Security of Income vs. Security of Principal

I have previously decried the practice of automatic investment in five-year bond ladders[1] and touched briefly in that essay on the importance of differentiating security of income from security of principal. In this effort, I will delve more deeply into this question – which is the fundamental consideration in fixed-income portfolio design – and attempt to explain why security of income is much more important than is usually thought.

The Difference

The difference between these two elements of fixed-income portfolio construction is fairly easy to define:

- **Security of Principal** refers to the ability of the investor to receive his capital back, in cash, on short notice. An extreme example of such an investment is a three-month treasury bill – even if the investor finds that he must sell prior to maturity, the price realized will be very close to his purchase price (and also very close to the maturity price).
- **Security of Income** refers to the ability of the investor to receive steady income, in cash, on a regularly defined schedule. An extreme example of such an investment is the UK 2.5% Annuities, first issued on June 13, 1853, with £1-million still outstanding.[2] The income has been steady, but the price has fluctuated considerably in the past 158 years!

It should be clear that these are incompatible objectives; if one emphasizes Security of Principal, then the issues will mature in the near future and the proceeds on maturity will have to be reinvested at a future, unknown, interest rate. If one emphasizes Security of Income, then the longer term of this issue means that the price of the instruments chosen to implement the strategy will swing wildly, resulting in very low Security of Principal.

In other words, the more you have of one, the less you have of the other.[3]

Despite the clear importance of both of these goals, most popular expositions[4] of bond investment strategy emphasize only the first element, Security of Principal, with the occasional nod to the benefits of diversification. Other authors point out[5] that the higher yield usually associated with longer-term bonds serves to mitigate the greater risk they pose to principal.

In this essay I will show that:

- Consideration of Security of Income is a widely recognized risk measure
- Variance of portfolio principal value is important for retirees only to the extent that net cash withdrawals exist
- Income is generally much more stable than principal value – for equities as well as for bonds!
- A simple retirement calculator is available that illustrates the above principles
- A steady source of predictable cash income – such as that provided by long-term bonds and preferred shares – dramatically reduces Sequence of Return Risk
- Inflation is not a major risk at present, and the increased inflation risk of long bonds is best addressed elsewhere in the portfolio

My arguments in this essay should by no means be taken as a deprecation of the importance of Security of Principal – I have, after all defined it as one of only two possible fixed income portfolio objectives! My purpose is to enhance readers' understanding of the importance of Security of Income, which all too often goes unmentioned.

Definition of Risk

Bolder and Deeley provide an admirably succinct summary of the problem of risk measurement in their 2011 Discussion Paper regarding the Government of Canada's debt financing strategy:[6] *In basic portfolio theory, one generally measures return as intermediate cash flows plus the percentage change in an asset's value over some period. The risk component is then typically described as the variance of this return. Indeed, the foundations of portfolio theory are constructed with these two simple statistical objects. One determines the optimal portfolio weights by simply minimizing the return variance subject to an expected return target.*

Fundamental to this approach is the idea that the investor stands ready to liquidate his or her portfolio at any moment. This quite reasonable assumption makes it difficult for us to use the cost and risk analogue of simple return and return variance. The reason is that the government's domestic debt portfolio is – and, it is safe to assume, will remain – a buy-and-hold portfolio. This implies that measuring cost as the percentage change in the liability portfolio's value is not particularly useful. Moreover, the variance of changes in the market value of the liability portfolio is also of limited usefulness.

Taking cost and risk definitions directly from portfolio theory, therefore, will not work.

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1 James Hymas, *Preferred Shares and GICs*, available on-line at http://www.himivest.com/media/PrefsAndGICs_090814A.pdf

2 UK Debt Management Office, *Gilts in Issue*, available on-line at http://www.dmo.gov.uk/chooseFormat.aspx?rptCode=D1A&page=D1A (accessed 2011-9-20)

3 For some objections to this statement and my responses, see the discussion at Financial Webring Forum, *Bond Ladders vs Bond ETF's*, available on-line at http://www.financialwebring.org/forum/viewtopic.php?f=33&t=110454&start=111 (accessed 2011-9-20)

4 E.g. Rob Carrick, *Why you need to hold bonds*, TD Waterhouse Canada Inc., 2011-8-30, available on-line at https://research.tdwaterhouse.ca/research/public/Markets/ExclusiveInsight?documentKey=867-GIGOLD20110830carrick0830-1 (accessed 2011-10-10)

5 E.g. Harry M. Kat, Theo P. Kocken, Vincent Van Antwerpen, Janwillem Engel, *Why Investors Should Hold Long-Dated Bonds, Even when Interest Rates are Low*, Cass Business School Research Paper, August 2004, available on-line at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=590543 (accessed 2011-10-10)

6 David Jamieson Bolder & Simon Deeley, *The Canadian Debt-Strategy Model: An Overview of the Principal Elements*, Bank of Canada, Discussion Paper 2011-3, available on-line at http://www.bankofcanada.ca/wp-content/uploads/2011/05/dp11-3.pdf (accessed 2011-9-13)

