Compounding

By Michael Kemp

Let's start with a short quiz:

- What traces its origins back 4,500 years to Babylonia, an ancient cultural region in Central-southern Mesopotamia (present day Iraq)?
- What was first presented in the form of an easy-to-read table when published in Jean Trenchant's book *L'Arithmetique* in 1558?
- What was once described by Albert Einstein as the "Greatest mathematical discovery of all time"?

The answer:

Compound interest – referred to as the Tool of the Wealthy. Yet despite this distinguished heritage and impeccable list of credentials it is interesting to hear that a 2008 survey revealed two thirds of Americans did not understand how compound interest worked. This starts to explain why so few people are financially comfortable when they come to retire. The Australian Investment Institute tells us that only 7% of retirees are financially secure and that 70% of retirees now claim some form of government support. Social security provides for a meagre standard of living at best and if you want to avoid it then you would be well advised to get the "tool of the wealthy" working for you.

An appreciation of compounding is essential for any investor. So strongly do I feel about this that I devoted an entire chapter of my book *Creating Real Wealth* to discussing it. Entitled *A Lesson Forgotten*, it reminds us that we all learnt about compounding at school but most have failed to apply it in our attempts at wealth creation. So let's go back to school and explore why Albert Einstein, undoubtedly a member of scientific royalty, believed it to be so great.

The formula

Compound interest, as opposed to simple interest, is calculated by including the reinvestment of all returns during the course of the investment period. These returns are not consumed, rather they are rolled into the next compounding period (usually 1 year), so as to then earn a return as well. This results in exponential growth of the principal over the period under consideration.

The formula describing this process is:

$A = P\,(1+R)^{n}$ where P = initial principal.

R = interest rate.

n = number of compounding periods.

Note that there are only 2 variables impacting the growth of principal. They are namely the rate of return (R) and the number of compounding periods (n). The greater the rate of return and the larger the number or compounding periods the greater will be the growth of principal. A low compounding rate will tend to be compensated for by a long investment period and a short investment period will tend to be compensated for by a high rate of return. Two popular examples demonstrate this point.

Time and return

In 1626 Peter Minuit, the then Director General of New Amsterdam (to which New York was referred before the English took over in 1664), "bought" Manhattan Island from the Lenape Indians for 60 Dutch guilders (US$24). Some say the price was a steal but in defence of Minuit, if the Indians had placed the money in a Dutch bank and allowed it to compound at the modest rate of 6.5% then the principal would have grown to $1 Trillion by 2015. This staggering figure is reached without any addition to the initial $24. This example demonstrates the impact of a large number of compounding periods. The following demonstrates the impact of a high rate of return.

Consider whether you would rather be given $1 million now or alternatively 1 cent which will be doubled every day for 30 days. This represents a 100% return over 30 compounding periods. The counterintuitive, but correct answer is the latter since 1 cent doubled every day for 30 days results in an accumulated amount of $10.7 million. Without compounding the answer would have been 31 cents.

What's behind these large numbers produced by compounding? It's the exponential nature of the growth curve. That is, reinvestment leads to an ever increasing capital base from which earnings are generated. Let it run for long enough and a graph of accumulated wealth starts to look more like a moon shot than a financial graph. It's why graphs of accumulation indices need to be plotted on a semi logarithmic scale, just to fit them on the page. But neither of the two examples above are practical ones. Their purpose is merely to demonstrate the power of the formula. The following examples are ones that can be applied to every day circumstances.

The million-dollar Mercedes

Many people like to spoil themselves with a European car. That's fine if you are already wealthy but for many people it is decisions such as these that actually prevent them from ever becoming wealthy. The following story of the *Million dollar Mercedes* is a true one and relates to someone I know who is now dependant on the old age pension. The car in question, a 280E Mercedes Benz, was purchased new in 1980 for $30,000. It was sold in 2006 for $4,000. That's a depreciation of $26,000 over a 26 year period – an amount that could be equated to $1,000 per year. Many would call that cheap motoring. But consider what would have resulted if instead the $30,000 had been invested in Australian equities for the same period. The S&P/ASX 200 Accumulation Index, which is calculated on the basis of the reinvestment of all dividends (the process of compounding) grew by 33 times from 1980 to 2006. Thirty three times $30,000 is near enough to $1 million by my calculations. And whilst you might say that one can't go without a car for 26 years, I would counter that by saying that it didn't have to be a Mercedes. A Ford Falcon cost $6,000 in 1980 which would have left $24,000 to invest. This would have grown to nearly $800,000 by 2006, thereby providing a very nice supplement to retirement. It is also important to note that the larger part of the $1 million was attributable to compounding. Market prices, as measured by the non-accumulation index, saw an increase of 9.5 times over the period. If dividends had been spent, rather than reinvested, then 70% of the gain would have been lost.

Superannuation

Let's apply the principle of compounding to our efforts in building a superannuation nest egg. In particular to exploring the financial impact of commencing the accumulation process at the start of our working career rather than its end. The assumptions used in the following calculation are as follows:

- a 40 year working career.
- an annual return of 10%.
- a 3% inflation rate hence a real rate of return of 7%.
- a contribution of $10,000 in year 1 and for this to be increased by the rate of inflation for all subsequent periods. This allows a direct comparison to be drawn between contributions made in different periods.

