take out an interest-only mortgage and buy an annuity with the proceeds. An annuity produces a lifetime income in exchange for capital. The income is equal to the difference between the annuity income that you receive and the mortgage interest that you pay out each month.

On death, the annuity ceases and the house is sold to repay the original loan. Your estate gets the rest and is distributed in accordance with your will.

Couples can take out a joint life scheme so the income continues until the last death.

The income is not very high and you have to be well into your 70's to make it even moderately worthwhile.

Reversion

You sell your house (or a portion of it) for cash to an institution, typically an insurance company, for a discounted figure. But the purchaser allows you to live there rent-free until the last partner dies. The price offered is quite a bit lower than the current value of your property. The funder has to take account of no rental income for an indeterminate period, and also reserve for the possibility that the property might not be looked after as well as before once the aging occupant's freehold interest has disappeared.

Nevertheless you can get quite a reasonable sum from this arrangement, and then convert it into income using a suitable investment, but all or most of your equity is gone. If the house subsequently falls in value, you are unaffected.

The amount of cash (which is tax free) payable depends on today's value of the house and the applicant's ages. The older you are, the greater the proportion of cash payable. The younger you are, the longer you will have to enjoy the proceeds.

The cash can be used for any purpose. You can invest it for income or, for certain schemes, receive the cash in stages over a period of years like a tax-free income.

There is little risk to the homeowner in either scheme provided they are properly advised and deal with a SHIP provider. You can also move house with these schemes.

The only ones possibly disadvantaged with either of these schemes are the intended beneficiaries, who clearly receive less than otherwise as some of the estate is being used to supplement their parent's income. Fortunately, most children take the view that they would rather see their parents comfortable than hope for a larger legacy. Many children are better off than their parents these days with more sophisticated pension arrangements and state benefits.

Annuities

If you need a regular income for the rest of your life you could purchase an annuity. In exchange for capital an insurance company will guarantee a monthly income for life. An annuity is exactly like a capital repayment mortgage where you are the lender and the institution pays you the monthly repayment. The term of the "mortgage" is to the date of death. This is in practice your life expectancy. Take the following example.

An insurance company will first estimate your life expectancy (or joint life expectancy for couples). For the sake of a simple example, assume this is only ten years. If you had £20,000 to invest, the company would be able to return one tenth of your capital back to you each year. That's £2,000 per annum.

In addition, interest of say £600 pa on average is also payable. So your total income would be £2,600 per annum (13% pa), of which £2,000 is called the capital element (and is tax free) and £600 is the income element and subject to tax. The actual figures depend on your particular age and life expectancy, and the income is usually paid monthly in advance.

If you should live longer than the ten years in this example, the insurance company will still continue to pay you the £2,600 per annum until your death. On the other hand if you died earlier the annuity ceases. Since an insurance company deals with a large number of people it can offset the 'loss' it suffers from a longer-than-average life with the 'profit' obtained from shorter lives. But if you and your partner died earlier than expected, neither of you are in a position to worry about it!

Income tax

You will have probably already spotted in this example the comparison with a capital repayment mortgage. A £20,000 mortgage over ten years at 6% interest would also cost about £2,600 per annum, payable monthly, the same as used in the example above. But with such a mortgage the mix of capital and interest varies each month with more interest to start with.

Fortunately the revenue only taxes the income element of a purchased annuity – the capital element is tax-free since it is a return of your own

money. But they take a simple approach and assume that the interest and capital element is constant throughout. The capital element is roughly equal to the initial investment divided by the life expectancy. This is good news, since the levelled interest element is less than it should be to start with so the income tax is lower than is should be to start with – but higher later on.

This taxation treatment differs from Pension annuities (called compulsory purchased annuities) where the whole annuity income is taxed, but then the initial investment was tax deductible at the time. This is why it is usually worth while taking the maximum tax free lump sum from a pension, even if it is invested right back into a purchased annuity, because the tax treatment for purchased annuities is more favourable than for compulsory purchased annuities.

What age should you buy?

The older you are, the higher the income you receive from an annuity, but the less time you have to spend it. Younger annuitants do not necessarily get poorer value for money, just a lower annual amount for a longer period, although a fixed, lifetime income may be eroded by inflation.

Varieties of annuity

There are various types of annuities. For example: -

- **Guaranteed.** In exchange for a lower income, you can guarantee a minimum payment period regardless of death during that period – typically 5 or 10 years. They will of course continue to pay income until death regardless of your actual life span.

- **Capital Protected.** In exchange for a lower income, on death the insurance company will return your initial capital less any gross payments already made.

- **Joint.** Joint life annuities provide an income until the last survivor dies. Obviously the income will be lower as joint life expectancy is longer than for a single life. But there are various combinations. For example, a pre-agreed reduction in income on the first death will increase the initial income.

- **Increasing.** You can choose an income that increases by a preset amount each year or even by inflation. The initial income is lower to start with.

- **Equity-Linked.** Instead of a guaranteed income, you can opt for your annuity to be linked to the performance of an equity or property fund such as an insurance company's with-profit fund.

Mathematically, all varieties of annuities are near enough identical value for money. They operate much like a repayment mortgage over a pre-set lifespan. The IRR is much the same for almost any combination when you take life expectancy into account. Bearing in mind the insurance company take the risk of you living longer, the deal can be a good one.

Some people just do not like the idea of “losing their capital". This is an inaccurate view, since the capital is not actually lost – it is paid back over a period. As I mentioned earlier, if you died earlier than expected, before the capital element was all paid back, you couldn’t have taken it with you anyway. Better for you to have the *guarantee* of a lifetime income regardless of how long you live in exchange.