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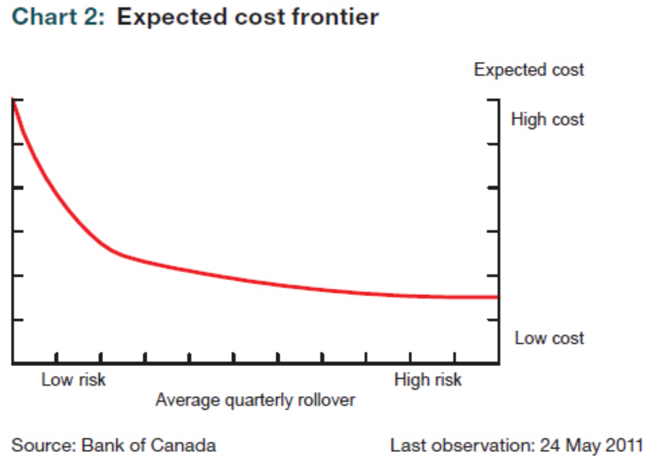
The authors assert that since the value of the debt portfolio should not be the basis of risk measurement, it is natural to use the cost of the debt – they are speaking from the perspective of the debt issuer, in this case the Government of Canada – and outline various ways in which this risk can be quantified:

- The standard deviation of the annual debt-service charges
- The Cost-at-risk (CaR) of the debt charges – that is, the maximum debt charges for a given period with a given probability[7]
- The conditional debt-charge volatility; which is the Nth year debt-charge variance conditional on (N-1)th charge – one might think of this as the smoothness of the annual charges
- A measure which uses an economic model to relate the size of the debt charges to the government's ability to pay
- Rollover risk – the amount of debt coming due during any particular period
- Consideration of the total debt charges over the simulation horizon. If this is done, then the choice of discounting factor has a high impact on the results, as an increasing discounting factor decreases the weight of the more volatile long-term projections.

In the discussion paper, Bolder and Deeley define cost as the average annual debt charges as a percentage of the total debt over the 10-year simulation; simulations are performed to minimize this cost while constrained to maintain risk (as defined in one of the manners specified) below a predetermined level.

Chart SI-1[8] shows the relationship between cost and risk for a sample set of optimizations, where in this case risk is defined as the average quarterly rollover. In this example, the yield curve is normally upwards-sloping, so the cost of financing will generally decline as the average term decreases, reaching a theoretical minimum when the government is assumed to do all its financing via three-month treasury bills. However, such a course of action would imply that 100% of the government's debt outstanding would require refunding every quarter at contemporary interest rates, leading to a high degree of volatility in the annual cost of financing this debt.

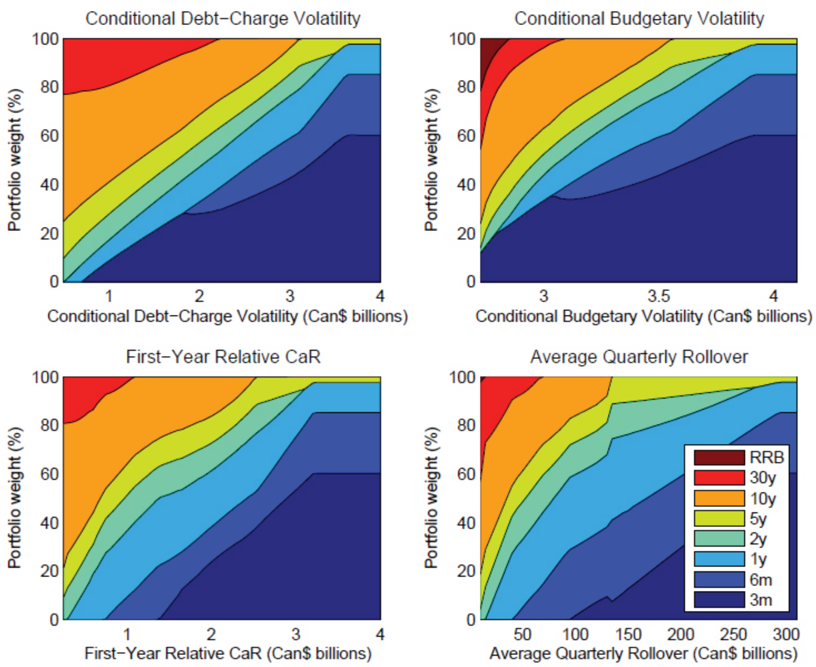
SI-1



The purpose of Bolder and Deeley's work is to provide insights into the proper mix of issuance of Government of Canada debt – how may the twin goals of reducing both cost and risk be met? The model provides output as shown in Chart SI-2, which displays the optimal term structure of the Government of Canada's debt when constrained to keep risk – defined in four different manners – below a certain level with a high degree of confidence.

As may be seen, longer-term issues are favoured in portfolios for which the government wishes to keep its risk tightly constrained - the opposite of what one would expect if risk was defined in Security of Principal terms as variance of the market value of the portfolio.

SI-2



7 The UK's Debt Management Office uses a Cost-at-Risk approach, focusing on the 95th percentile of potential yield changes. See UK Debt Management Office, *Debt and reserves management report 2011-12 Annex B: Context for the decisions on the Debt Management Office's financing remit*, available on-line at http://cdn.hm-treasury.gov.uk/2011budget_debtreserves.pdf (accessed 2011-9-20). It is to regrettable that the BoC has not discussed how their methodology compares with others.

