Cracks in your crystal ball – the problems with projections

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Projections predicting the future rise and fall of savings are often used in do-it-yourself and professionally assisted financial planning. Indeed you may have created forecasts for your future wealth using Microsoft Excel or one of several online calculators. Many have had projections prepared for them by an advisor. The latter are often shown using technicolour graphics illustrating the evolving components of your wealth, income and expenditure. These analyses promise great potential as they speak to important questions like "How much will I have?", "How much savings is enough?" and "Can I retire now?"

The problem is that all projections are wrong. In many cases they provide a false sense of security. In my experience not all have had fully explained to them or understand the key assumptions and limitations that underlie these forecasts. In the following we'll explain the issues and share ideas for using projections responsibly.

We also write this as a submission to the Australian Securities & Investments Commission (ASIC) who last month released "*Consultation Paper 101 : Superannuation Forecasts*" (http://www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/Consultation_paper_101_Superannuation_forecasts_v1.pdf/$file/Consultation_paper_101_Superannuation_forecasts_v1.pdf) seeking input on "the provision of superannuation forecasts (ie. estimates provided to consumers of the likely balance of their superannuation investment at retirement"). The latter is a well meaning initiative to get Australians more interested in superannuation and perhaps set aside more for their retirement. UK and Swedish pension funds are obliged to annually provide in member statements a forecast of future savings and the government thinks this might be good for Australians. You might be surprised that under current law, end-benefit projections are considered a form of personal advice and cannot be provided other than via a licensed personal financial advisor or where relief has been provided by ASIC (as it has for online calculators). Of course no one can stop you making your own projections.

The unrealised danger with most projections is that the effect of volatility (which none need reminding of at present) isn't usually considered. Almost all models generate a smooth projection of how your savings grow and then are gradually depleted, which is an outcome the real world won't deliver. The defensive characteristics of your portfolio and whether you retire into a secular bull or bear market, or an inflationary or deflationary period, have a strong influence on your investment balance trajectory. Retirement funding projections in particular are especially sensitive to a range of variables.

We will illustrate this in the following by comparing simple projections with actual historical experience looking back over 120 years of Australian investment market history. To the best of my knowledge, no one has done this in Australia before. Others including Canada's Jim Otar have done a similar analysis for the US market making similar observations.

A simulated retirement

Figure 1 is a typical projection of one's savings balance over the years following retirement. Here it is predicted that $1m invested in an annually rebalanced portfolio allocated 60% to Australian equities and 40% to bonds will smoothly and adequately fund 30 years of retirement living. Thirty years is relevant as many retire at age 60 or 65, and age 90 to 95 provides a safety margin beyond average life expectancy of 82-85 for men and women respectively. This assumes $60,000 (6%) is initially drawn down and that amount is increased with inflation to maintain purchasing power. The calculation is generated assuming this portfolio earns the average rate of return for a portfolio of this construction which is 9.5% observed for the last 120 years. In addition an allowance of 1.5% for fees and taxes is included which provides for a net return of 8%. Most wouldn't consider this overly aggressive. Indeed this falls within the band of performance suggested for a balanced fund net of fees on the ASIC *fido* website. An inflation rate of 3.2% is used, which is the average for this period.