Many people feel than annuities currently offer a bad deal. But this is due to two things: interest rates have fallen and life expectancy has increased. This does not affect the basic principle of an annuity which is a safe income augmented by withdrawing capital, but without risk of actually running out of capital. Imagine any alternative investment that produces such a high, safe income. The equity-linked variety would suit a more adventurous investor, at least in part.

Shared appreciation mortgages - SAMs

Recently there has been another type of home reversion scheme on the market called a SAM – which stands for Shared Appreciation Mortgage.

The Bank of Scotland first started the scheme in late 1996 and since then one or two other banks occasionally provide funds. The main feature of a SAM is its simplicity.

Typically the bank will advance you 25% of the value of your property, interest free in exchange for 75% of the appreciation of the property when you either sell or die. That’s basically it.

Suppose your house is worth £100,000. Borrow £25,000 and pay nothing more until you sell or die. Suppose you sell after 10 years and the house is then worth £160,000 (4.81% pa growth). It has appreciated £60,000. You therefore then own the bank the £25,000 you borrowed originally, plus the shared appreciation “interest” of 75% of £60,000, which totals £70,000.

So you borrowed £25,000 and repaid £70,000 10 years later. That is an IRR of around 10.8% per annum – over double the house growth rate. This is an expensive loan, but the risks are taken entirely by the lender, who is effectively investing in a rent-free property. If the house went up by more, the amount you owe increases too. There are a few other permutations, but at the time of writing, no other lender has funds, so we await a new lender to enter the fray – when they do, the cash tends to be snapped up pretty fast.

Reverse mortgages

This is an idea that I devised myself in the early 1990’s but later abandoned. There were two reasons for this: house prices were falling and home income plans generally were reeling from a scandal involving a well-known Building Society. The lender was advancing elderly homeowners roll-up loans – loans with no interest to pay month by month, but the interest was added to the capital debt. The cash raised was then invested into investment bonds from which income was withdrawn. In some cases, borrowers used bond withdrawals to repay the interest on the loan instead of rolling it up.

In short, the bonds fell in value because of the heavy withdrawal rate, the house fell in value because the market was poor, and the loan outstanding rolled-up until it exceeded the value of the property. Elderly pensioners were on the verge of losing their home, their capital and their income over a short period of years.

This debacle highlighted the problems in dealing with elderly people wanting to convert their house into income, but who were unaware of the pitfalls. All home income plans were suddenly suspect, including my own fledgling scheme, despite the guarantees built in. It worked like this.

Instead of advancing a capital sum and expecting the borrower to invest it somewhere else to obtain income, why not advance the income itself as a month-by-month loan. Since then the lender was effectively paying the customer a monthly income it was like a mortgage in reverse.

Example

As an example, imagine a 65 year old couple living in a £100,000 house. It is possible to pay them £211.35 per month tax-free, guaranteed for the rest of their lives, possibly another twenty years, with access to equity. How does it operate?

The monthly income is actually a monthly loan – that's why it's tax-free. The lender charges interest on it and 7.5% pa is assumed in this example.

Month by month the loan gradually increases. Since the advances consist of small amounts of 'income' spread over a period, rather than large chunks of capital, the interest roll-up is small to start with. The house appreciates in value also; 4.25% pa is assumed in the table. Few people live to age 100. In fact the actuary I spoke to some ten years ago said they assumed *no one* lives beyond 100 for all practical purposes. That could of course change.

The monthly income figure of £211.35 is worked out so that the loan equals the expected property value at the youngest borrower's 100th birthday. This is actually £429,202 in this example - a sizable figure – but few are expected to reach it.

Flexible payment facility

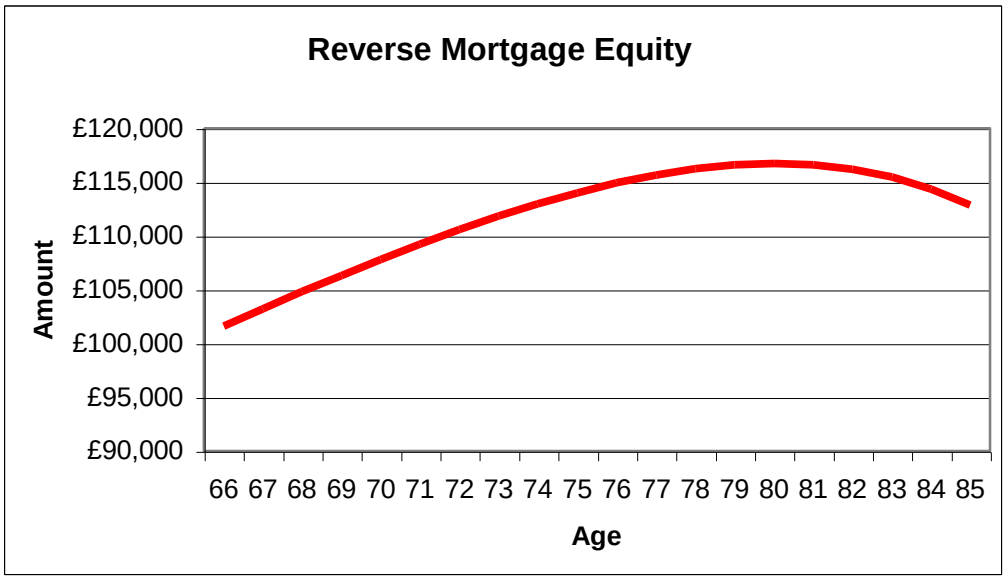
The whole 35 year period is illustrated on the next page. In practice, several other important ingredients were offered with the original product. Firstly, every three years the borrowers had the opportunity to ask for a revaluation of their property. If it was higher than that expected, and interest rates had not increased, the borrowers could increase their income. Moreover, borrowers could repay a portion of their loan and withdraw it later – rather like the flexible mortgage discussed earlier.