Consider now 2 self-employed workers. They are the same age and they commence their careers in the same year. Both, after working for 40 years, retire at the same age (sounds like the advertisement on TV doesn't it?). Person A makes 10 annual CPI-adjusted contributions during the first 10 years of his career and then no more. For 30 years he contributes nothing into superannuation. Person B is disinclined to save until 10 years before his retirement. He starts saving 30 years after commencing his career in an attempt at *late life catch up*. He saves the inflation adjusted equivalent of $10,000 per year for 10 consecutive years. In inflation adjusted terms A and B have both made the same contributions. The difference in retirement capital between A and B? Person A has accumulated $3.4 million upon retirement - person B only $450,000. The message is clear. The power of compounding means that superannuation contributions made early in one's working life provide a much greater benefit than those made near retirement.

Compounding and Share Price Growth

A wider appreciation as to how compounding impacts share prices started to develop early last century. Instrumental in this understanding was the release in 1924 of Edgar Lawrence Smith's best-selling book *Common Stocks as Long Term Investments*. Until the release of Smith's book stocks, at least in the United States, were generally regarded as a medium for speculation, not as one for long term investment. The short term fluctuations in stock prices were perceived as a phenomenon that needed to be traded.

Smith argued that stock price charts was misleading. They were not adjusted for stock splits, Index charts did not allow for variations in market capitalisation between individual stocks and the effect of dividends was not considered. Smith constructed his own chart covering the 86 year period between 1837 and 1923 in an effort to adjust for these factors. He observed there to be a parabolic rise in the value of his hypothetical stock portfolio. He put this down to compounding and measured the rate of return over the period at 2.5%.

Smith saw dividend policy as an important factor in share price growth, an issue, which until that time had not been widely recognized. These are his words: *Over a period of years directors will never aim to declare all the company's net earnings in dividends. They will turn back a part of such earnings to surplus account, and invest this increasing surplus in productive operation. Such a policy successfully carried out is in fact a practical demonstration of the principle of compound interest*.

Smith's book was released near the commencement of the bull market of the 1920's, a market which culminated in the famous 1929 Crash. Prior to the Crash his message had been used by some to justify ever increasing stock prices. The argument went that if prices were determined by the forces of compounding then virtually any price could be justified. Alas, no business grows indefinitely, a lesson well relearned in October 1929.

Dividend Policy

Thus the principle of compounding is intertwined both with dividend policy and share valuation. In determining the intrinsic value of a company a multiple is often applied to its book value. The book value, or shareholder's equity, is that part of the business that is actually owned by the shareholders. It is calculated by deducting total debt from total assets. The multiple which one applies to shareholders equity, in order to derive the intrinsic value, is influenced by two key variables: the anticipated return on equity (ROE) and the future dividend payout ratio. The share price can be expected to increase at a greater rate for companies that have a high ROE and a low payout ratio. This assumes, of course, that management also achieves a high rate of return on the retained earnings (the incremental return on equity). But not all businesses use retained earnings to grow equity. Some businesses require the retained earnings simply to maintain the status quo. To spot these companies look out for a lack of growth in shareholders' equity despite a high retention of earnings and the tendency to return to shareholders and the market for ongoing capital raisings. Some prime examples of such capital intensive businesses are found in the airline industry.

This line of reasoning also leads to an appreciation that contrary to popular belief a company with a high dividend yield is not necessarily an attractive proposition. A high dividend yield is often associated with a high payout ratio (Telstra is a prime example). All other things being equal this will generally result in low share price growth. A high payout ratio is really only justified if either the management doesn't know what to do with the money or if the company produces a low ROE. If management can't do anything worthwhile with your money they would be best to give the earnings to you in the hope that you can do better.

As stated the application of a high incremental ROE and a high retention of earnings is an example of compounding at work. It's what has driven Berkshire Hathaway's dividend policy for years and is why the Berkshire share price is now up around $125,000 (no that isn't a typo - $125,000 for a single class A share!). A company with the ability to maintain a high ROE is best to retain earnings and utilize them to grow the company's capital base, earnings and share price. Don't worry about the low dividend. Remember that you now know all about compounding – the growth in the share price will more than make up for the smaller dividend (remember the example of $10.7 million Vs 31 cents). And if you sell the shares in the drawdown phase of your superannuation fund they won't be subject to CGT.

Summary

Every investor needs to have a working knowledge of compounding and apply it to their:

1. Superannuation planning decisions.
2. Consumption and savings decisions.
3. Intrinsic value calculations.
4. Appraisal of the appropriateness of dividend policy.

Without it, you aren't investing.

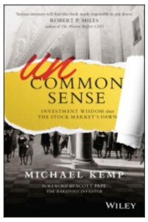
To read more of Michael Kemp's work

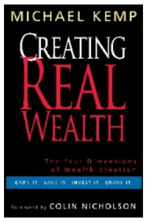
Previous Articles

All Michael's previous articles for the website are now on the *Michael Kemp Articles* page on the Free Resources menu. They are now listed by title with a brief description of their contents.

Books

Michael has written two books, both of which are available for purchase from the ***Buy Books*** menu:





CREATING REAL WEALTH - The four dimensions of wealth creation

UNCOMMON SENSE - Demystify the complex world of investments and make your own investment calls

Michael Kemp is the chief analyst for the Barefoot Blueprint and author of "Uncommon Sense". Published under the Wiley label "Uncommon Sense" delivers a deeply considered and logical approach to the otherwise complex world of investing.