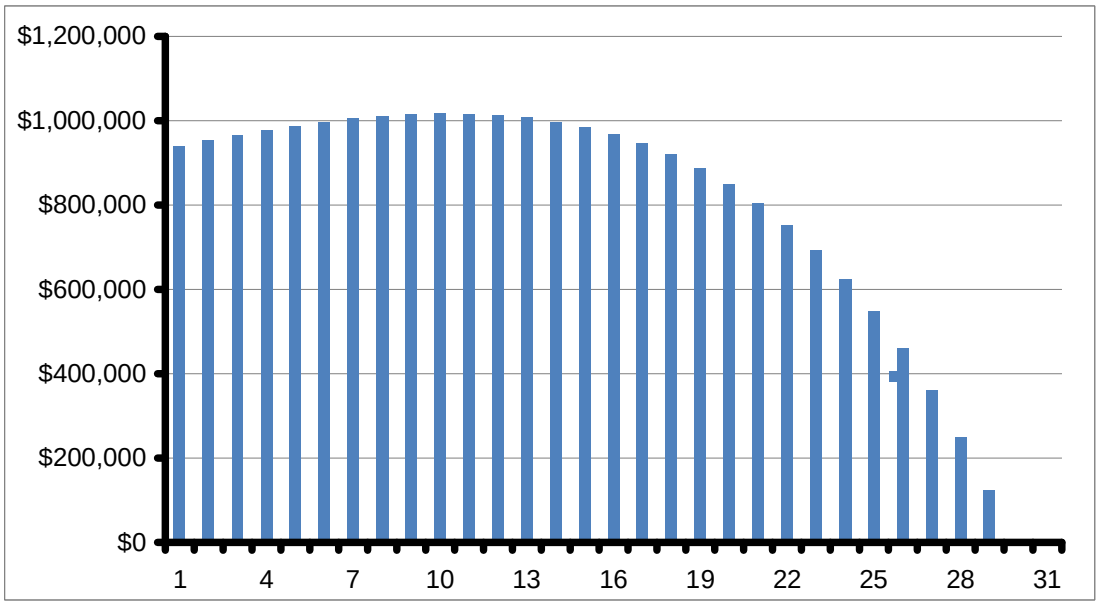

Figure 1: Typical retirement simulation showing growth and decline of a $1m investment balance for each year of retirement while funding inflation adjusted living costs starting at $60,000 in year 1.

Common to most projections like this is the expectation that total investments rise initially as investment returns (both income and capital appreciation) exceed drawings. However as inflation pumps up the draw down requirements, this growth is increasingly countered by inflating drawings such that the portfolio value, first slowly then more quickly, declines. If you're unsure why inflation needs to be considered, then you probably haven't been to Safeway or Coles lately.

Actual retirement histories

Leaving the world of make believe, rather than using an average return lets instead use actual historical year by year returns for the Australian share and bond markets as well as inflation. This will help illustrate how a retiree's savings balance would have changed under real world conditions which recognise the randomness of returns, bull and bear markets and periods where inflation and deflation broke out. Figure 2 shows the trajectory of this same $1m investment balance invested for someone retiring beginning in 1885 and beginning every 3rd and 5th year since then until lastly retiring in 1980. The smooth red line is the same forecast as shown in Figure 1. The black lines are the estimated actual retirement savings balances for those who started in each one of the 40 start years studied using year by year historical data.