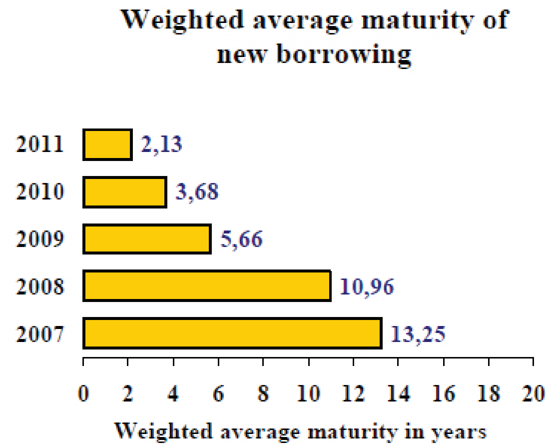
8 Marc Larson and Etienne Lessard, *Developing a Medium-Term Debt-Management Strategy for the Government of Canada*, Bank of Canada Review, Summer 2011, available on-line at http://www.bankofcanada.ca/wp-content/uploads/2011/08/larson.pdf (accessed 2011-9-17)

Frankly, I was somewhat surprised that the optimal proportion of long term bonds was not found to be higher by the model, but this is largely explained by two factors:

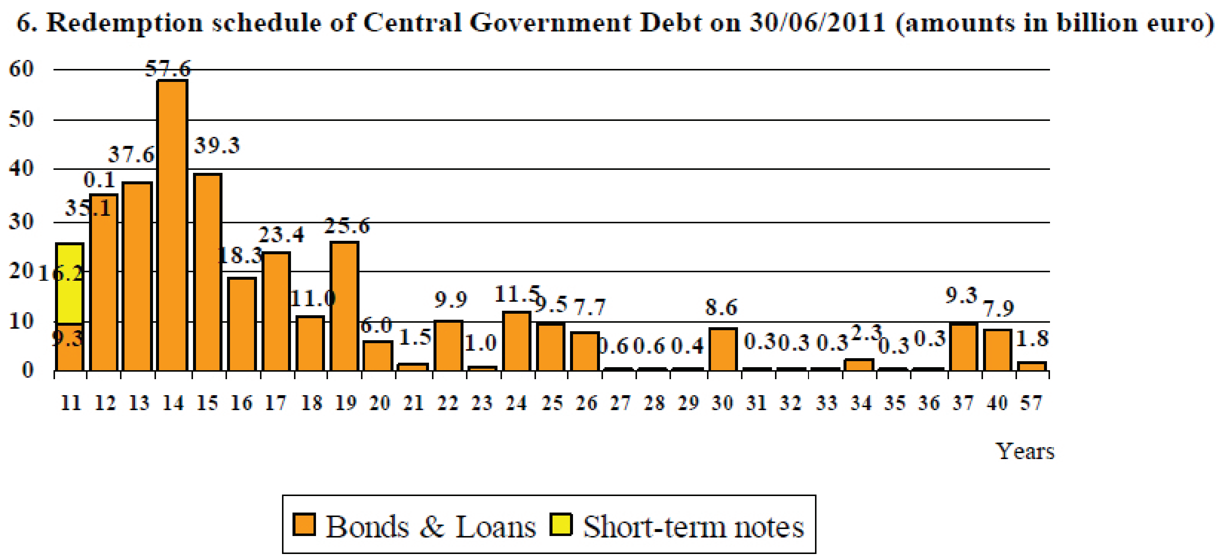
- The simulations are performed for only a ten year period, which I consider to be a relatively short period of time, although considered desirable when the Bank is providing advice to its political masters.
- There are no funding shocks applied in the simulations, by which is meant periods during which the government finds it difficult to find buyers for its debt.

The importance of funding shocks cannot be over-emphasized; Canada came very close to the brink of having auctions fail in 1994; currently, of course, the best example of such a shock is Greece; their public debt bulletin of June, 2011[9], is illustrative of the problems that may be encountered. Chart SI-3 shows how their ability to issue long-term debt has declined over the past five years, while Chart SI-4 shows that their past financing decisions have lead to a huge short-term refunding requirement.

SI-3



SI-4



The arguments in this section have been made from the issuer's perspective, but may be easily reversed to reflect investors' interests. Issuers refer to the coupons on their bonds as "costs" and seek to minimize this figure; investors will refer to the coupons as "income" and seek to maximize the value. However, both parties to the trade – provided that they intend to maintain their holdings for the foreseeable future – have an interest in minimizing the variance of the income as this facilitates long-term planning.

9 Hellenic Republic Public Debt Bulletin, Number 62, available on-line at http://www.minfin.gr/content-api/f/binaryChannel/minfin/datastore/dc/5c/e9/dc5ce9be2bb508c88271471a3c6ad25f7b64ba12/application/pdf/Bulletin_No_62.pdf (accessed 2011-9-17)

The Importance of Variance

It is impossible to create a financial plan without some projections of future growth in investment value, but it must be borne in mind at all times that single-number projections do not only represent merely the long-term projected average rate of growth, but also ignore the variability of returns in the interim.

William J. Bernstein has addressed the issue:[10] *Most of you have seen the nifty retirement software available from the likes of Vanguard and T. Rowe Price which provides the mathematical muscle to help you plan your retirement. Input your retirement age, expected lifespan, required annual income, rate of inflation and investment return, and hey presto, you find out that to avoid a golden years diet of Alpo you need the GDP of the average Central American republic.*

Problem is, it may quite possibly be worse than that. These calculators all make the same erroneous assumption – that your expected rate of return is the same each and every year. In other words, let's assume that the real (inflation adjusted) rate of return of the S&P 500 will be 7% in the future. You might conclude that you can withdraw an inflation adjusted $70,000 of your $1,000,000 Vanguard Index Trust 500 IRA each and every year indefinitely, and maintain yourself with the same real income in the long run. And you'd be wrong.

