Two Models of FixedReset Pricing

The relative pricing of FixedReset preferreds presents several conceptual problems, and has done so since enough of these issues were trading simultaneously to allow for the search for patterns.

The problem is that FixedReset pricing generally does not reflect the usual tenets of fixed income investing.

For example, Chart 1 shows the relationship as of August 12 between the Modified Duration[1] of various issues and their Yield-to-Reset. The Modified Durations and yields have been calculated with the assumption that a call on the first reset date is a certainty – an assumption that may be challenged, to a greater or lesser extent, for each of the issues. However, for most issues in the sample, the Issue Reset Spread[2] is sufficiently high relative to what the issuers might have to pay for a new issue that the chance of redemption at the first opportunity is overwhelmingly likely.

The grey line shows an approximate theoretical relationship: yields are expected to increase with Modified Duration (which will be well correlated with the expected term until the call date in the range of this chart). This is because a higher Modified Duration implies a greater price risk for any given change in yield; additionally, investors are also expected to require a "term premium" in exchange for investing their money for a longer period of time. Naturally, the relationship between Modified Duration and Yield can have any slope the market considers proper – even negative – but it is very difficult to see any relationship at all in these data.

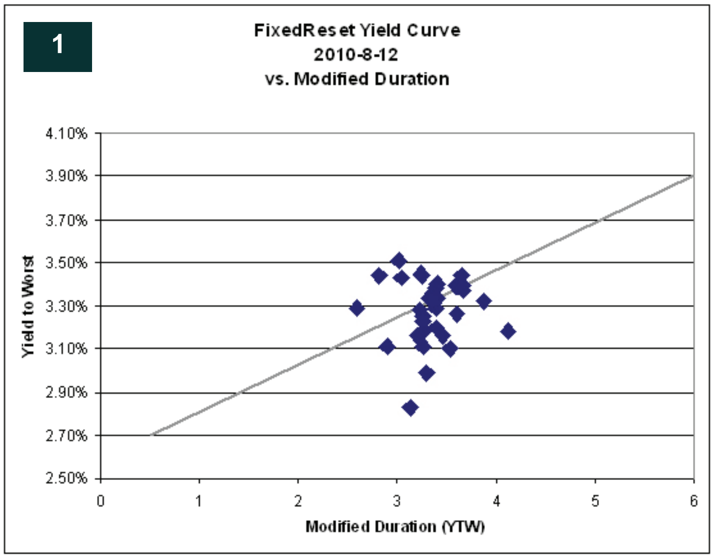
Chart 2 shows another theoretically approved relationship.[3] The theoretical justification of the grey line is:

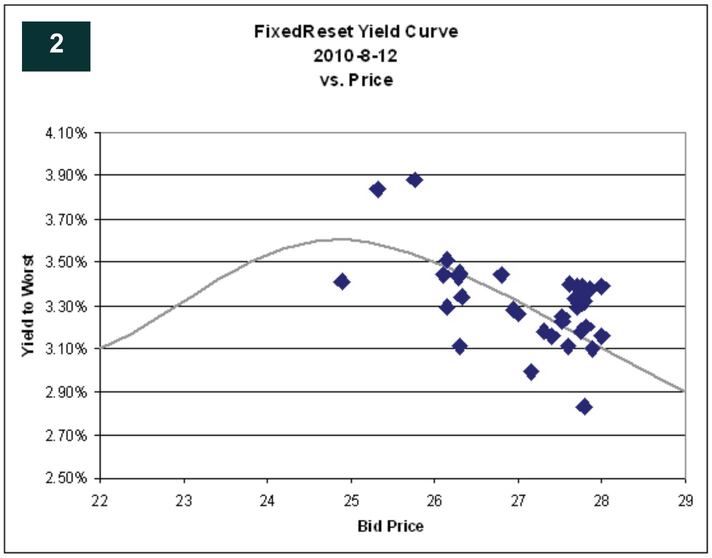
- Investors who wish to hold a short-term investment will prefer issues trading well above their call price, as these are most likely to be called at the first opportunity. Such investors will be willing to give up yield in exchange for increased certainty of a call.
- Investors who wish to hold a long-term investment will similarly prefer instruments trading well below their call price and be similarly willing to give up yield in exchange for increased certainty that it will not be called.

To put it another way, the grey line shows the effects of investor aversion to negative convexity,[4] which will result from the issuer having options available to it that may be exercised to the detriment of the holder – such as calling the issue when it would otherwise yield more than comparable investments. The slope of the grey line may be either shallow or steep, depending on the degree of investor risk aversion, and may be different for discounted and premium issues; but the high point of the curve should always be the par value - or perhaps a little higher, to account for frictional costs of issuance.