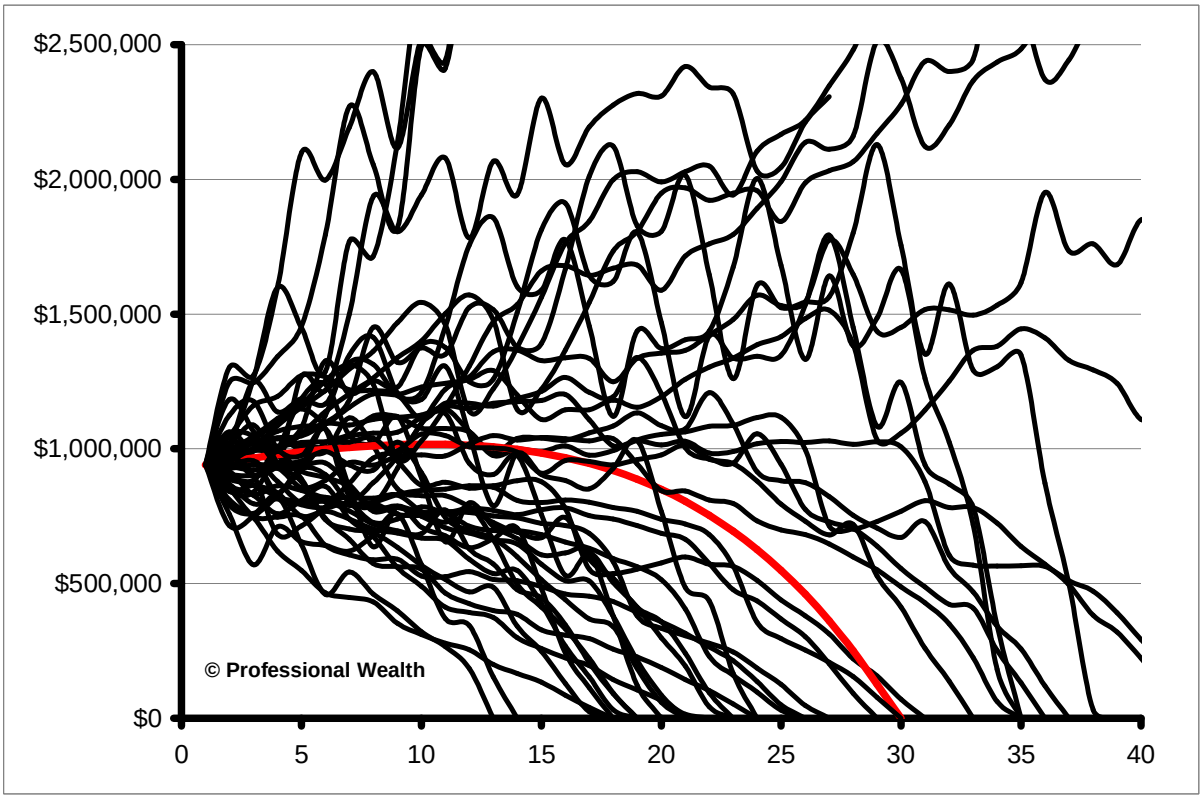

Figure 2: Retirement simulation constructed using historic yearly Australian equity return, 10 year bond yield and inflation data. Each black line is for a retirement starting in 1885 and every 3rd and 5th year thereafter until lastly retiring in 1980. The red line is a projection constructed using the average investment return and inflation over these 120 years invested in the same 60% Australian equity:40% bond, annually rebalanced fund.

Figure 2 might surprise you. It shows …

- No historic retirement balance tracked that predicted – investors even in a balanced fund have to steel themselves for a bumpy ride which projections don't illustrate

- The breadth of potential retirement savings balances over time is incredibly wide which is a function of the many different interacting variables

- A substantial portion of retirements fail to achieve a predicted 30 year lifetime – in this case 21 of 40 or 53% of start years studied provided funding for less than this target and 2 of the years shown didn't even make it half way. You would need to adjust your steady state investment return assumption 3% downwards from net 8% to 5% per annum to match the worst 20% outcome

- Some enjoy 'super' returns well above that predicted and therefore become able to fund an improved lifestyle, or leave to the next generation a substantial legacy

Some of the variation in Figure 2 results from not everyone enjoying the same average annual return on their investments even for periods longer than ten or more years. The simple average of gross annual returns for years within each line or retirement trajectory varied between 8 and 16%. This is a big difference from the average return. However this isn't the only reason for the variation in portfolio longevity.

If we examine retirement histories that share the same average investment return we can isolate out the effect of average investment return. In Figure 3 we show a subset of historical retirements where the simple average investment return for the years of the funded retirement lifetime is roughly the same - a gross 10% per annum plus or minus 0.5%. Because variation is still evident, this shows other factors must be contributing to the scatter.