It turns out that if you have rotten returns in the first decade you will run out of money long before reversion to the mean saves your bacon in later years.

In a follow-up article[11] he introduced Monte Carlo analysis (in which monthly returns are chosen randomly from a pre-defined set of possibilities) and derived "success rates" (for a retirement withdrawal plan) that showed a very high variance depending upon the volatilities of the chosen investments.

Table SI-1: 30-Year Success Rates (Monthly Withdrawals) Returns: Stocks 4.5%, Bonds 3.5% (from Bernstein, 2001)

			Withdrawal Rate			
	Return	SD	4.0%	5.0%	6.0%	7.0%
Stocks	4.5%	12.0%	88.8%	70.4%	48.0%	28.3%
75/25	4.4%	9.09%	94.3%	75.2%	46.6%	22.2%
50/50	4.2%	6.5%	98.2%	80.1%	41.3%	12.0%
25/75	3.9%	4.8%	99.5%	81.1%	28.9%	3.4%
Bonds	3.5%	5.0%	98.2%	68.3%	18.5%	0.2%

Success is defined as reaching the thirty-year mark with a portfolio value that exceeds zero

This investment model requires some refinement in order to account properly for bonds, as will be discussed later in this essay, but the point is clear: one cannot use average returns as a tool for projecting the future value of a portfolio in the presence of cash withdrawals. Annual variance in returns has a large and cumulative effect on the probability of success and the order in which these returns are realized is extremely important.

This phenomenon is known as Sequence of Returns risk, which has been often stressed[12] by Dr. Moshe Milevsky of The Individual Finance and Insurance Decisions Center (IFID), as a source of retirement risk that is often underestimated.

To understand why this should be so, consider an investment portfolio that for the first five years of its existence achieves annual returns of -20.26%, 1%, 6%, 15% and 30%, for a total return of 27.63%, or 5% p.a. on an annualized basis. In the absence of cash flows, the order of these returns makes no difference; but if cash withdrawals of 5% of the initial value are made at the end of each year, this changes dramatically.

Table SI-2: Hypothetical Portfolio, Returns in Descending Order

Year	Starting Value	Portfolio Return	Year-end Value before cash flow	Cash flow	Final value
1	100,000	30%	130,000	-5,000	$125,000
2	125,000	15%	143,750	-5,000	$138,750
3	138,750	6%	147,075	-5,000	$142,075
4	142,075	1%	143,496	-5,000	$138,496
5	138,496	-20.26%	110,437	-5,000	$105,437

10 William J. Bernstein, *The Retirement Calculator from Hell*, 1998, available on-line at http://www.efficientfrontier.com/ef/998/hell.htm (accessed 2011-4-5)

11 William J. Bernstein, *The Retirement Calculator From Hell – Part II*, 2001, available on-line at http://www.efficientfrontier.com/ef/101/hell101.htm (accessed 2011-4-5)

12 E.g., Moshe Milevsky, *Feast or Famine First?*, available on-line at http://www.ifid.ca/pdf_newsletters/PFA_2007DEC_FEAST.pdf (accessed 2011-8-30)

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Changing the order in which the returns are experienced, as in Table SI-3, results in a dramatic difference in the ending value of the portfolio. As a result of his own analysis, Dr. Milevsky concluded that – for a retiree simulated with reasonable parameters, and an average of 19 years of retirement – poor performance in the first seven years of the life of the portfolio had approximately double the effect of poor performance in the second seven years; which in turn had double the effect of the third seven year period (where "effect" was determined by the question of whether the initially chosen portfolio withdrawal schedule could be maintained).

Table SI-3: Hypothetical Portfolio, Returns in Ascending Order

Year	Starting Value	Portfolio Return	Year-end Value before cash flow	Cash flow	Final value
1	100,000	-20.26%	79,740	-5,000	$74,740
2	74,740	1%	75,488	-5,000	$70,488
3	70,488	6%	74,717	-5,000	$69,717
4	69,717	15%	80,175	-5,000	$75,175
5	75,175	30%	87,727	-5,000	$92,727

This may be understood in more quantitative terms by considering the following derivation of the end-value of a portfolio subjected to varying returns and a constant withdrawal rate:

Let P = initial portfolio value
P_i = portfolio value after i^{th} period
r_i = total return factor for period i
w = withdrawal per period

Then:

$$P_1 = Pr_1 - w$$

$$P_2 = P_1 r_2 - w$$

$$= (Pr_1 - w)\, r_2 - w$$

$$= Pr_1 r_2 - r_2 w - w$$

$$P_N = P \prod_{i=1}^{N} r_i - w\,(1 + r_2 + r_2 r_3 + \ldots + [r_2 r_3 \ldots r_N])$$

$$= P \prod_{i=1}^{N} r_i - w \sum_{j=2}^{N} \prod_{i=j}^{N} r_i - w$$

It is clear from the above that the second term, which serves to decrease the end value of the portfolio, will be minimized if the lower returns are concentrated in the later years. More ambitiously, we can take the partial derivative of P_N with respect to r_k to determine which returns will have the greatest effect on portfolio end-value in the presence of withdrawals:

$$\frac{d\,P_N}{d\,r_k} = P \prod_{\substack{i=1 \\ i \neq k}}^{N} r_i - w \sum_{j=2}^{k} \prod_{\substack{i=1 \\ i \neq k}}^{N} r_i$$

and if we assume that in our initial case all the $r_i = 1$ (that is, there is no growth assumed in the portfolio) then

$$\frac{d\,P_N}{d\,r_k} = P - (k-1)\,w$$

The sensitivity of the end value of the portfolio, P_N, to a variation in the k^{th} periodic return, r_k, is greatest when k is small and w is large; if there are no withdrawals, then $w = 0$ and the sensitivity is not dependent upon the order of returns. Thus it may be seen that a portfolio subject to negative cash flows will have ultimate results for the investor that are highly dependent upon the sequence of returns actually experienced.

