A Discussion on Discount Rates in Alberta

In personal injury cases, a **lump sum award** often is provided to a plaintiff as compensation for the loss of a future stream of employment earnings, or to compensate for anticipated future costs of care. After investment of the lump sum award, the periodic withdrawals from the fund should exhaust the fund at the point where future losses (or costs) have been replaced in full.

A **discount rate** is used to calculate the value of the appropriate lump sum. Selection of an appropriate discount rate is open to argument in Alberta. A short discussion of the discount rate follows.

The inter-relationship between future interest income and impacts of future price inflation needs to be considered in the selection of the discount rate. Lump-sum awards intended to compensate and individual for future losses assume (necessarily conservative) investment of the awards. The investment incomes realized will partially fund the ongoing stream of compensation payments and preserve the 'purchasing power' of the lost incomes.

The selection of an appropriate discount rate for valuation of future losses of employment incomes also should take into consideration the effects of possible wage increases in excess of price inflation, arising from improvements in the productivity of labour.

Given that inflation expectations often impact nominal interest rates, these two factors are combined in the real (or inflation-adjusted) rate of interest. The **real rate of interest** is comprised of two components:

(1) the nominal rate of interest,
and
(2) the rate of inflation.

Over the years, both of these components have been subject to some major fluctuations, and as a result, the real interest rate has varied significantly. To provide an illustration of the variability of one measure of the real rate of interest, estimated annual real returns on **3-month, treasury bills** from 1946 to 2013 were reviewed. From 1946 to 1952, real rates of interest were significantly negative, presumably as a result of post-war interest rate controls. If real rates of return from the post-WWII period to (and including) 1952 are excluded, the historical average real rate of interest on 3 month T-bills is about **1.9%**.

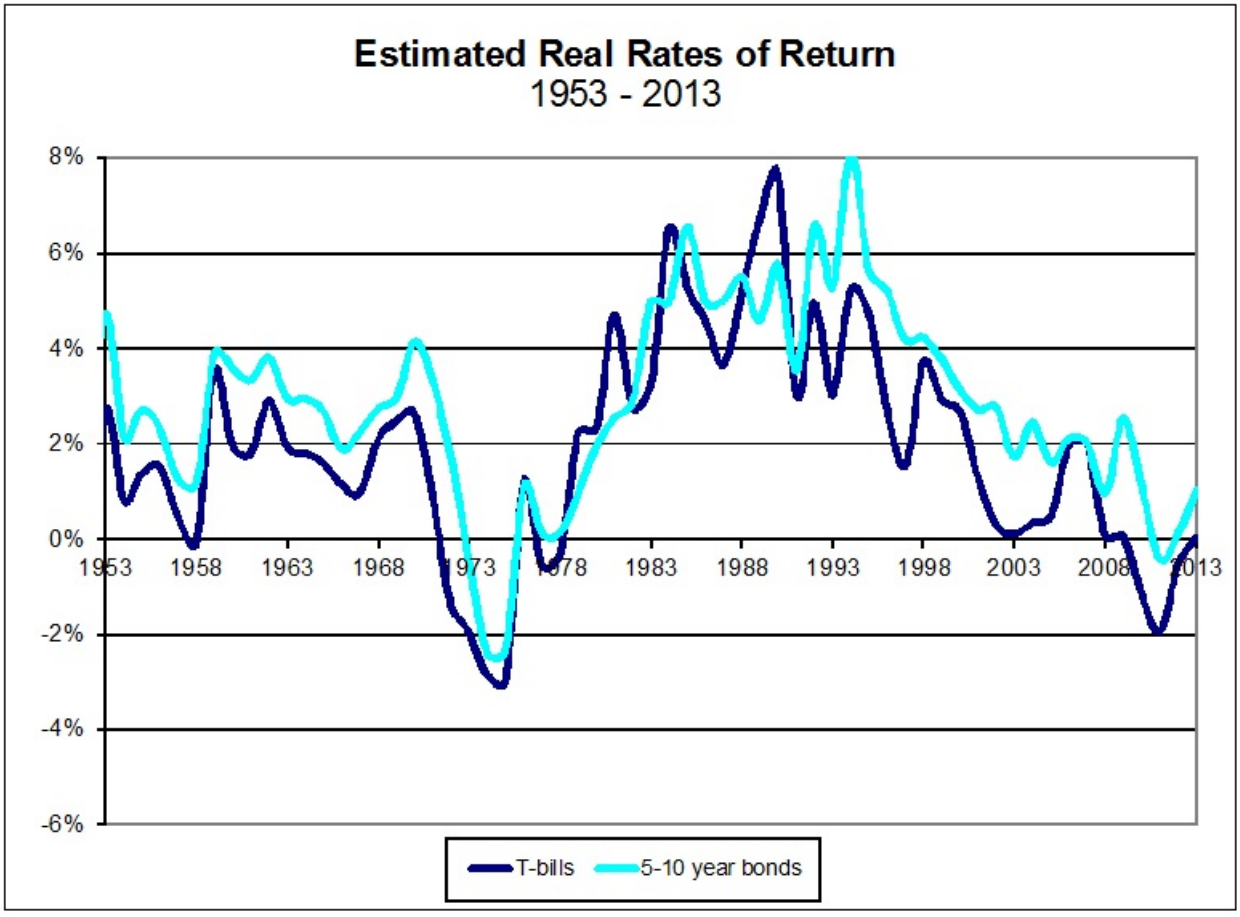
In 1972, the year prior to the start of the OPEC oil price crisis, real rates of interest turned negative, and remained at negative or very low rates until 1979. If both the post-war data to 1952 and the "OPEC" data from 1972 to 1978 are excluded from the series, the real rate of interest on 3-month T-bills averages approximately **2.3%**. However, real rates of return on 3 month T-bills have averaged about one-tenth of one percent over the last decade, were negligible in 2008 and 2009, and have been negative most of the past four years.

