

Volume 9 //

Acuity

The greatest wealth is **your peace of mind...**



BARNETT
RAVENSCROFT
WEALTH MANAGEMENT

I always hated maths at school!



“Compound interest is the eighth wonder of the world. He who understands it, earns it ... he who doesn't ... pays it.”

Albert Einstein

Deathbed regrets

No-one on his or her deathbed ever regretted not doing more maths at school. Yet more and more, with the demise of the final salary pension scheme, and increasing longevity, many will regret that they had not thought out their financial retirement plans more carefully. The two subjects are closely linked. Maths matters to us but, on the whole, we don't feel comfortable around numbers.

For many, double maths on a Monday morning at school was a bad start to the week. Trigonometry, calculus or simply 'sums' have challenged school children since time immemorial. For the majority, maths was something to be endured, crammed for an exam pass and promptly forgotten. Fortunately, a few went on to use it in their day-to-day lives in careers such as engineering, accountancy, science and financial planning.

For many, its application is a little humdrum; totting up the shopping bill, completing a tax return, or reconciling the bank statement. However, what many investors fail to realise is that maths plays a crucial role in the success or failure of their long-term financial plan and investment strategy. This short note seeks to provide a little insight into some of the simple maths that is involved. Be brave, read on!

Basic maths in financial planning

Financial planning, at its very simplest, is about understanding how much one needs to put aside during the 'working' years of life to build a pot of money large enough to fund the 'fun' years of retirement, without running out of the stuff before you die. Getting a good plan in place requires a good head for numbers. Fortunately, good financial planners will handle the mathematical heavy lifting on your behalf, aided by cashflow modelling tools. The power of maths can mean the difference between a successful and happy outcome, reflected on in the shade of a palm tree in the Bahamas, or alternatively from behind a wind break in Bognor. The choice, as they say, is yours.

Retirement maths

Here are some simple retirement numbers to start with. Imagine that you wish to retire on £40,000 per annum, in today's money. Assuming that you don't want to risk eroding your capital before you die, a commonly used rule of thumb suggests that you should probably not withdraw more than 3%-4% a year from your portfolio (assuming a balance between bonds and equities). If you opt for a 4% withdrawal rate, you would need a pot of around £1 million to sustain you in your dotage.¹

To build this pot, you would need to know how much to save a month, at what rate of return, and for how long? Table 1 provides some insights into the challenge individuals face in trying to secure their financial futures.

Table 1: Approximate monthly contribution to build £1,000,000

After-inflation Rate of Return							
Years	1%	2%	3%	4%	5%	6%	7%
10	£8,000	£7,600	£7,300	£6,900	£6,600	£6,300	£6,000
20	£3,800	£3,400	£3,100	£2,800	£2,500	£2,300	£2,000
30	£2,400	£2,100	£1,800	£1,500	£1,300	£1,100	£900

Source: Smarter Investing, 2nd Edition (2009), by Tim Hale, FT Prentice Hall.

The combination of time and higher returns helps to ease the burden, through the power of compounding i.e. the concept of interest-on-interest, or as Benjamin Franklin once said ‘The money that money earns, earns money’. It is never too early to begin investing for retirement. One of the greatest financial gifts that grandparents and parents can pass to the younger generation is the understanding of compounding and the need to start investing early.

The tyranny of big numbers and the power of small numbers

No financial market report these days is complete without some mind boggling numbers, such as a Euro 100 billion bailout, or a trillion dollar debt mountain (i.e. \$1,000,000,000,000 to give it all its noughts). This leads to a tendency in some to become blasé about small numbers, and even a little disappointed in them - ‘my portfolio only returned 3% above inflation last year’. Yet the small numbers really do matter and are meaningful.

Imagine three different portfolios that deliver returns of 1%, 3% and 5% per year, after inflation, over a period of 30 years. £100,000 invested in each would result in a growth of purchasing power to around £135,000, £240,000 and £430,000 respectively. Seemingly small differences in the compound rates of return (known also as geometric returns) turn into large differences, in terms of financial outcomes.