The above mathematics was derived without the consideration of income received from the portfolio. and the effect is only important to the extent that an investor must liquidate assets in order to meet his cash flow requirements. Suppose the investor for whom we have examined the effect of sequence of returns invests his entire portfolio of $100,000 in perpetual government bonds with a yield of 5% and continues to draw his $5,000 annual requirement. The analysis of his investment is summarized in Table SI-4.

Table SI-4: Hypothetical Portfolio, Invested in 5% Perpetual Government Bonds

Year	Starting Value	Income	Portfolio Return	Year-end Value before cash flow	Cash flow	Final value
1	100,000	+5,000	Who cares?	Who cares?	-5,000	Who cares?
2	Who cares?	+5,000	Who cares?	Who cares?	-5,000	Who cares?
3	Who cares?	+5,000	Who cares?	Who cares?	-5,000	Who cares?
4	Who cares?	+5,000	Who cares?	Who cares?	-5,000	Who cares?
5	Who cares?	+5,000	Who cares?	Who cares?	-5,000	Who cares?

In this manner, the investor has guaranteed himself – as well as it is possible to speak of guarantees in an uncertain world – his annual income of $5,000, 5% of his initial value, which may be drawn each and every year forever. Market interest rates may go up or down; the capital value of his portfolio may change dramatically; but he can blithely cash his government cheques.

One could choose yearly changes in long-term government yields such that the total return of this perpetual bond matched that of the sample portfolio with ascending annual returns analyzed in Table SI-3 – and it wouldn't matter. The cash thrown off by this portfolio is constant, irrespective of market price.

The important conclusion to be drawn is that, in the presence of cash flows, it is not merely the average return that matters, but the sequence and volatility of those returns; further, a point that is often underestimated is the fact that the greater the amount of cash thrown off by the investment portfolio, the less that sequence and volatility matters.

Portfolio Income is Generally Less Volatile than Portfolio Value

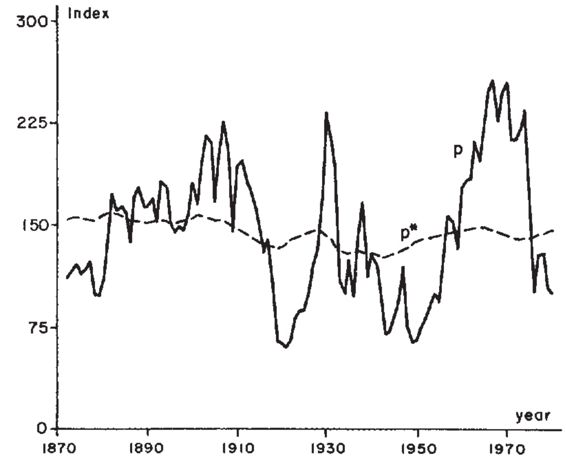
As dramatically illustrated in Table SI-4, a retiree whose cash needs are being met in total by his investment portfolio (and will continue to be met in the foreseeable future) may blithely ignore the state of the markets: all he needs to do is cash the cheques as they arrive.

Additionally, it should be clear that any steady income received from the portfolio will serve to reduce the necessity of selling capital assets to fund retirement spending and that such a reduction will serve to decrease the importance of Sequence of Returns risk.

However, these effects are not accounted for in most retirement models – such as that used by Bernstein – and the cash component of portfolio return is simply ignored; all required cash flows are funded by the sale of assets. This would have no effect on results if the cash component of returns was perfectly correlated with price, but it is well known[13] that equity prices are much more volatile than can be justified by the volatility of their dividends.

In fact, in 1981 Robert Shiller published[14] a chart, shown here as Chart SI-5, comparing the real detrended Standard and Poor's Composite Stock Price (solid line) with the ex post rational price (the present value of actual subsequent real detrended dividends, dotted line); as one may see, the difference in price is quite dramatic!

SI-5



While I have not been able to find a similar study for bond portfolios, it should be clear that the market price of a single bond (which can change dramatically) will be much greater than the variance in its coupon payments (which – barring default – will not change at all). This has previously been alluded to in the section 'Definition of Risk'. Still, it would be very useful if an academic could prepare a chart similar to SI-5, relating a bond portfolio's cash income to its market price.

[13] Jaksa Cvitanic & Semyon Malamud, *Equilibrium Driven by Discounted Dividend Volatility*, available on-line at http://sfi.epfl.ch/files/content/sites/sfi/files/users/192820/public/General7disc_vol.pdf (accessed 2011-9-19)

[14] Robert J. Shiller, *Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?*, The American Economic Review, June 1981, available on-line at http://www.math.mcmaster.ca/~grasselli/Shiller81.pdf (accessed 2011-9-19)

A Retirement Calculator Incorporating Relatively Stable Income

In the April, 2011, edition of my monthly newsletter, PrefLetter,[15] I introduced the HIMI Implementation of a Retirement Withdrawals Calculator, which I have made available on-line at http://www.prefblog.com/xls/retirementWithdrawals.xls (it must be downloaded to your computer's hard-drive in order to work).