Reverse Mortgage – Payment and Equity Table. The life expectancy is normally about aged 85 - there is still plenty of equity left and LTV=51%

Year End	Age	Monthly Income	Total loan year end	House Value	Equity on sale
1	66	£211.35	£2,625	£104,250	£101,625
2	67	£211.35	£5,454	£108,681	£103,226
3	68	£211.35	£8,503	£113,300	£104,797
4	69	£211.35	£11,788	£118,115	£106,327
5	70	£211.35	£15,329	£123,135	£107,806
6	71	£211.35	£19,144	£128,368	£109,224
7	72	£211.35	£23,255	£133,824	£110,568
8	73	£211.35	£27,686	£139,511	£111,825
9	74	£211.35	£32,460	£145,440	£112,980
10	75	£211.35	£37,606	£151,621	£114,016
11	76	£211.35	£43,150	£158,065	£114,915
12	77	£211.35	£49,125	£164,783	£115,658
13	78	£211.35	£55,564	£171,786	£116,222
14	79	£211.35	£62,503	£179,087	£116,584
15	80	£211.35	£69,981	£186,699	£116,718
16	81	£211.35	£78,039	£194,633	£116,594
17	82	£211.35	£86,723	£202,905	£116,183
18	83	£211.35	£96,080	£211,529	£115,449
19	84	£211.35	£106,164	£220,519	£114,354
20	**85**	£211.35	£117,031	£229,891	**£112,859**
21	*86*	*£211.35*	*£128,742*	*£239,661*	*£110,919*
22	*87*	*£211.35*	*£141,362*	*£249,847*	*£108,485*
23	*88*	*£211.35*	*£154,961*	*£260,465*	*£105,504*
24	*89*	*£211.35*	*£169,616*	*£271,535*	*£101,918*
25	*90*	*£211.35*	*£185,409*	*£283,075*	*£97,666*
26	*91*	*£211.35*	*£202,428*	*£295,106*	*£92,677*
27	*92*	*£211.35*	*£220,769*	*£307,648*	*£86,879*
28	*93*	*£211.35*	*£240,533*	*£320,723*	*£80,190*
29	*94*	*£211.35*	*£261,831*	*£334,353*	*£72,522*
30	*95*	*£211.35*	*£284,783*	*£348,564*	*£63,780*
31	*96*	*£211.35*	*£309,517*	*£363,377*	*£53,861*
32	*97*	*£211.35*	*£336,171*	*£378,821*	*£42,650*
33	*98*	*£211.35*	*£364,894*	*£394,921*	*£30,027*
34	*99*	*£211.35*	*£395,847*	*£411,705*	*£15,858*
35	*100*	*£211.35*	*£429,202*	*£429,202*	*£0*

Guarantees built in

The first year's income level was guaranteed for life. Furthermore, an insurance policy was put in place to guarantee to the lender that his debt would always be repaid, even if there were negative equity, without recourse to the borrowers. But if the income was increased at a subsequent revaluation, it could fall back to the initial guaranteed level if property values or interest rates were adverse at the following review date – but never lower than the initial, guaranteed level.



The borrower's view

From the borrower's perception, a reverse mortgage is superior to a reversion scheme, since there is equity available to the estate or if the borrower wishes to move at any time – and it is as easy to calculate as any other mortgage: a full reversion takes all the equity. A reversion is not so easily "reversible".

No investment is required. Indeed their own home is the investment, and any increases over the base figures enable them to enjoy a higher income. The income would be about the same as a reversion scheme and a lot more than the mortgage plus annuity method.

The equity left to the estate on death will be probably a lot more than other reversion schemes, depending on how long the borrowers lived. It peaks at about the time when death is expected, as can be seen from the graph above, so the beneficiaries should be happy. The borrower could still sell up and move into a nursing home and have some cash to pay for it. Even if they did make aged 100, there might well still be surplus equity in the event.

The actual product also differed in that there were some initial fees added to the loan, part of which paid for the mortgage indemnity guarantee and part went as a commission to an introducer. Also the cost of a periodic valuation during the life of the scheme could be added to the loan as well.

The Lender's View

From the lenders perception, the scheme offered the prospect of a long-term loan with no collections required and little administration. The main drawback is that the cashflow would be erratic – indeed zero in the early years until someone dies: although the underlying return on capital was still there, it was effectively being reinvested. It would also take some time to build up a decent sized loan book, as the initial lending figures are so small.

This scheme could be re-launched: the indemnity insurance policy must be renegotiated, a brochure prepared, a simple administration system installed and the scheme could be up and running in no time. No doubt the insurers and the lenders will want to prepare their own initial income tables based on their view of the future. There are only three variables: -

1. Life expectancy
2. Long-term interest rates
3. Long-term property growth rates.

The inevitable spreadsheet entitled "Reverse Mortgage" illustrates the relatively simple mathematics behind the scheme.

But now I have retired, I must leave the possible re-launch of the Reverse Mortgage scheme to someone else – perhaps to you dear reader. There are a massive number of prospective customers over the age of 60 with good sized properties, and are longing for a decent, simple scheme which provides genuine value for money for both customer and provider.

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"It's better to travel hopefully than to arrive"

Epilogue

What has been achieved at the end of this sometimes-complex journey? My objective was to pass on some of the key general principles relating to loans and mortgages, and of use generally for other financial analysis.

I hoped to convey sufficiently general-purpose concepts so that readers will be equipped to perform their own analysis on the many products available throughout the financial services industry, whether loans or not. Compound interest and the IRR apply just as much to an investment as it does to a loan.

I have also exposed some of the pitfalls in the lending industry – flat rate loans, Rule of 78, annual compounding but monthly collections, and interest-only loans with the wrong sort of investment plan. We identified the irony that the safest investment is unsuitable to repay an interest-only loan.