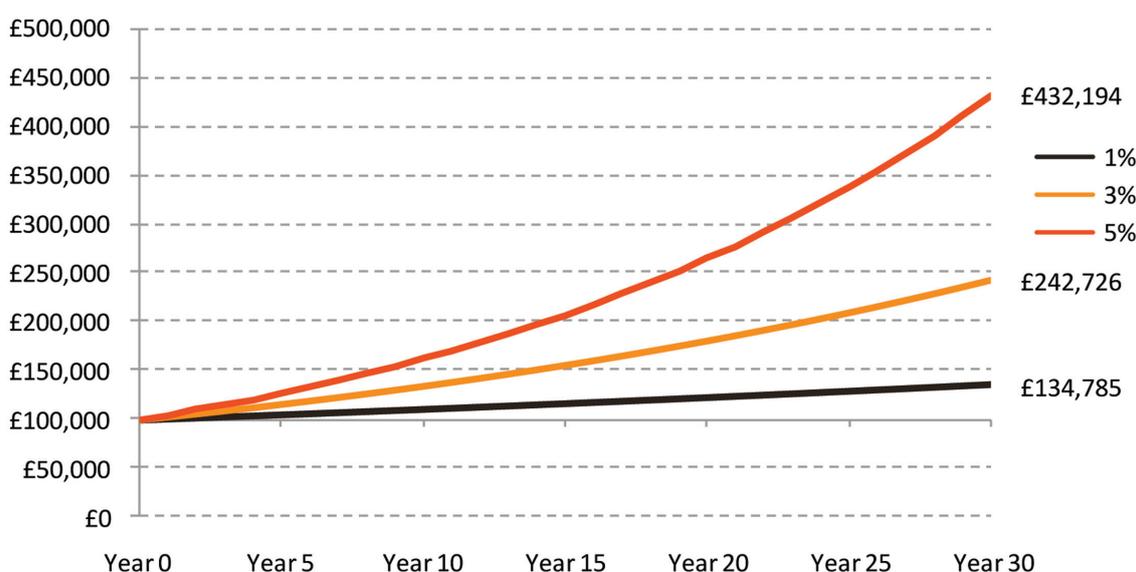


Figure 1: Compounding is a powerful concept ²

An insight into market returns

If we take a look at the longer-term historical returns that different investment asset classes have delivered, such as equities (owning a part share in a company), bonds and cash (lending to governments and companies), we can perhaps see why 'get rich slow' is not a bad slogan for investing. Attempting to 'get rich quick' is simply gambling. When we strip out the negative effect of inflation, what surprises many investors is just how slim the pickings appear to be, and that's before tax and the costs of investing have been factored in. Over the past 112 years, cash has delivered a return of around 1% above inflation, government bonds around 1.5% and UK equities a shade under 5%.³ Do not despair; read on!

The 'Rule of 72' at work

The challenge we face as investors is that calculating compound returns, and visualising the impact of costs on final outcomes, is taxing for most people's grey matter. Fortunately, some bright mathematician has worked out a rule of thumb to help. It is the 'Rule of 72'.⁴ If you take the compound (geometric) rate of return and divide it into 72, you can estimate the number of years it will take for you to double your money. The table below illustrates this rule of thumb in action.

Table 2: Years to double your money at different rates of return

Return	1%	2%	3%	4%	5%
Years	72	36	24	18	14

It is wise to remember that in reality investment returns do not come in straight lines and the investment journey is likely to be increasingly bumpy, the higher the return target. Alternatively, the Rule of 72 can be used to establish what rate of return is required to double your money over a specific number of years.

Table 3: Rate of return to double your money over a specified time horizon

Time	5	10	15	20	25
Return required	14%	7%	5%	4%	3%

Avoiding cost leakage becomes important

Investors need to ensure that there is minimum cost leakage from their investment portfolios. That means both financial costs such as product fees, tax and unnecessary investment activity; as well as the material costs of moving in and out of markets in response to the emotional pressures felt at times by investors. In terms of investment activity, less is more. Capturing as much of the return that the market delivers becomes a primary objective. A percent or two in costs, here or there, is not a small number. It will make a big difference.

Protecting wealth from inflation is very important for long-term investors

The Rule of 72 works in reverse too. It provides insight into the damage that inflation can reap on savers. Some plan for retirement by carefully saving money (good) and building up bank deposits (not so good) for their retirements, with a view to spending the post-tax income to supplement other pension income. Others will buy a level annuity on retirement that is exposed to the risk of inflation. The rule reveals an alarming fact – even low rates of inflation can rapidly erode the purchasing power of a saver's principal. Take a look at the table below.

Table 4: The erosion of purchasing power of capital by inflation

Inflation	1%	2%	3%	4%	5%
Number of years to halve capital	72	36	24	18	14

The Bank of England’s target rate of inflation of around 3% will halve the value of capital every 25 years or so (i.e. prices will double in this time). To bring some immediate relevance to these numbers, figure 2 illustrates the growth of wealth from deposits (or the erosion of it in the past few years). Note that these returns are before tax and all income is reinvested, which is rarely the case. Holding cash deposits is a poor strategy for retirement.