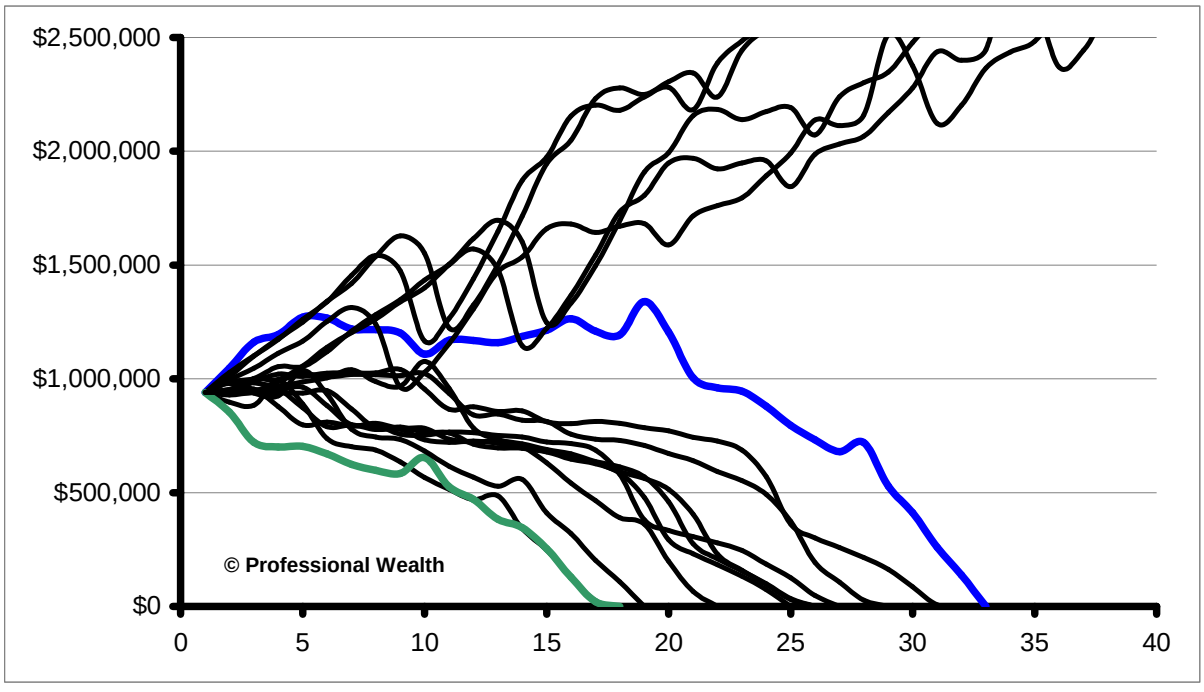

Figure 3: Historic retirements which share the same simple average, gross annual investment return of 10% pa over each portfolio lifetime. The upper-most blue and lower-most green lines are for retirements beginning in 1933 and 1951 respectively which also share similar average inflation over the period.

One of these factors is the role of inflation. For the different retirement years selected in Figure 3, the average annual rate of inflation over each period varied from 1.6 to 4.9%. Those whose retirement fought with higher average inflation would have seen their money run out earlier than those who enjoyed lower cost pressures.

Inflation however isn't the only factor. In Figure 3 we highlight two retirements starting in 1933 and 1951. In addition to having both the same average nominal annual investment return of 10%, these retirements also have the same inflation-adjusted or real investment return of 6%. That is, annual inflation averaged roughly 4% for both. Despite this, in the first scenario about 33 years of retirement could be funded, while in the latter case only 17 years could be funded.

Another contributor to portfolio longevity is the variability of returns over the period. When it comes to retirement funding, smooth steady annual investment returns are much more preferred than periods of up and down. Investment professionals often use standard deviation to measure the variation or volatility in returns. The standard deviation of the annual investment returns for those years funding the longer retirement starting in 1933 is a low 7.4%. For the shorter retirement starting in 1951 it was a high 9.9%.

Also the timing of your retirement relative to longer or 'secular' investment bull and bear markets and periods of high and low inflation is important. Imagine a retirement made up of two periods, a bull market period with low inflation, and another bear market high inflation period. If you retire first into a high-inflationary, bear market period then your money will run out far sooner than if you instead retire first into a low-inflation, bull market. In the former case your portfolio can't recover sufficiently to make up for capital depleted to maintain your standard of living.

In historical perspective, couples retiring in 1933 enjoyed stellar equity market investment returns of 29 and 27% in their first two retirement years when inflation wasn't a problem. This compares with couples retiring in 1951 around the time of the Korean war who immediately encountered two successive years of negative investment return (-3 and -11% for the ASX) and war related high inflation which together acted to permanently impair financial fortunes.

The first 10 years of your retirement often predict your overall financial trajectory and success funding your desired lifestyle. In a future article we'll share strategies that you might employ to improve your "trajectory" and make your retirement more resilient against these influences especially just before and after starting retirement.