We looked at the flexible mortgage and, in particular, the current account mortgage. This method of lending is very likely to become commonplace in the near future. There is no reason why a single, cheap flexible mortgage cannot replace all other sorts of lending, such as credit cards loans, car loans, hire purchase, unsecured loans and second mortgages. At the same time, it can be a home for all your short-term investments too, but at rates significantly higher than any other deposit-taker would pay.

I have suggested that while personal attitudes to risk and financial skill-level will affect ones ultimate choice of a loan scheme, the use of an accurate comparison tool is vital in order to put subjective judgement into context and to enable scheme-evaluation to be consistent. The IRR and the NPV provide this tool.

We also examined ways of profiting from gearing, in particular, how to become a millionaire from building up a portfolio of investment property. I also hope that the downside risks were made prominent enough, as nothing in this life is ever certain.

If you make it to retirement, you may want to turn your house back into income, and the methods for doing this were discussed. A challenge was laid down to a lender wishing to take up the Reverse Mortgage concept, which provides the best of all worlds for both lender and borrower.

I sincerely hope you will find the spreadsheets of use. They have been quite carefully designed so that they are as general purpose as possible. As in any software, there might well be a bug or two, so please e-mail me if you discover one – mkelly@foxwood.me.uk.

The Internet and the digital revolution

E-commerce is now beckoning the consumer with promises of transparency and choice. It is now possible for anyone to enter some basic personal details on to a web page, and then an electronic robot will trawl through hundreds of schemes in just seconds, returning with an ordered best-buy list. This process in theory heralds a perfect marketplace, with supplier's products competing where they should, in personal appeal rather than mass appeal.

Such *mass customisation* is effortless with a computer. The future of the direct sales force, representing just one company, is under threat: prospects

can now “go-direct” so much more easily, and compare competitor’s products on the web or use an on-line site that does the comparing for you.

The Digital broker

Independent Financial Intermediaries (IFAs) who embrace the Internet are on a winning ticket. There is still a need for someone to sift through a large, ever changing list of available suppliers and schemes and then attempt to match them to an array of different consumer-types. This process is itself able to be digitised and some of the variables were discussed in this book.

But, at the time of writing, I have yet to see a truly accurate web site, which is able to identify the individual type of consumer, source every possible lender, and then list the results in a genuine value-for-money order, using the IRR as the measure over a realistic life span. There is no doubt that this will happen soon.

Transparency and commoditisation

Lenders and suppliers generally are right to be concerned about this process. Borrowers are now demanding more transparency: hidden costs must be exposed and products must be made simpler so that lenders can no longer camouflage bad-value with obscure small print. The larger banking lenders have probably more to fear than the specialist lender and the mutual societies. Specialist lenders can command their smaller but specific niche areas, and can retain their competitive position because of their smaller mass. The Halifax or Abbey National are forced to serve the standard, commodity market in large volumes to survive, since the proportionate effect of niche products is so small in comparison to their size. For their commodity products to remain attractive, even a small interest rate reduction can make a massive difference to shareholder’s profits.

Integration, digital efficiency and flexibility

The web is a perfect sales channel for almost any cerebral product requiring no physical stock, and financial services fit very well. But the front end processes must be integrated with the back end administration for complete success: the sales process must be seamlessly connected to the underwriting and case processing area and thereafter to the collection and administration departments in order to achieve the overall speed and efficiency improvements everyone expects. Such efficiency brings cost savings for the benefit of everyone. Eventually, it might be possible for potential borrowers to auction themselves on the web, with lender’s bidding for their mortgage. The lender’s interest rate margin will change depending on the attributes and quality of the case being offered to them.

Borrowers expect to be able to apply for a mortgage or a loan on-line. Most people hate form filling and a mortgage application form is one of the worst. Successful lenders will facilitate this process, and also give customers an opportunity to track the progress of their application on the web without having to hang on to the telephone listening to a recorded voice saying how important your call is and that you are twenty seventh in a queue.

Once the mortgage has completed, digitisation still has a role to play. For example, a flexible mortgage can be ‘operated’ by the borrower through the lender’s web site. An unlimited set of repayment schedules can be set, reset or cancelled at the click of a mouse. Statements would be immediately

available on-line. Since the process can be entirely automated, no human need be directly involved and so the costs of 'managing' your own mortgage are down to just your own time, probably on one wet Sunday afternoon.

So, soon you will be able to apply for, complete, service and redeem your mortgage entirely electronically. This will save costs and will enhance efficiency, speed, and flexibility for both supplier and consumer. The supplier will profit from savings achieved: market forces will ensure that much of the saving will have to be passed on to the consumer.

Technophobia

Some people fear this revolution. They are concerned that they are not able to cope with computers – it all seems so fast and clever. I suspect that there will be a market for these consumers, who want to be served in the traditional manner. Traditional products will still be available but with more expensive, old-fashioned paper transactions, telephone and face-to-face 'people' transactions, the costs of such an 'old-regime' product will make them more expensive.

The future is bright…

Much of all this is happening right now. There are still many aspects needing improvement. The web is still slow – the World Wide Wait is still a worthy acronym. But new, much faster connections are just on the horizon. Moreover, mobile digital communication will soon connect to the web at much faster speeds than current WAP phones can achieve.

Future technology will change the world as we knew it far more comprehensively than we have ever experienced before. The original industrial revolution took over a hundred years to take full effect: we can now witness an industrial revolution almost every five years - and reducing!

In such a fast moving era, it is vital to hold on to the *basic principles* in order to cope with these on-going revolutions and I hope the principles shared with you herein will remain intact for many years to come. I wish my grandchildren well in their new world – I actually really rather envy them…

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Annex A

Low Start Flexible Payment Mortgages and Index Linking

Most people enjoy a higher standard of living when they are older. The first few years of adulthood are invariably tight, particularly for a young couple bringing up children and starting out on the lower rungs of a career. Once the children are older, mother may well have returned to work, and father has been promoted or used his experience to obtain a better job. Money becomes easier later on in life.