By way of comparison, **real rates of interest** (i.e., interest rates net of price inflation) on **Government of Canada bonds** during the same period (from 1953 to 1971 and 1979 to 2013, inclusive) averaged about **2.8%** (1 to 3 year bonds), **3.1%** (3 to 5 year), **3.3%** (5 to 10 year), and **3.6 %** (over 10 years).

Note, however, that average **real yields** (i.e., yields net of price inflation) for these bonds in the last decade have been significantly lower, at about **0.5%** (1 to 3 year bonds), **0.9%** (3 to 5 year bonds), **1.4%** (5 to 10 year bonds) and **2.0%** (over 10 year bonds).

The Government of Canada introduced **real return bonds** (RRBs) in November 1991. The (real) yields provided by these bonds ranged from 3% to 5% throughout the 1990s, but declined steadily from 1999 to 2006, to a 2006 average of 1.7%. Rates then increased to a peak of about 2.7% late in 2008. RRB yields since have declined to about 0.4% by November 2012. Historically, the average yield on real return bonds is about **2.9%**. Yields on real return bonds averaged **1.5%** over the last decade.

Market volatility (see the chart below) and current uncertainties make selection of an appropriate discount rate for valuation of future returns problematic.



Three possible approaches to the selection of an appropriate real interest rate may be considered. **Econometric modelling** of the myriad factors that are expected to have an impact on (nominal) interest rates and price inflation is one possible approach. However, given the complexity and volatility of the factors that would need to be considered, an appraisal of the assumptions used to generate a model would be difficult.

Time series analysis — like that used in the summary discussion of historic trends in real rates of return set out above, or much more technical data-fitting analyses — presents a second approach to selection of an estimated real interest rate.

Note that these two approaches are primarily backward-looking, although econometric modelling will look forward, if provided with projections of the likely future values of the explanatory variables.

Use of the **financial market's aggregate view of the future** presents a third approach. Bond yields commonly are used as a key indicator of the financial markets' view of the future. The Ontario courts, for example, have tied their base discount rates for pecuniary damages for a period of fifteen years from trial to recent yields on **real return bonds**.[1] The current (2014) discount rate used in Ontario courts is **negative 0.5% per year**, (i.e., real values of losses are increased by 0.5% per year), for the first 15 years post-trial.[2] Thereafter, projected losses are discounted (reduced) by 2.5% per annum.

The selection of an appropriate discount rate for the valuation of future losses is highly speculative, given the uncertainties about future economic events. Based largely on historical rates of return, I am of the opinion that an assumed **discount rate of about 3% per year** will provide a reasonable basis for the valuation of **longer term future real rates of return** on conservative investments (such as Government of Canada bonds), net of effects of price inflation.