As an aside, the government prescribes a minimum aged-based percentage that must be drawn down from a pension. You of course don't have to spend all of that or indeed you may need or choose to spend more. If you tie what you live off to the balance of your funds each year, this may provide some protection against exhausting monies when your balance is knocked down. Unfortunately this can mean living on a fluctuating income and at the worst case living off a 30-50% lower inflation adjusted lifestyle during years with poor investment return and high inflation. The amount of funds you draw out from savings is an important variable in retirement which we don't explore here.

Accumulators' perspective

If you're a long way away from retirement and if you are hoping to predict how much money you will have beginning then, your scenario is different. It is a simpler scenario because a draw down amount is not relevant and some might think neither is inflation.

In Figure 4 we compare how well a projection of accumulated regular savings using a fixed average investment return compares with that using historical data. Here we project how $10,000 invested each year for 30 years would grow. This is closer to the scenario of a regular saver and contributor to superannuation. If you're aged 30 then the full width of this projection is relevant. If you're aged 50 and planning to retire at 65 then maybe only look at the balances for the last 15 years (assuming you have saved something already).

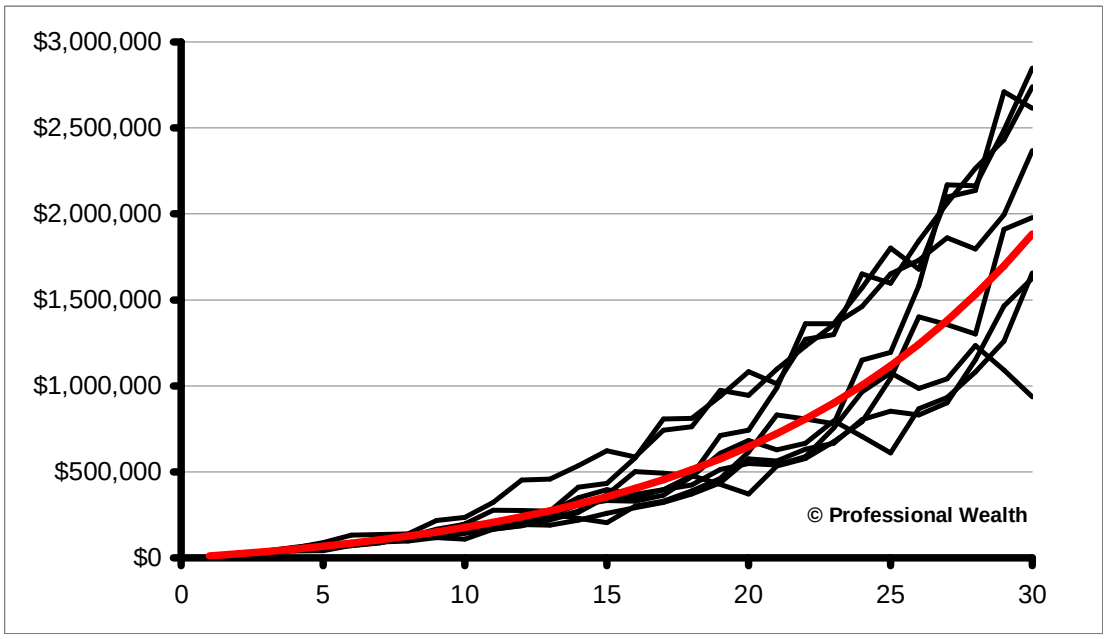

Figure 4: Growth of $10,000 invested annually in a balanced fund for 30 years predicted using the period average rate of return for 1940-2005 (red line) compared with actual results for an investor saving similarly beginning in 1940, 1945, 1950, 1955, 1960, 1965, 1970 and 1975 and earning those years' historical investment returns.

Again the red line is that predicted by a model which assumes the average rate of earnings growth over this period is earned steadily each and every year. The many bumpy black lines represent what might have happened if you started a discipline saving plan in 1940 or began one every 5th year afterwards until last starting in 1975. We can't start it any later as we don't have historical data beyond 2008. You see again the challenge simplified modelling techniques have predicting the future. The model based prediction assumes that about $1.8m is accumulated after 30 years. History suggests the final amount would have varied between $900,000 and $2.8m.