The monthly mortgage payment seems so much more of a burden at the start. It always seemed to be such a high proportion of take-home pay. In fact, most people struggle to finance their first house, which is the best they can afford at the time and so the initial years of a mortgage are always the toughest.

Even if ones standard of living remains unchanged, inflation will ensure that the mortgage payments become easier with time. Inflation shrinks debt. Apart from the inevitable variation in interest rates, conventional monthly payments always follow a level course. A normal repayment mortgage is often called a *level* repayment mortgage as the payments are designed to be, well, level.

It's when you are young and full of energy that surplus spendable cash would be of most benefit, yet life now conspires to deliver the heaviest expenditure compared with your modest income. When you could be exploring the world and having fun, parties, cars, holidays and all the exciting stuff of life, there is furniture to buy, children to clothe, the mortgage to pay as well as the HP on the car, the TV, the computer, even school fees. So much to do - so little money: we've all either been there or are there right now!

Later on in life the children are independent (sometimes), the HP is paid off and the mortgage burden seems to be less significant now with a good, stable income coming in and the wife back at work. Ones standard of living is starting to be really quite bearable.

Why pay more at the beginning when you can pay more at the end?

The biggest monthly burden for most families is usually the mortgage payment. In 1979, when inflation was still in double digits, it seemed to me that monthly mortgage payments really shouldn't be level at all. It would be much easier for borrowers if they started out with lower-than-average mortgage payments, even though they may have to increase subsequently. Later on, most people can more easily afford mortgage payments; it is at the start when they need to be cheaper.

Low start payments, as they were soon called, gave borrowers the choice of either a better standard of living when they were young and most needed it, or they could buy a more expensive house for the same initial outlay. Most borrowers went for a bit of both.

The index-linked mortgage

As explained in the introduction, our Index Linked Mortgage & Investment Company Limited was the first lender to offer the index-linked mortgage for house purchase. It was a very simple idea. The initial monthly repayment was about 30% lower than that for a conventional "level" repayment

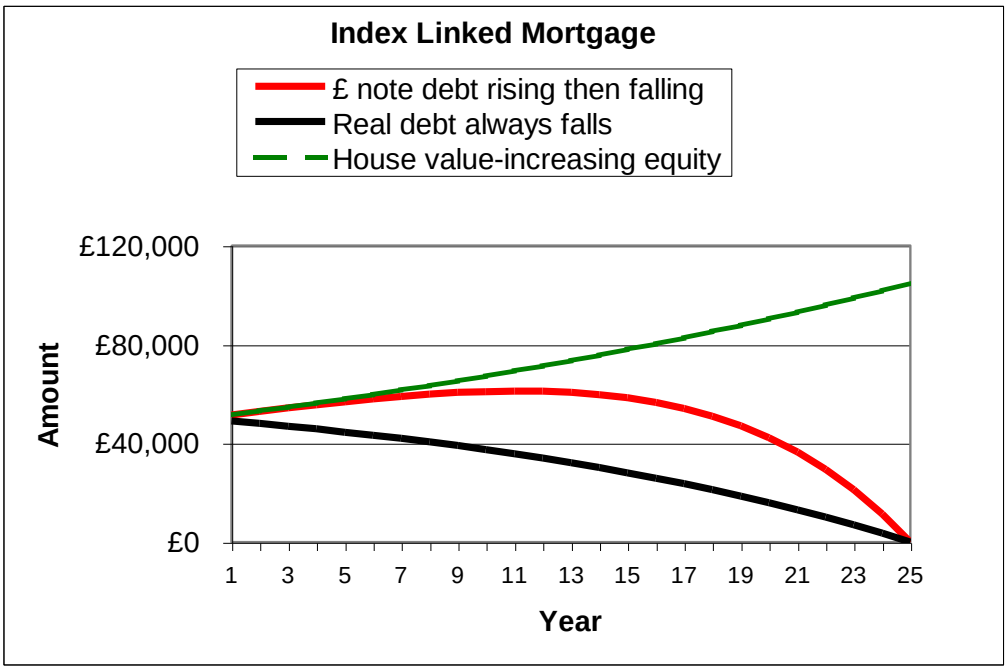
mortgage. But this monthly repayment was increased every year by the rate of inflation. In fact there was a guarantee that the payment would never increase by more than the rate of inflation.

We achieved this clever bit of mathematical juggling by linking the interest rate to the inflation rate. Inflation is measured by the Retail Prices Index, which regularly compares the cost of a typical basket of goods as purchased by the so-called average person. The actual interest rate charged in 1979 was 5.5% plus the RPI rate. The 5.5% was fixed. So it was as if we were charging a fixed "real" rate of just 5.5% - "real" means adjusted for inflation. At that time, when normal mortgage interest rates were around 15%, a mere 5.5% interest rate produced a significantly lower starting payment which borrowers found particularly appealing.

Low starting costs that stay low in real terms

The initial monthly repayment was calculated as if the interest rate was only 5.5% pa and, although the monthly payments were increased annually by the inflation rate, in "real" terms these monthly repayments were fixed. In other words, the monthly cost of the mortgage, compared with the cost of everything else, remained in the same proportion - indeed was guaranteed so to be. If a borrower's income increased in real terms, that is to say his pay increased by more than inflation, the mortgage repayments would become a lessening burden. As most people expect their standard of living to improve, compared to inflation, the mortgage payment was thus wrapped up nicely as if it was always a fixed multiple of the average food bill.

One of our early borrowers called his index linked mortgage the "baked beans" mortgage, because I used to liken the monthly repayments as being the equivalent of so many tins of baked beans, the number of baked bean tins required being constant throughout the life of the mortgage. This was an attempt to explain what "real" meant. My wife said, trust me to use a food analogy.