That said, low current bond yields and the **sensitivity of investment returns to the market conditions early in the future period** strongly suggest that near-term rates discount rates should be substantially lower than rates for the more distant future. This concern is particularly important when dealing with an exhausting fund which is subject to ongoing withdrawals. (Lump sum awards for future losses of employment incomes or costs of care are subject to ongoing withdrawals which are calculated to exhaust the respective awards at the date of retirement or at life expectancy.) The use of a long term average discount rate for a period which starts with lower than average rates of return will deplete the exhausting fund before the end of the contemplated period of loss. Recent

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[1] 12 month averages are calculated once per year, and then are used as the rate to be applied to valuations of losses for the next fifteen years. The 12 month average return on RRBs are calculated in August of each year, rounded to the nearest quarter of a percentage point, and then reduced by one percentage point. (I am not aware of the basis for the latter adjustment.)

[2] Ignoring the "less 1 percentage point" portion of the Ontario courts' formula, the real discount rate would be 0.5% per annum for 15 years.

unusual conditions suggest that the use of longer-term average discount rates will lead to early exhaustion of lump-sum awards which have been calculated using long-term average rates.[3]

This suggests that variable discount rates now should be considered. We are of the opinion that assuming a discount rate of about 1.0% for the first 2 or 3 years, followed by a rate of 2.0% or so for another few years before returning to a longer-term average of approximately 3.0% should generate conservative estimates of present values of future pecuniary losses.

However, the calculation of present values requires more specific assumptions. **Our estimates assume two discount rates for invested funds: 1.5% for the first 5 years, followed by 3.0% thereafter.**

The valuation of future **losses of employment incomes** also requires consideration of the possible future effects of the **productivity of labour** upon the discount rate. The time series currently available for the assessment of productivity of labour is relatively short, given major definitional changes in Statistics Canada's estimates of average weekly earnings that occurred in 1983. Since trends in the data can only be analysed for a relatively short time period using current definitions, potentially important information regarding movements in average weekly earnings prior to 1983 may not be evaluated.

Note, however, that real changes (i.e., net of inflation) in **average weekly earnings in Alberta** have averaged about 0.7% per year over the period from 1984 to 2013. However, real changes have averaged 2.6% per year over the last decade; i.e. employment incomes have increased much more

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[3] By way of illustration, consider the following situations which are based upon annual rates of return on real return bonds (RRBs) over the period from 1992 to the end of 2013. The average rate of return over that 22 year period was **2.91% per annum** (rounded), assuming annual compounding. Initial rates were higher (at more than 4% per annum for the first 9 years) and lower than the full period average for the last 9 years (dropping to less than 1% for the most recent 3 years).

Using the average interest rate on RRBs for the 22 year period (i.e., 2.91% per year) as the basis for discounting for the next 22 years, the present value of annual year-end expenditures of $20,000 would be estimated at $322,040.

(I previously have adopted this general approach — i.e., using a fixed long term average discount rate — as have some other parties who prepare such opinion reports, albeit using different assumed discount rates.) It can be demonstrated that such a fund would exactly exhaust at the end of the 22 year projection period, after fully funding the assumed withdrawals of $20,000 per year.

However, if the initial lump sum (of $322,040 in this example) would not earn a constant 2.91% per annum, but rather initially would earn the low rates of recent history followed by the higher rates of older history (i.e., if the rates of return time series was reversed for the future, starting at current low rates and increasing over time in a mirror image of the 22 year history), the assumed annual deductions (of $20,000) would exhaust the fund early — prior to the payout at the end of year 21. The cumulative shortfall would be over $52,000 — or about 16% short of fully covering the costs that generated the initial lump-sum requirement estimate of $322,040 that was indicated by the assumed applicability of the longer-term average real rates of return.

The converse is true; if rates of return for the future repeated the pattern which appeared from 1991 onward, excess funds would be available at the end of the funding period of 22 years. (That result, however would require a near-term change from the current rate of about 0.9% to a rate of about 4.6% — an unlikely event.)

rapidly than prices, although the most recent rates (2012 and 2013) have been somewhat lower, at about 2.3% per annum.

The discount rates cited earlier should account for future effects of price inflation and future investment incomes. The observed more rapid growth of wages suggests that calculated present values of future employment incomes should use lower discount rates in order to account for the more rapid growth of employment incomes. The selection of an appropriate adjustment for the 'productivity of labour' is at least as speculative as the selection of a financial discount rate.

Wage inflation in Alberta since 2005 suggests that near-term net discount rates for the valuation of future employment incomes may be very small or even negative. However, estimates of **present values of employment incomes** which appear in our reports are discounted at a rate of **0.5% for the first 5 years and at a rate of 2.0% per year thereafter** — which should generate conservatively valued estimates of present values of future employment incomes, in my opinion. (These assumptions assume productivity of labour at 1% per annum throughout the projection period.)