While you might think a -50% to +100% variation between the actual result and that projected is a poor effort, it is a better predictor than that shown earlier for retirements for a few reasons:

- the bulk of monies aren't invested or haven't really grown through compounding until the later years, whereas in a retirement simulation you start with a large lump sum

- there is no drawdown amount which varies year by year

- inflation plays no part in this calculation, but its relevance is sometimes forgotten

- dollar cost averaging can play a remedial role where investments made in a down market help to repair the damage made to the overall capital following a share market decline (this perhaps is a reminder to some considering abandoning their regular investment strategy at this time)

Not shown, but if you instead simply wanted to know how a single lump invested over 30 years would fare, we find the final balance estimated using historical experience varies from 35% to 310% of that simulated using an average rate of return.

How to project responsibly

This raises then the question how can you project responsibly?

One viable answer is to "just say no". Instead of focusing on projections you might invest your time ensuring your wealth is properly structured and that your portfolio is designed to weather volatility, fight inflation and achieve a fair reward for risk taken. You might use simple conservative rules of thumb for how much your assets might grow and how much is prudent to withdraw.

However there is great educational benefit from understanding how markets work and gauging the uncertainty that is traded for when seeking higher than cash rates of return. While the analogy may be crass, I believe you need to avoid being "half pregnant" when using or offering projections. Either don't do it or spend a lot of time explaining the complex issues surrounding them. That's a real challenge if you are trying to communicate to millions of super fund members.

Things to consider if you make forecasts are:

- Project only for 5 or 10 years realising that beyond that significant error creeps in making most benefit projections unreliable.

- Round estimates to 1 or at most to 2 single figures. Saying you will have $327,538 in five years implies an unrealistic certainty. Even saying $330,000 is a guess unless your money is in a five year fixed term deposit.

- Use projections only to explore effects like changing your draw down rate, inflation assumptions, fees and taxes and portfolio return. It would be better to 'normalise' or change scale from $'s and make comparisons against another reference scenario benchmarked to 1.0 or 100%.

- Employ a modelling technique that accounts for variability like a "Monte Carlo" simulation which generates 1000's of statistically varied simulations and shows the range of probable outcomes including a confidence interval. I have personally used this technique, albeit sparingly, and also with a historical example along side to show what real world investing is like. A problem with this statistical based method is it

assumes investment returns are random when in fact favourable and unfavourable periods occur more often in sequence.

- Incorporate historical data and do your own back testing. Some say "those who don't study history are doomed to repeat it" while others remark "if share markets follow history, then librarians would be the richest people in society".

- Represent information adjusted for purchasing power. Share market returns in the latter part of the 1970's were good, however when adjusted for inflation they weren't keeping up with long term real returns.

- Be ultra conservative in your return assumptions and model with a safety margin - perhaps 'wipe off 3%' (borrowing from a road safety campaign). In retirement scenarios, because of "reverse dollar cost averaging" (that is, making regular withdrawals including when capital values are depressed), projections generated using averages can actually over estimate typical portfolio longevity.

- Model using a series of lower, medium, higher ranges for returns and inflation. Note I purposefully don't recommend using the words 'worst' and 'best' as markets may invent new versions of these during your lifetime.

- Be sceptical about projections which foretell future balances nor give due credit to investment approaches designed to mitigate risk at the expense of some upside.

- Don't forget that 50% live longer than their average life expectancy and the longer you live, the longer is your life expectancy. If you are 55, there is about a 10% chance you'll live to 100. In addition to providing a buffer in case your investments under-perform, you need a buffer in case you personally outperform. Unfortunately now mostly extinct, defined benefit savings plans had an advantage over individual investing because they could spread both these risks over their membership base.

- If you are a super fund or financial advisor, explain and disclaim. Don't guarantee any projections and rethink whether providing long term projections adds value or adds risk to your practice.

- Remember, just like all long term business, marketing and economic forecasts, all investment projections strictly speaking are wrong.

In summary and particularly in response to question B8Q1 in ASIC's consultation paper "Have we identified all of the relevant variables?" I say don't forget about volatility.

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