Borrowers could always increase their payments by more than inflation if they chose. This meant the loan would either be repaid more quickly or the future payments would be lower. However, most borrowers opted for the minimum payment throughout.

The Inflation Bond for Investors

Borrowers liked the mortgage concept (I had an index-linked mortgage myself) and we soon needed a lot more money to lend out to our growing numbers of mortgage applicants. We used the interest link to inflation as a method of raising matched funds from investors to support the mortgage. We offered an "Inflation Bond" which gave a return to investors of more than inflation, even after tax. Remember we are talking about 1979 when there were no index-linked gilts as there are today. Inflation was not totally under control then, and any investment that promised to beat inflation seemed almost too good to be true. We managed to balance our books with investors and borrowers in those early days, often with several investors per mortgage, but it became increasingly clear that we needed a more substantial backer to take the concept forward.

Index Linked Pension Funds

Skandia Life, then a brand new company, was under the very creative leadership of actuary Paul Bradshaw. He recognised the demand for index linked products and in 1980 Skandia launched the first ever index linked pension fund. The entire fund was supported by our index linked mortgages and we focused on marketing and managing the mortgage side and left Skandia to supply the funding. But we still could not satisfy the ever-growing demand for this type of mortgage.

Lazards Brothers, the merchant bankers, later in 1981 joined forces with us to launch LILMUT. Yes, it sounds a silly name, but it stood for the Lazard Index Linked Mortgage Unit Trust and it was specifically designed for pension fund investments. Lazards persuaded some of their more creative pension fund managers to give some experimental support to this new-fangled index linking idea.

Index Linked Government Stock

By this time, the Nationwide Building Society had also launched their version of an index-linked mortgage and at one stage we had even considered a joint venture. The mortgage was beginning to be more understood although it was still considered a bit niche. Nevertheless, we were still experiencing an enormous demand for the mortgage product - far greater than the funds we could raise to finance the loans.

The City was still sceptical about the indexing concept. Pension funds were not particularly keen to become mortgage lenders for fear of the "ordinary man" being too involved in their fund management processes. They hated the prospect of perhaps having to repossess the house of a defaulting pension fund member, probably with good reason. Eventually, prompted by the Institutions, the government launched the first index-linked gilt in 1982. This was a Government Stock whose value was directly linked to the RPI, just like our Inflation Bond. This launch finally satisfied those institutional investors who clearly wanted index linking at that time but who were nervous about doing it with mortgages.

Conventionally funded low start mortgages

Having now lost out to the government who had pitched for our own funding sources, what could we now do to satisfy the ever-increasing demand from borrowers for a low start mortgage when we could not arrange enough matching funds? Well, that is when we changed our name to Mortgage Systems Limited and launched an index linked look-alike mortgage, funded by more conventional banking sources.

We had proved the concept of low start mortgages. We knew that borrowers also understood that future monthly repayments must increase to compensate for the low start. So it was a relatively straightforward step to redesign the mortgage to achieve the same cashflow effect, but with interest linked to bank rates rather than inflation rates. There was a tenuous link between the two anyway.

Our first low start mortgage in 1983 was funded by a bank (Scandinavian Bank) and assumed the monthly payments increased by 5% per annum rather than the inflation rate. The figures looked something like the graph shown earlier for the index-linked mortgage. Both original methods are summarised in spreadsheets entitled “Index Linked Mortgage” and “Flexible Payment Mortgage”.

There were then many different variations, including loans that required the payment increases to be truncated over say 5 years and to be level thereafter. There were repayment and endowment variations. In every case, borrowers were permitted to pay more than the minimum at any time. This either shortened the mortgage term or reduced the minimum payment required in future years.

Today’s flexible payment mortgages are modelled much on the same lines apart from the automatic increasing payment, so you have to elect your own payment increase. In 1983, I used to think that someday all mortgages would be built this way. Twenty years later this prediction might turn out to be true.

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Annex B

Current Mortgage regulation, the Mortgage Code and CAT standards

At present, the regulation of mortgages is fragmented and steps are in hand to consolidate it. Whilst the Financial Services Authority (FSA) regulates the institutions concerned with investment, as I write, mortgages are still largely regulated by a voluntary code, but this will change.

- Regulations under the Consumer Credit Act apply to the advertising of all mortgages, and the full provisions of the Act apply to secured lending on loans of £25,000 or less (unless it is for the purpose of house purchase and other limited exceptions). Firms and individuals involved in arranging loans are required under the Act to hold Consumer Credit Licences, which are administered by the Office of Fair Trading.

- The voluntary Mortgage Code applies to all mortgage loans to private residential owner-occupiers unless they are already covered by the full provisions of the Consumer Credit Act (ie they are for less than £25,000 and not exempt from the Act). Lenders subscribing to the Code were registered and monitored by the Independent Review Body for the Banking and Mortgage Codes. Intermediaries were registered and monitored by the Mortgage Code Register of Intermediaries. From November 1999, arrangements for lenders and intermediaries were merged, and both are now registered and monitored by a single integrated organisation, the Mortgage Code Compliance Board.

- "Non-status" lending is subject to the quasi-regulatory Guidelines on non-status lending published by the Office of Fair Trading.

- The Unfair Terms in Consumer Contracts Regulations 1994 provide remedies for potential unfairness in consumer contracts, on mortgages just as on all other consumer goods and services.

The government has stated its intention to bring mortgage lenders into the regulatory framework of the Financial Services Authority (FSA) with a new set of regulations for advertising. The aim, according to the Treasury Secretary, is to give consumers clear, comprehensive and comparable information in order to drive up standards, cut costs, improve competition and to improve consumers' ability to make informed choices.

In the meantime, the Mortgage Code is in place and its main features from the borrowers' standpoint are summarised below.