In the FixedReset field the evaluation of the likelihood of a call is more complex than a simple look at the price, since this probability will depend on the Issue Reset Spread, which will not necessarily be directly reflected in the price: an issue might have a relatively low Issue Reset Spread and a relatively high current dividend, which will complicate the analysis beyond what may be inferred from Chart 2. However, the sample is sufficiently homogeneous that Issue Reset Spreads are well correlated with current dividend payments and, therefore, with prices.

Chart 2 shows there is a slight indication that the theoretical relationship between price and yield-to-reset is influential in determining the relative pricing of FixedResets, but there is a large amount of scatter shown in the graph





1 For a discussion of Modified Duration, see my article on-line at http://www.himivest.com/media/moneysaver_0705.pdf

2 The Issue Reset Spread is the spread over five-year Canadas to which the dividend yield will reset on each reset date, in accordance with the terms of the prospectus.

3 This relationship was discussed in my seminar on FixedResets, available for purchase on-line via http://www.prefletter.com/eMailVerification.php?path=vid

4 See http://www.himivest.com/media/moneysaver_0711.pdf

It will be noted that in the preparation of these charts, and throughout the rest of this essay, the data examined has been restricted to issues of the highest credit rating according to DBRS,[5] in order to minimize the effect of changing credit spreads. It might be objected that Credit Stratification[6] will make the data heterogeneous despite this restriction, but Chart 3 shows that this does not appear to be the case: there is considerable overlap between the issuers and the relative ordering when there is no overlap does not appear to reflect a rational view of relative credit quality.

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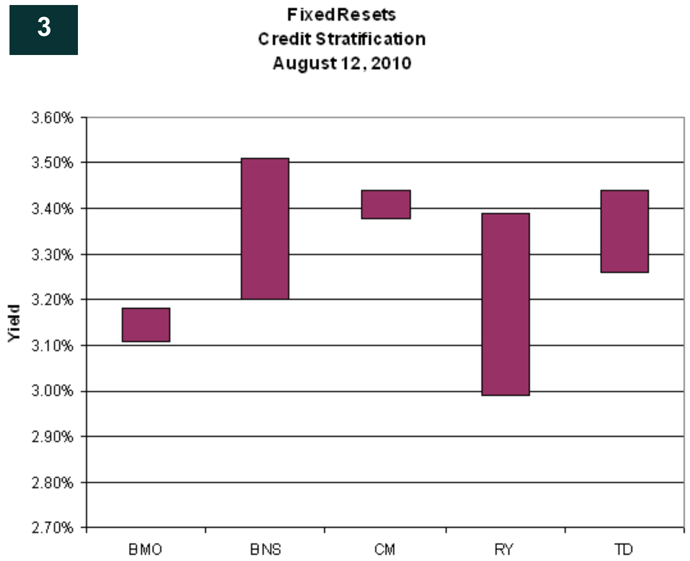

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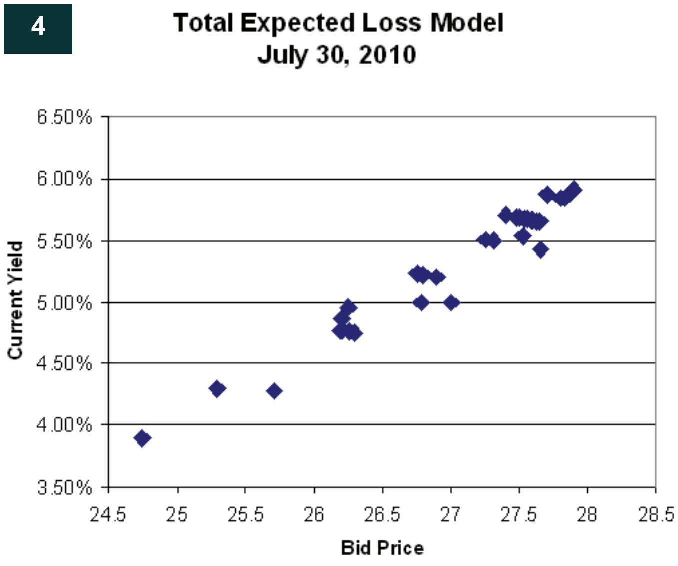


An Overview of FixedReset Issuance Policy

There are two major features of FixedResets that make them attractive to issuers:

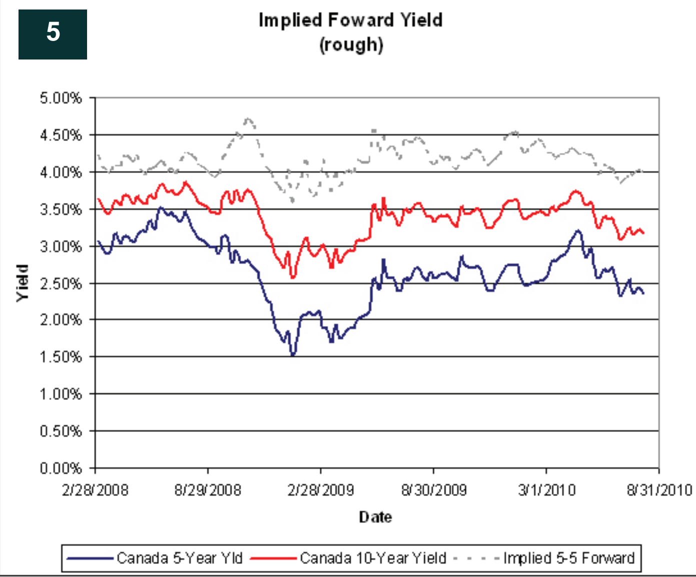
- They may be called five years after issue
- If not called, they permit long-term funding at short-term rates

The first point explains much of their popularity with issuers during the Panic of 2007. Issuers felt that the rates at which they were able to borrow had spiked up unjustifiably high due to concern regarding solvency. However, financial issuers were under extreme investor and regulatory pressure to increase their Tier 1 ratios. The answer was to develop a vehicle that qualified as Tier 1 capital, but could be called as quickly as possible: Straight Perpetuals did not fit the bill since even if a new issue had been saleable at any price during the crisis, the required yield would have been very high and the customary structure mandates that a call at par is not possible until at least nine years after issue.

Issuance continues and can be expected to continue since many investors underestimate the size of the term premium. From the issuer's perspective, longer terms are often preferable because it removes a great deal of funding risk from corporate operations – and it was funding risk that destroyed or crippled more firms during the crisis than did actual insolvency.

The value of funding risk can be estimated in many ways, but for the sake of illustration I have shown the five-year, ten-year and five-year, five-year forward rate ("5/5 Forward") for Government of Canada bonds over the past two and a half years in Chart 5. The forward rate has been calculated as yield required on a five year bond purchased in five years so that the total return on two successive five-year bonds will be equal to the total return realized on a ten-year bond.[7]

5



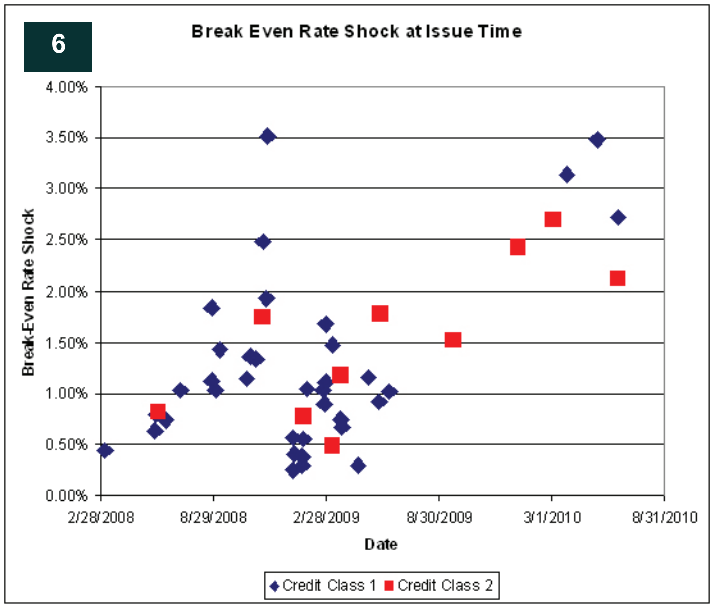
5 For this purpose, Pfd-1 is considered equivalent to Pfd-1(low). In June, 2009, DBRS downgraded all bank preferreds which had previously been rated Pfd-1 to Pfd-1(low) (see http://www.prefblog.com/?p=7073). Currently there are no FixedReset issues rated Pfd-1.

6 See http://www.himivest.com/media/moneysaver_0806.pdf for a discussion of Credit Stratification as it has been observed (and is still observable) for PerpetualDiscounts.

7 The calculations were not strictly accurate. In using published yield to maturity data (http://www.bankofcanada.ca/en/rates/interest-look.html) it ignored the discrepancy whereby cash-flows on identical dates are discounted at two different yields-to-maturity. This does not affect the point: the second five years is much more expensive than the first five years.