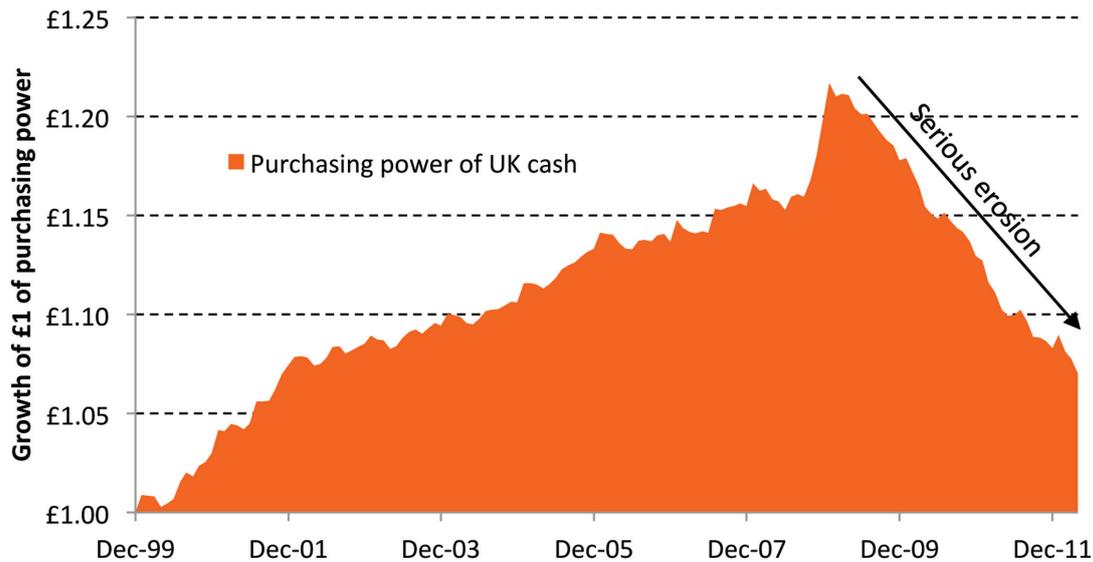


Figure 2: Cash is not a good long-term strategy for retirement ⁵

It is sobering to note that even before considering the impact of taxes, savers have seen the purchasing power of their deposits fall by over 10% in the past three years.

The maths of diversification

The next piece of maths is simple too, but one that has profound implications for the structuring of investment portfolios. Take a look at the table below. As you can see, if we can reduce the volatility of a portfolio, i.e. narrow the range of returns experienced, through sensible diversification across markets and asset classes, we can improve the compound (geometric) return of the portfolio. This is important, knowing what we do about compounding and small numbers.

Table 5: Reducing volatility in a portfolio pays

	Year 1 Return	Year 2 Return	Average Return (Arithmetic)	Compound Return (Geometric)	Value at End of Year 2
Portfolio A	-25%	25%	0%	-3.18%	£9,375
Portfolio B	-10%	10%	0%	-0.50%	£9,900

What conclusions can we draw from this maths lesson?

1. Time is your friend
2. Small numbers and small differences matter
3. It is important to minimise cost leakage, both financial and emotional
4. Be wary of the corrosive effects of inflation
5. Diversify your portfolio to reduce volatility.

In a nutshell, these are the things that we focus on when building client portfolios. A well structured portfolio, implemented using low cost passive funds, and which is well diversified, is likely to provide investors with a better chance of success over the long-term than most other approaches, including holding cash on deposit.

Just as you may have wished at school, we have kept this maths lesson brief; but hopefully you can see why understanding some basic maths is so important to your financial future. Maths rocks!

Take-home points

- Maths is rarely top of the popularity list of subjects studied at school. Many people feel uncomfortable around numbers and tend to avoid them.
- However, maths underlies the financial planning process and plays a big part in the success or failure of peoples' retirement plans. Understanding a few key mathematical concepts is useful.
- When it comes to retirement planning, basic calculations can help you to understand the magnitude of the task of accumulating a sufficiently large pot to see you through your retirement years.
- Compounding of returns is a major force for both good and ill in investing. A simple rule of thumb - the Rule of 72 - helps tackle some of the basic calculations we face.
- Inflation is an insidious cost and even low levels of inflation eat away purchasing power rapidly.
- Reducing the range of returns of a portfolio, by sensible diversification, can help to raise the compound return - small differences in return make big differences over long periods of time.

End notes

1. Calculation: $\pounds 40,000/4\% = \pounds 1,000,000$.
2. Compounding outcomes are calculated as follows: Starting amount X $((1 + \text{rate of return})^{\text{number of years}})$, where ^ is 'to the power of'.
3. Barclays Equity Gilt Study, 2012
4. The 'Rule of 72' is only a reasonable approximation.
5. UK 1-Month Treasury Bills
6. Compound return = $(100 * (1 + \text{Year 1 return})) * (1 + \text{Year 2 return}) / 100 - 1$

Other notes and risk warnings

This article is distributed for educational purposes and should not be considered investment advice or an offer of any security for sale. This article contains the opinions of the author but not necessarily the Firm and does not represent a recommendation of any particular security, strategy or investment product. Information contained herein has been obtained from sources believed to be reliable, but is not guaranteed.

Past performance is not indicative of future results and no representation is made that the stated results will be replicated.

Errors and omissions excepted.

Barnett Ravenscroft Wealth Management is authorised and regulated in the United Kingdom by the Financial Services Authority FRN:225634, is registered in England and Wales under Company No. 04013532.

The registered office address of the Firm is 13 Portland Road, Edgbaston, Birmingham, B16 9HN

Acuity



br
**BARNETT
RAVENSCROFT**
WEALTH MANAGEMENT

Barnett Ravenscroft Wealth Management
13 Portland Road
Edgbaston
Birmingham
B16 9HN
UK

Tel: +44 (0)121 454 0910
Fax: +44 (0)121 410 5619
Email: info@brwm.co.uk
Web: www.brwm.co.uk