The Mortgage Code

From 30 April 1999, every prospective mortgage customer will be given a copy of the "You and your mortgage" leaflet at the earliest contact they have with the lender (or intermediary). The shorter leaflet has been recently redrafted and is reproduced as follows: -

YOU AND YOUR MORTGAGE

The mortgage code provides protection for you as a mortgage borrower. It sets out minimum standards which mortgage lenders and intermediaries have to meet. This leaflet is designed to introduce the mortgage code to you.

The mortgage code

By giving you this leaflet, your lender or intermediary is confirming to you that they keep to the principles of the mortgage code. This provides important protection for you, as the code sets out:

- how your mortgage should be arranged;
- what information you should receive before you commit yourself; and
- how your mortgage should be dealt with once it is in place.

If a lender or intermediary fails to meet the standards of the code, and you suffer as a result, you have the right to compensation under a compulsory independent complaints scheme.

The rest of this leaflet concentrates on the details, which are most relevant to you when you are arranging a mortgage. We then give you an outline of the code's main commitments. You can use this leaflet as a checklist to help you through the process of arranging a mortgage.

Choosing a mortgage

There are three different levels of service which your lender or intermediary may provide to help you choose a suitable mortgage. The lender or intermediary will tell you, at the beginning, which of these levels of service they can provide. The levels are:

- **advice and a recommendation** on which of the mortgages they can provide is most suitable for you;
- **information on the different types of mortgage product** on offer so that you can make an informed choice of which to take; or
- **information on a single mortgage product only**, if only one mortgage is available or if you have already made up your mind.

Check that you understand which level of service you are being offered, and what this means for you.

Whichever level of service they provide, your lender or intermediary should give you information on all the following areas of the mortgage you are considering -

- The repayment method (for example, endowment, capital and interest) and the repayment period.
- The financial consequences of repaying the mortgage early.

- The type of interest rate - variable, fixed, discounted, capped and so on.
- What your future repayments after any fixed or discounted period might be.
- Whether you have to take any insurance services with the mortgage, and if so whether the insurance must be arranged by the lender or intermediary.
- The costs and fees which might be involved with the mortgage - valuation fees, arrangement fees, legal fees, early redemption fees and so on.
- Whether you can continue with your selected mortgage terms if you move house.
- When your account details may be passed to credit reference agencies.
- Mortgage interest tax relief (MIRAS) [Now no longer applicable].
- Whether you need to pay a high percentage lending fee, and if so what this means to you.

If you are using the services of a mortgage intermediary to arrange the loan, they must also tell you if they are receiving a fee from the lender for introducing the mortgage to the lender. They must also let you know whether they usually arrange mortgages from a number of selected lenders or from the market as a whole.

Before your mortgage is completed, your lender or intermediary will confirm, in writing, the level of service they have provided, and the reasons for any mortgage recommendation (if they gave you one). Check that you fully understand this written confirmation, and ask if there is anything that is still not clear to you at this stage.

The Code's main commitments

The code has 10 main commitments. Broadly speaking, these say that lenders and intermediaries will:

- act fairly and reasonably with you at all times;
- make sure that all services and products keep to the conditions of the Code, even if they have their own terms and conditions;
- give you information on services and products in plain language, and offer help if there is any area which you do not understand;
- help you to choose a mortgage to fit your needs, unless you have already decided on your mortgage;
- help you to understand the financial effects of having a mortgage;
- help you to understand how your mortgage account works;

- make sure that the procedures staff follow reflect the commitments set out in the code;
- correct errors and handle complaints speedily;
- consider cases of financial difficulty and mortgage arrears (missed payments) sympathetically and positively; and
- make sure that all services and products meet the relevant laws and regulations.

The code goes into more detail on each of these commitments.

Keeping to the code

How the lenders or intermediaries keep to the mortgage code is monitored independently. And, any organisation under the code must be a member of a recognised complaints scheme - such as the Banking Ombudsman, the Building Societies Ombudsman, or the Mortgage Code Arbitration Scheme. This gives you an extra level of protection, as each of these schemes can award compensation of up to £100,000 to you if you suffer as a result of your lender or intermediary failing to keep to the code. Your lender or intermediary will be able to tell you which scheme applies.

The full mortgage code is also available on the Council of Mortgage Lenders' website www.cml.org.uk.

CAT Standards

In early April of 2000, the Treasury announced a CAT standard for mortgages. CAT stands for Charges, Access and Terms. It is a voluntary standard and the objective to set a standard product type which was supposed to incorporate the most desirable features from the consumers' perspective and includes the following main elements: -

<u>Charges</u>

No arrangements fees or MIG premiums
Interest calculated daily (not the same as *compounded* daily)
Full credit given for all payments made
No fees paid to brokers
All other fees disclosed
No redemption charges outside a fixed rate period
No redemption charges at all for variable rate mortgage
No redemption charges if you stay with the same lender when you move home.
Interest (for variable rate loans) to be no higher than 2% above Bank of England base rate.
Falling rates to take effect within a month of a base rate fall.

<u>Access</u>

Any customer may apply
Minimum loan is £10,000
The lender's normal lending criteria must apply

You can choose to make repayments on any day of the month
You can make early repayments at any time.

Terms

All advertising and paperwork must be straightforward, fair and clear
You do not have to buy any other product to get a CAT standard mortgage
If you are in arrears, you still pay normal interest on the debt.

The CAT rules are still in an experimental stage. Ironically, the cost of such loans may turn out more than for non-CAT loans since offsets are not possible: in other words commissions on related policies, protection from mortgage indemnity guarantee (MIG) premiums or discounted interest rates protected by redemption charges. For example, if a lender cannot charge for a MIG premium for a high LTV loan, the interest rate must be increased to compensate.

We must wait and see. But whatever the new rules bring in, the fundamental principles described herein should remain valid in the long term.