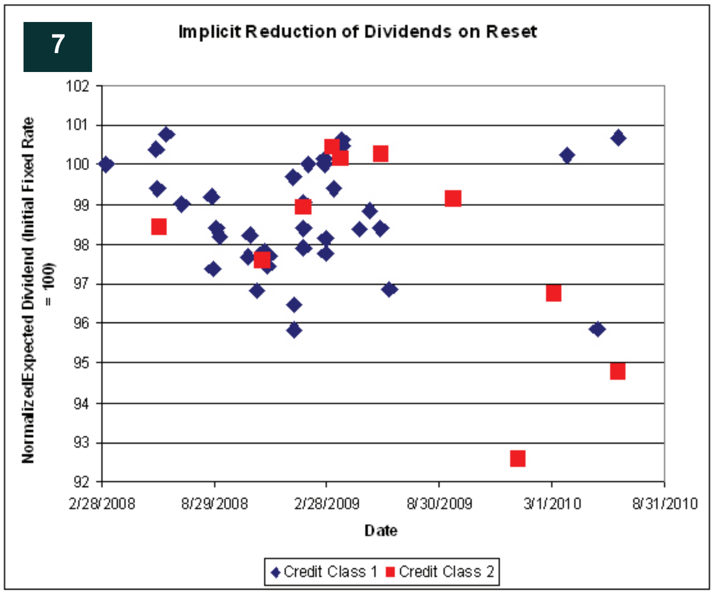
It may be seen that the 5/5 Forward rate is greatly in excess of the current five year yield. While some of this may be ascribed to a prediction that 5-year rates will increase, a large portion of the difference is termed[8] the :"liquidity premium" – and note that this is a different liquidity premium than that used in decomposing corporate bond yields relative to government bonds of like term!

The concept of Break Even Rate Shock[9] is a calculation related to forward rates. In this calculation, we compare a FixedReset issue trading at par with a PerpetualDiscount preferred share. The latter will yield more, but is more vulnerable to upward shocks in the yield curve, such as those that might be experienced due to a sudden, permanent increase in inflation. Chart 6 shows how Break Even Rate Shock has varied over time, when successive new issues of FixedResets are compared with PerpetualDiscount yields from the same issuer on the new issue announcement date.



One interesting feature of FixedReset new issues is the fact that the term until the first Reset Date is generally well in excess of five years. The spread is then calculated as the difference between the Initial Yield and government bonds of that term, whereas the dividend will be reset according to government bonds of a five year term – which will generally yield less.

Hence, if there is no change in government yields between the issue date and the first reset date, a reduction in dividends paid may be expected. This expected reduction in payout is generally rather small, but can be rather substantial, as shown in Chart 7. The most dramatically reduced payout is expected for BAM.PR.R, as discussed previously.[10]



8 See William F. Sharpe, *Interest Rates and Bond Yields*, available on-line at http://www.stanford.edu/~wfsharpe/mia/prc/mia_prc4.htm (accessed 2010-8-14)

9 See the June, 2009, edition of this newsletter and my article *Break Even Rate Shock*, available on-line at http://www.himivest.com/media/moneysaver_0910.pdf

10 See the March, 2010, edition of this newsletter and http://www.prefblog.com/?p=9269

Prior Analytical Methodology

Previous issues[11] of this newsletter have attempted various methods of explaining relative pricing, but it was not until a major decline in overall prices from March 26, 2010 to April 29, 2010 (the Slump Period) allowed for the investigation of the changes in relative prices under stress in the May, 2010, edition that a convincing model was developed.

In that issue, the yields of FixedReset issues were computed in various ways at both the beginning and the end of the Slump Period:

- Yield-to-Reset
- Yield-to-Perpetuity
- Blended Yield
- Forecast Yield
- Current Yield
- Dynamic Price Yield
- Dynamic Spread Yield

These various methods will not be discussed in detail here, except to note that Current Yield is simply the dividend divided by the price, while Yield-to-Reset assumes that the issue will be called at par on the first reset date and incorporates the expected capital loss over time in the yield determination.[12]

Rank Change analysis was then applied: the relative ranking of the issues according to each method of yield calculation was examined and the change in ordering from the beginning to the end of the Slump Period was quantified. This procedure led to the surprising conclusion that Current Yield was the best explanatory variable to be used in FixedReset analysis, since the ranking of issues by the method was virtually unchanged over the period despite the great changes in price.[13]

It was also found that higher-priced instruments tended to have a higher Current Yield than lower-priced instruments, leading to the hypothesis that the issues were being valued by the market according to an objective function having two elements:

- Maximize Current Yield
- Minimize the total expected capital loss

The development of a theory that explained the relative pricing within the FixedReset market gave impetus to an attempt to explain the pricing difference between FixedResets and PerpetualDiscounts in the June edition of this newsletter. It was hypothesized that both classes of preferred share trade on the basis of their Current Yield, with the market trading to maintain a relatively constant spread between the two. The difference in yields between the two classes may be analyzed as:

- Current Yield FixedResets less actual yield FixedResets (the FixedReset Computation Spread)
- Current Yield PerpetualDiscounts less Current Yield FixedResets (the Bozo Spread)
- Actual yield PerpetualDiscounts less Current Yield PerpetualDiscounts (the PerpetualDiscount Computation Spread – an almost negligible figure)

The Bozo Spread has proven to be surprisingly stable – much more stable than the FixedReset Computation Spread – which lends credence to the theory. In this essay I will examine the historical record in an attempt to determine the length of time the mechanism appears to be operative and draw some conclusions from the data. An alternative specification of the base hypothesis will be presented and examined through the historical period. I will conclude with some observations regarding the likelihood of the current relationships breaking down and the ability of an informed investor to capitalize on the current degree of market inefficiency.

The Total Expected Loss Model

This is the model as originally presented. Chart 4 shows the data that is to be regressed – the bid price and Current Yield at that price for all of the FixedReset issues rated Pfd-1(low) on July 30, 2010. The results of this regression, and the results of similar regressions at month ends back to October 31, 2008, are shown in Table 1.

It is apparent from Table 1 that the relationship between the Current Yield on FixedResets and their price (and hence, the total expected loss when the issue is called) is strong and stable. Ever since the average price of the issues in the sample moved firmly above par in April 2009, the correlation between these attributes has exceed 70% and, as a rule, hovers near the 90% mark (see Chart 8). Given the wide variety of possible explanatory attributes not included in the model – issuer, Issue Reset Spread, term to reset date and proximity to ex-Dividend date, to name but a few – the correlation is, in fact, surprisingly high.

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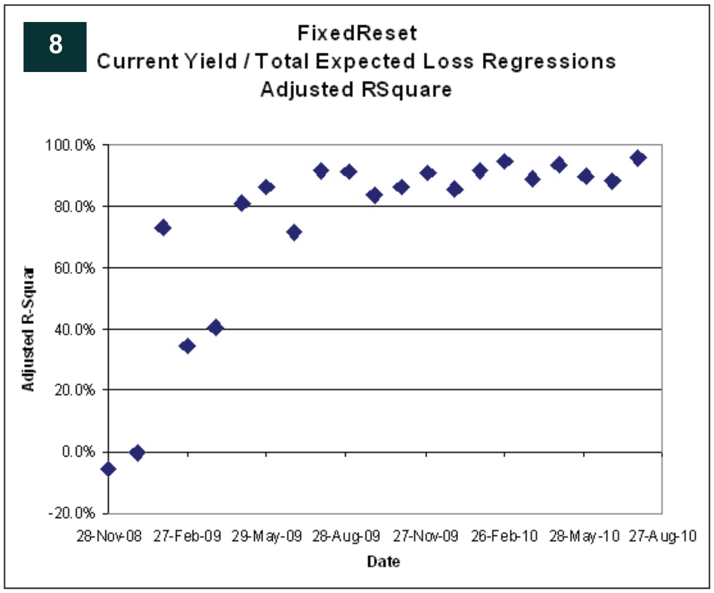
11 See the January, February and March, 2009 editions of this newsletter

12 For a calculator, see http://www.telusplanet.net/public/kbetty/ytc.xls Use of this calculator is explained in my article *Yield Ahead*, available on-line at http://www.himivest.com/media/moneysaver_0607.pdf

13 i.e., if issue A had a higher current yield than issue B at the beginning of the period, it was overwhelmingly likely to have a higher current yield at the end of the period. The preservation of the ordering by current yield was much higher than with any other method.