Table SI-5: HIMI Retirement Calculator Assumptions Used to Replicate Bernstein (2001)

Input Assumption	Value
Start Date	2002-12-8
End Date	2010-12-8
Symbol	*0350
Expected Annualized Return [Equities]	4.50%
Dividend Yield [Equities]	0.00%
Bonds Expected Return	3.50%
Bonds Coupon	0.00%
Standard Deviation	5.00%
Annuity Rate	630.00
Correlation	0.00
Inflation	0.00
Stocks, Percentage	Varied
Bonds, Percentage	Varied
Annuity, Percentage	0
Initial Withdrawal Rate	Varied

This implementation, which borrows heavily from the work of Pritz, Van and Ponzo,[16] has the following features:

- Possible monthly equity returns may be distributed normally or in accordance with a specified template
- Equity returns may be compared with regulatory requirements imposed on insurance companies for equity models
- Bonds may be incorporated with a specified correlation to equities
- Initial dividend and coupon income may be specified; these cash yields may be varied over the course of each simulation as discussed below
- Annuities may be incorporated in the simulation
- Output includes confidence levels at various time intervals and a graph thereof

Various enhancements are planned to the calculator and will be announced in *PrefLetter*.

The most important difference between this implementation and the one used by Bernstein (2001) is the incorporation of relatively stable income, which reduces the necessity for the sale of capital assets. Specifically, the inital cash income from both stocks and bonds is held constant, until variation in the simulated market price causes the yield to be 1% different from the initial figure. At that point, the annual cash payments are changed so that the cash yield is 0.50% closer to the target value. For equities, this reflect companies changing their dividend to reflect the economic environment implied by the market prices; for bonds, this reflects investors changing their holdings (due to maturities, credit concerns, or other factors) so that the portfolio incorporates newer bonds with a current coupon.

The random selection of monthly returns means that different runs may provide greatly different results; but the fact that these monthly returns are all selected in the same way from the same set of possibilities means that patterns will emerge as the number of runs increases. Two thousand simulations provides good convergence, as shown in Chart SI-6.

A sample of the spreadsheet's output is displayed in Chart SI-7; this chart resulted from a simulation using the parameters of Table SI-7, with 50% Stocks, 50% Bonds and a 5% withdrawal rate. The "success rate" of the 2,000 simulations used to produce Chart SI-7 was 58.4% – not precisely equal to the figure shown for these inputs in Table SI-7, but within the bounds of convergence shown in Chart SI-6.

Reducing Sequence of Return Risk with Income

Naturally, new implementations of any calculator must be compared with prior implementations to determine consistency. Accordingly, the April, 2011, edition of the HIMI Retirement Calculator was first used to replicate Bernstein's work using the input assumptions shown in Table SI-5.

Table SI-6: 30-Year Success Rates (Monthly Withdrawals) Returns: Stocks 4.5%, Bonds 3.5%

Zero Cash Income

			Withdrawal Rate			
	Return	SD	4.0%	5.0%	6.0%	7.0%
Stocks	4.5%	12.0%	84.2% (-4.6)	63.6% (-6.8)	42.0% (-6.0)	23.2% (-5.1)
75/25	4.4%	9.09%	92.6% (-1.7)	69.5% (-5.7)	43.2% (-3.4)	17.0% (-5.2)
50/50	4.2%	6.5%	97.4% (-0.8)	75.6% (-4.5)	38.7% (-2.6)	11.0% (-1.0)
25/75	3.9%	4.8%	98.9% (-0.6)	79.1% (-2.0)	31.8% (+2.9)	4.8% (+1.4)
Bonds	3.5%	5.0%	98.4% (-0.2)	72.2% (+3.9)	24.5% (+6.0)	3.0% (+2.8)

Success is defined as reaching the thirty-year mark with a portfolio value that exceeds zero

Bracketted figures indicate difference from the Bernstein, 2001, results shown in Table SI-1

15 Available for subscription via http://www.prefletter.com

16 Described and published by Peter Ponzo at http://www.financialwebring.org/gummy-stuff/Monte-Carlo.htm (accessed 2011-9-20)

As may be seen from examination of the bracketted figures in Table SI-6, the broad results of the HIMI Implementation (with cash income set to zero) are roughly comparable to those indicated by Bernstein (2001), although there is a tendency to report less favourable results for equities. Unfortunately, this tendency cannot be explained without a detailed examination of the Bernstein source code; but as shown by Chart SI-6, the differences are within the bounds that may be explained by random fluctuation.

To prepare Table SI-7, the assumptions of Table SI-5 are varied: all the expected returns from bonds, 3.5%, are presumed to be cash, as are half the returns from stocks – the expected return from stocks is 2.25% dividends and 2.25% growth.