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Annex C

This is a list of the largest 30 mortgage lenders as at mid 2000. Size is not necessarily a criterion of efficiency, creativity or performance. Many will have merged by the time you have read this.

Rank	Name of Group	Year Ended	Mortgage Assets £ billion
1	Halifax plc	31-Dec-99	£93.0
2	Abbey National	31-Dec-99	£64.9
3	Lloyds TSB	31-Dec-99	£47.5
4	Nationwide BS	04-Apr-99	£36.9
5	Woolwich plc	31-Dec-99	£25.5
6	Alliance & Leicester plc	31-Dec-99	£19.4
7	Barclays Bank plc	31-Dec-99	£18.7
8	National Westminster Bank	31-Dec-99	£18.6
9	Bradford & Bingley BS	31-Dec-99	£17.1
10	Northern Rock plc	31-Dec-99	£15.8
11	Bank of Scotland	29-Feb-00	£13.6
12	HSBC Bank plc	31-Dec-99	£13.1
13	Bristol & West plc (incl Bank of Ireland Home Mortgages)	31-Mar-00	£12.8
14	Britannia BS	31-Dec-99	£9.9
15	Royal Bank of Scotland	30-Sep-99	£9.2
16	Yorkshire BS	31-Dec-99	£8.1
17	Portman BS	31-Dec-99	£4.9
18	Coventry BS	31-Dec-99	£4.6
19	National Australia (GB & Ireland)	31-Jan-00	£4.4
20	Standard Life Bank Ltd	31-Dec-99	£3.8
21	Skipton BS	31-Dec-99	£3.7
22	Chelsea BS	31-Dec-99	£3.6
23	Leeds & Holbeck BS	31-Dec-99	£2.8
24	Derbyshire BS	31-Dec-99	£2.3
25	West Bromwich BS	31-Mar-99	£1.9
26	First Active Financial plc	31-Dec-99	£1.7
27	Cheshire BS	31-Dec-99	£1.7
28	Principality BS	31-Dec-99	£1.7
29	Norwich & Peterborough BS	31-Dec-99	£1.7
30	Newcastle BS	31-Dec-99	£1.5

Annex D

Spreadsheet Summary

The following spreadsheets were included on the original web site (others may be added later), and are listed here in alphabetical order. They have been written in both Excel and Lotus 123 format and you should first run the appropriate compressed self-extracting file from the file. This will automatically unzip the individual spreadsheets.

Use the spreadsheet menu item View, Zoom to set the screen sizing appropriate to your computer screen. If you save the unchanged spreadsheet it will then remember that setting the next time you use it. Most of the sheets are protected to prevent you accidentally overwriting key formulae, but you can easily unprotect if you wish, as there is no password.

APR Calculator
A general-purpose APR (Annual Percentage Rate) calculator, illustrating the use of “Goal Seek” (or Backsolver in Lotus). It is designed for long term loans where there may be an interest rate change every year, and some regular or one-off monthly or annual fees or charges. The Macro button automates the process.

Buy or Rent
Choose whether to buy or rent a house by entering your own ideas of the future. An immediate graph indicates when the optimum breakeven point occurs in terms of how long you stay in the property.

Current Account Mortgage
Choose any combination of payments, credits & debits & graph the results.

Flexible Mortgage
Enter your own mortgage payment schedule and future interest rates: see some examples of how to use a flexible mortgage.

Flexible Payment Mortgage
The product of the eighties, which included a low-start option and flexible payments. This sheet is more of historical interest rather than practical value.

Index Linked
The first residential mortgage linked to inflation. As with the flexible payment mortgage, it is of historical and mathematical interest only.

Investment and Mortgage Calculator
Illustrating the effect of using a savings scheme alongside an interest-only mortgage, and calculating the optimum savings rate from a given performance estimate. Includes two examples.

Investment Property Returns
A useful spreadsheet for those interested in buy-to-let or commercial property as an investment. Estimate the return on capital for almost any scenario. Determine when it pays to borrow and use gearing to enhance your return.

Loan Comparator (the basic tool)
Use this to accurately compare any two mortgage or loan products using the IRR (Internal Rate of Return) method. Calculates APR as well and supports up to two interest rate changes, illustrating the monthly payments: probably the most useful spreadsheet of all for serious mortgage seekers.

Mortgage and Loan Product Design
Useful for a lender to help determine the margin required on any loan product. Then using "Goal Seek" macros, it will calculate backwards to determine say the cashback or discount that can be offered to match the required margin.

Mortgage Affordability
A simple spreadsheet to calculate the mortgage advance to match what you can afford each month and an indication of the income you need.

Mortgage Illustration and Comparator
Ideal for calculating and illustrating the key variables of a mortgage, including a payment schedule over the life of the loan, and a comparison tool.

Mortgage Scheme Select Wizard
Answer three simple questions to see which type of mortgage scheme suits you, and an explanation of each scheme.

Mortgage Exposed Part I
A summary of the figures used in the tables in Part I of "Mortgages Exposed" in simple, unprotected spreadsheets so that the beginner can get some idea how the sheets are constructed.

Project IRR
Take any project with monthly cashflows and calculate the IRR

Property Portfolio
A dynamic example of how to build up a portfolio of 16 commercial properties over twenty years using mortgages and re-invested rental income and, given initial assumptions, immediately calculate the surprising outcome.

Regional Property Values
Using regional indices since 1973, see how houses have grown region-by-region, and estimate your own property value.

Remortgage Check
Determine whether it is worthwhile switching to another mortgage scheme by calculating the potential savings as a lump sum "Present Value".

Reverse Mortgages
Illustrating an unusual scheme to compete with home reversions for those over fifty who are house rich but cash poor.

Rule of 78
Illustrating how to calculate the early settlement of a loan using this method.