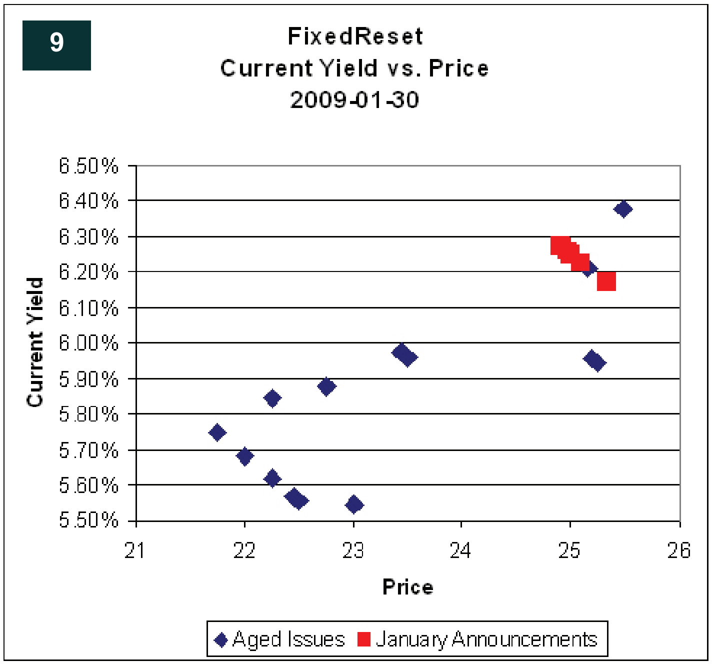
The data even indicate a possibility that the relationship will hold even when the class is, as a whole, trading below par – Chart 9 shows the raw data for January 30, 2009. If such a relationship could be shown to stable and of meaningful size, this could indicate a projection by the market that the issues should normally be priced at par, since the effect is too large to be plausibly explained by an aversion to negative convexity, which will also result in a decline of yield as the price of the issue moves further below par as discussed in connection with Chart 2.

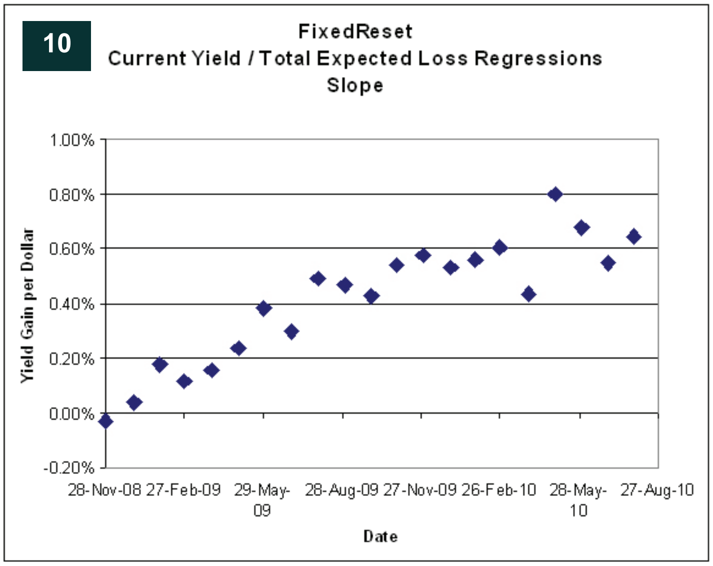
However, the correlations during the period of discounted FixedResets are poor; there weren't as many issues at that time and the markets were extremely unsettled in that period, to say the least. Conclusions regarding the relative pricing of FixedResets when trading at a discount will have to await better quality data.

Table 1: Total Expected Loss Model Regression Data

Date	Adjusted R-Square	Observations	Slope	Par Yield	Average Price
2008-10-31	-2.3%	9	-0.15%	5.13%	23.97
2008-11-28	-5.7%	13	-0.03%	5.92%	22.08
2008-12-31	-0.5%	15	0.04%	5.82%	23.59
2009-1-30	73.2%	21	0.18%	6.16%	23.78
2009-2-27	34.6%	22	0.12%	6.14%	23.76
2009-3-31	40.7%	27	0.16%	6.10%	24.31
2009-4-30	80.9%	30	0.24%	5.58%	25.60
2009-5-29	86.4%	31	0.38%	5.26%	25.99
2009-6-30	71.5%	33	0.30%	5.03%	26.69
2009-7-31	91.7%	33	0.49%	4.35%	27.12
2009-8-31	91.3%	33	0.47%	4.38%	27.15
2009-9-30	83.9%	33	0.43%	4.46%	27.17
2009-10-30	86.3%	33	0.54%	4.43%	26.88
2009-11-30	90.8%	33	0.58%	4.01%	27.32
2009-12-31	85.6%	33	0.53%	3.88%	27.64
2010-1-10	91.5%	33	0.56%	4.03%	27.35
2010-2-26	94.6%	33	0.60%	3.88%	27.41
2010-3-31	89.1%	33	0.44%	4.22%	27.51
2010-4-30	93.7%	34	0.80%	4.43%	26.34
2010-5-31	89.9%	35	0.68%	4.35%	26.56
2010-6-30	88.3%	36	0.55%	4.25%	26.91
2010-7-30	96.0%	36	0.64%	4.00%	26.99