Table SI-7: 30-Year Success Rates (Monthly Withdrawals) Returns: Stocks 4.5%, Bonds 3.5%

Cash Income (Current Yield): Stocks 2.25%, Bonds 3.5%

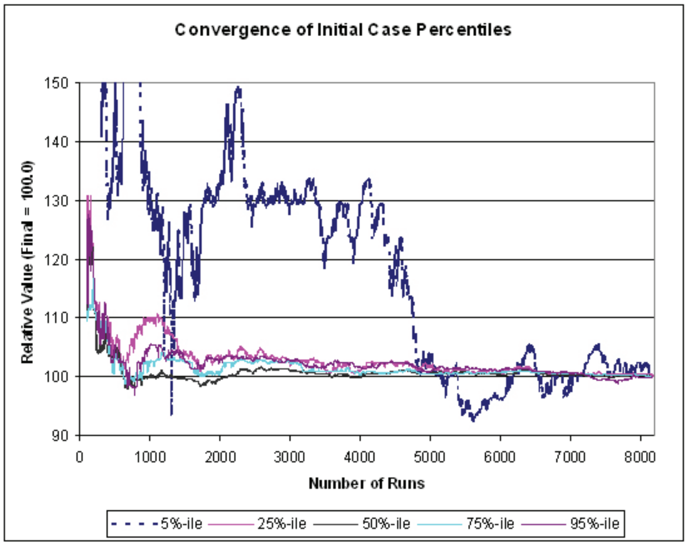
			Withdrawal Rate			
	Return	SD	4.0%	5.0%	6.0%	7.0%
Stocks	4.5%	12.0%	89.4% (+5.2)	71.8% (+8.2)	50.5% (+8.5)	30.8% (+7.6)
75/25	4.4%	9.09%	95.4% (+2.0)	78.6% (+9.1)	50.6% (+7.4)	24.8% (+7.8)
50/50	4.2%	6.5%	98.2% (+0.8)	83.1% (+7.5)	47.0% (+8.3)	15.3% (+4.3)
25/75	3.9%	4.8%	99.4% (+0.5)	84.0% (+4.9)	32.8% (+1.0)	5.6% (+0.8)
Bonds	3.5%	5.0%	97.5% (-0.9)	71.6% (-0.6)	23.1% (-1.4)	3.1% (+0.1)

Success is defined as reaching the thirty-year mark with a portfolio value that exceeds zero

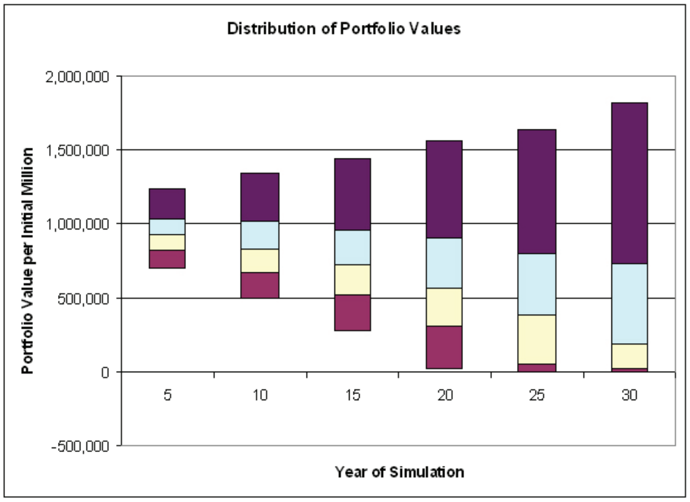
Bracketted figures are the change from Table SI-6, in which all returns are assumed to be price-based, with no regular income.

This table has been adjusted in April, 2012, to correct errors in the originally published figures.

SI-6



SI-7



We may draw a number of important conclusions from the comparison of Tables SI-6 and SI-7:

- It is not enough to consider the total return of an asset class when formulating an investment plan for retirement. The cash income and price return must be considered separately
- Bonds are more favourable than Dr. Bernstein indicates
- Long bonds, with their normally higher and predicable annual cash income, can reduce portfolio risk

Inflation

Any essay which suggests increased use of long bonds in retirement planning must include at least some discussion of inflation risk.

Readers will have noted that the specification of parameter values shown in Table SI-5 for the retirement scenarios include a setting of inflation to zero; and inflation is assumed to have remained at zero for the duration of the thirty year simulation.

While this setting may easily be justified by the fact that we are characterizing the asset classes in terms of their real return, it will be admitted that the assumption of constancy is a weak point in the argument – a weak point that is shared by all other retirement withdrawal calculators I have seen.

We have become familiar with Inflation Targetting, whereby the *Bank of Canada aims to keep inflation at the 2 per cent target, the midpoint of the 1 to 3 per cent inflation-control target range*.[17] This has been *the cornerstone of monetary policy in Canada since 1991, when the Canadian inflation rate was about 5%*.[18] The initial problem found with assuming a constant inflation rate is the fact that the target has no memory: it remains the same regardless of the experience of the past few years.

However, the bank has been researching the potential for moving to a regime of Price Level Targetting since 2006.[19] The difference can be explained succinctly:[20] *Despite its recent successes in terms of macrostabilization, several authors have highlighted some shortcomings in the inflation-targeting (IT) framework. Most notably, uncertainty on the price level grows with the planning horizon, since central banks with inflation targets accommodate shocks to the price level, taking the post-shock level as given and aiming to stabilize inflation from this level. In fact, the price level is unbounded at very distant horizons. Price-level targeting (PT) mitigates this uncertainty by committing central banks to restore the price level to a preannounced target following shocks. PT is frequently described as a departure from IT's prescription for letting "bygones be bygones."*

While I believe that central banks have learnt a permanent lesson from the stagflation of the 1970's, there are some very respected economists who argue in favour of a period of higher inflation as a method of easing the debt strain on governments and heavily mortgaged consumers[21] – so it is quite clear that a prudent investor will at least consider the effects that a period of high inflation may have on his portfolio. Even Real Return Bonds (RRBs) may not be considered a panacea for the problem, since the inflation compensation is largely delayed until the maturity of the instrument[22] rather than annually as is the case with nominal (fixed-rate) bonds. Thus, while RRBs address inflation risk, they may actually reduce cash flow and thus exacerbate Sequence of Return Risk.

However, in support of my thesis that central bankers are currently terrified of inflation, I can cite no less an authority than Paul Volcker (Federal Reserve Chairman from 1979 until 1987) who, writing in the New York Times,[23] declared: *What we know, or should know, from the past is that once inflation becomes anticipated and ingrained – as it eventually would – then the stimulating effects are lost. Once an independent central bank does not simply tolerate a low level of inflation as consistent with "stability," but invokes inflation as a policy, it becomes very difficult to eliminate.*

It is precisely the common experience with this inflation dynamic that has led central banks around the world to place prime importance on price stability. They do so not at the expense of a strong productive economy. They do it because experience confirms that price stability – and the expectation of that stability – is a key element in keeping interest rates low and sustaining a strong, expanding, fully employed economy.

The article was noted approvingly[24] by Richard W. Fisher of the Dallas Fed: *His words from that article should be engraved on the foreheads of every central banker.*

Investing is complex and there are no easy solutions to any problem: one cannot eliminate risk, one can only shift it around and seek to minimize one's exposure to any single risk source.

In the case of inflation, I suggest that investors:

- Seek inflation protection in the equity portion of their portfolio, by a predilection towards resource stocks
- Consider that the potential for switching to an annuity as a form of insurance. The price of an annuity is closely related to the price of a portfolio of corporate bonds, divided approximately 50-50 between medium-term (5–10 years) and long-term (10+ years). If considering only this factor then such a portfolio is not an inflation hedge – but it should be remember that mortality credits (the amount in excess of the market yield, derived from the expected mortality of those purchasing annuities) are increasing annually. The annuity base rate hedges your nominal income; the mortality credits hedge inflation.

[17] Bank of Canada, *Monetary Policy: Inflation*, Bank of Canada, available on-line at http://www.bankofcanada.ca/en/inflation/index.html (accessed 2011-4-9)

[18] Bank of Canada, *Inflation Control Target, Backgrounder*, September 2009, available on-line at http://www.bankofcanada.ca/en/backgrounders/bg-i3.html (accessed 2011-4-9)

[19] John Murray, *Research on Inflation Targeting*, Bank of Canada, Review, Spring 2009, available on-line at http://www.bankofcanada.ca/en/review/spring09/review_spring09.pdf (accessed 2011-4-9)

[20] Robert Amano, Tom Carter and Don Coletti, *Next Steps for Canadian Monetary Policy*, Bank of Canada, Review, Spring 2009, available on-line at http://www.bankofcanada.ca/en/review/spring09/review_spring09.pdf (accessed 2011-4-9)

[21] Rich Miller, *U.S. Needs More Inflation to Speed Recovery, Say Mankiw, Rogoff*, Bloomberg, 2009-5-19, available on-line at http://www.bloomberg.com/apps/news?pid=newsarchive&sid=auyuQlA1lRV8 (accessed 2011-9-21)

[22] Government of Canada, Ministry of Finance, *Government of Canada Market Debt Instruments*, available on-line at http://www.fin.gc.ca/invest/instru-eng.asp (accessed 2011-9-21)

[23] Paul A. Volcker, *A Little Inflation Can Be a Dangerous Thing*, New York Times, 2011-9-18, available on-line at http://www.nytimes.com/2011/09/19/opinion/a-little-inflation-can-be-a-dangerous-thing.html (accessed 2011-9-27)

[24] Richard W. Fisher, *Explaining Dissent on the FOMC Vote for Operation Twist (With Reference to Jan Mayen Island, Paul Volcker and Thor's Hammer)*, Remarks before the Dallas Assembly, 2011-9-27, available on-line at http://www.dallasfed.org/news/speeches/fisher/2011/fs110927.cfm (accessed 2011-9-27)

Conclusion

Many people over-emphasize Security of Principal in their fixed income portfolios at the expense of Security of Income; they therefore face the risk of a decline in income when their maturing bonds or GIC proceeds need to be reinvested.

However, Security of Income is an important factor in portfolio management for retirees and investors should seek to ensure that their reliance on asset sales to fund their retirements is minimized. To this end, longer-term investments such as long-term bonds and preferred shares, with their higher yields and stable cash flows, are a very useful component of retirement portfolios.

The importance of cash income to mitigate the effect of cash withdrawals should also be well understood by investors. One of the key features of fixed income investments is that they provide a steady rate of cash income throughout their existence and this has important consequences when considering a retirement portfolio. Despite all the mathematically convenient approximations of Efficient Frontier Theory[25], bonds are not merely 'junior equities' differing from their more muscular cousins only in expected return and variance. They are bonds.

[25] Peter Ponzo, *Modern Portfolio Theory and the Efficient Frontier*, available on-line at http://www.financialwebring.org/gummy-stuff/Efficient-Frontier.htm (accessed 2011-10-24)

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