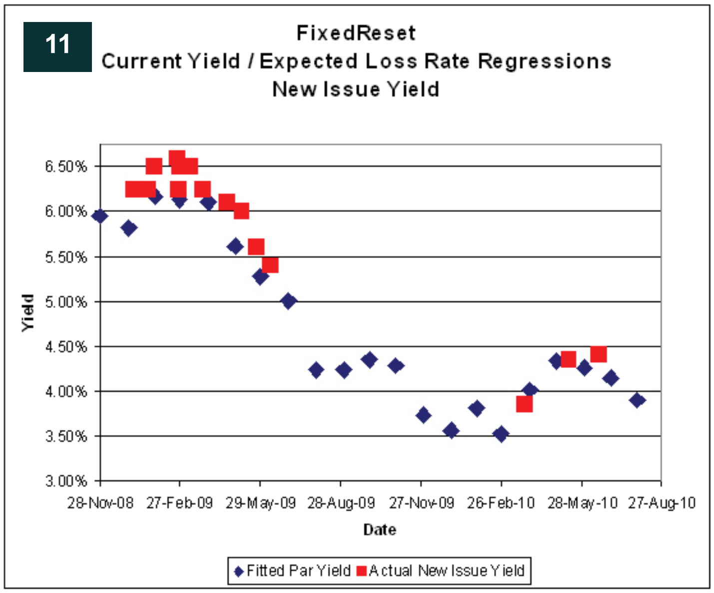
An analytical conclusion of much more significance is the steadily increasing slope of the relationship between Current Yield and Total Expected Loss, as shown in Chart 10. This may be due to the passage of time and the realization that every passing day brings the expected call date a little nearer. This observation led to the alternative hypothesis that seeks to explain the variation of FixedReset Current Yields in terms of the Expected Loss Rate, as will be discussed below.





Naturally, the fitted relationship between price and Current Yield allows for the calculation of the Current Yield of a hypothetical issue trading at par value of $25. It is very gratifying to see in Chart 11 that this calculation has good predictive power; new issue yields were, in general, slightly above the predicted value, which is as it should be considering the necessity of offering a new issue concession (extra yield given new issue buyers as an inducement for them to reshuffle their portfolios).

It will be most interesting at some point to examine data in which the prices incorporated into the sample span the $25.00 par value mark. Given the expected theoretical change of slope shown in Chart 2, the correlations should then become of low quality with little predictive power – but it is not clear as to whether the FixedReset market cares much about such effete notions as "negative convexity"!



The Expected Loss Rate Model

As noted above, the increasing risk-aversion to Total Expected Loss shown in Chart 10 leads to the idea that the market may, in fact, be accounting for the increasing proximity of the expected call dates for the issues trading at premia.

I will admit that this is a potential nuance I missed earlier; if both the Current Yield and a full allowance for the amortization of the discount are both accounted for, then the calculation will closely approximate the true yield, as shown in Equation (23) of the June, 2010, edition of this newsletter:

$$i = \frac{d+(M-P)/N}{P}$$

Where i = the true yield
d is the Annual Dividend
M is the Maturity Price (or call price, in this case)
P is the current price
N is the number of years until the maturity or call date

Note that the proximity of the next ex-dividend date is not being accounted for in the above equation, but this is a relatively small adjustment.

Since it is the inability of proper yield calculations to explain the relative pricing of FixedReset issues that has prompted the entire investigation of alternative pricing models, the possibility that the market is, in fact, amortizing the premium in any kind of rational manner did not immediately occur to me. Mea culpa!

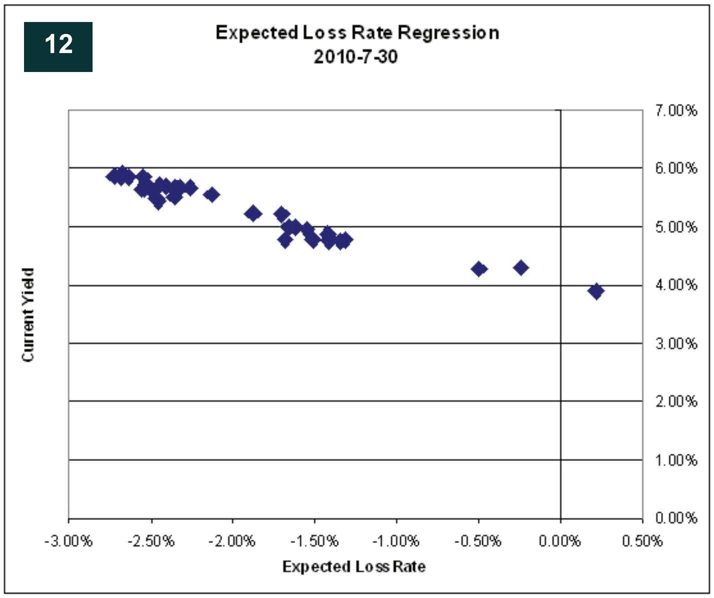
However, this omission will now be rectified with the Expected Loss Rate Model. To develop this model, we calculate the Current Yield of each issue in the sample – identically to the Total Expected Loss model – but instead of regressing these values against the price of the issues, we regress against the Expected Loss Rate, which is calculated as:

$$E = (M - P) / PN$$

Where the notation is the same as used in the above equation. The calculations required for BNS.PR.P on July 30, 2010, are shown in Table 2.

Table 2: Expected Loss Rate Calculations for BNS.PR.P as of 2010-7-30

Attribute	Notation	Value
Price	P	$26.21
Annual Dividend	d	$1.25
Current Yield	CY = d/P	4.77%
Maturity Price	M	$25.00
Maturity Date		2013-4-25
Term to Maturity	N	2.74
Total Expected Loss	M – P	$1.21
Expected Loss per year	(M – P)/N	$0.44
Expected Loss Rate	(M – P)/NP	1.69%

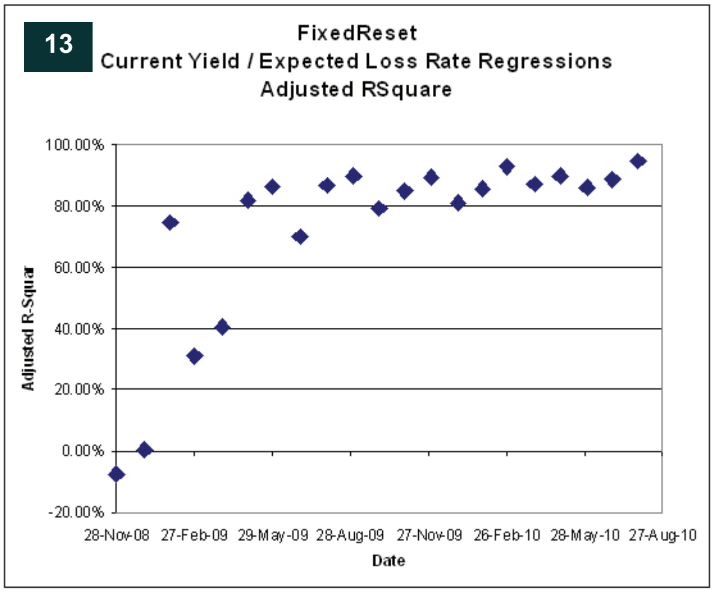


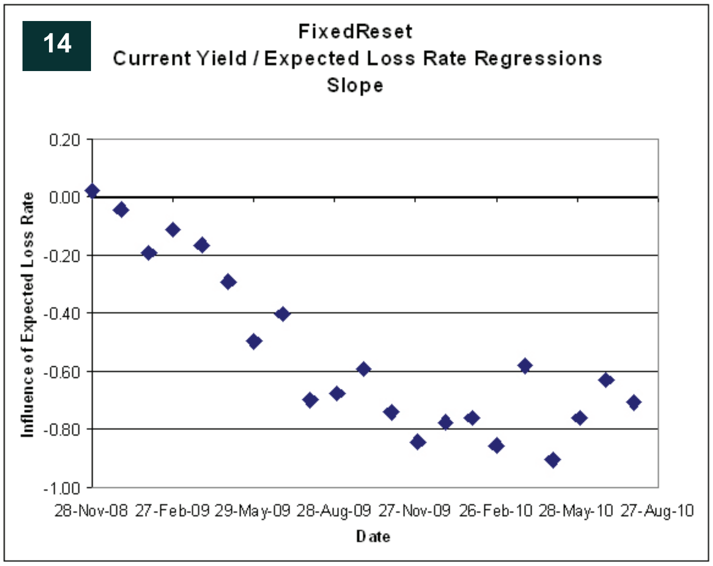
After repeating these calculations for all of the issues in the sample, we may plot the Current Yield against the Expected Loss Rate, as shown in Chart 12.

A glance at Chart 12 is sufficient to make two conclusions of interest:

- There appears to be some accounting for the Expected Loss Rate
- The reason that this accounting does not result in yields being equal is that the accounting is not full: a 2% increase in Current Yield is associated with an approximately 3% increase in the Expected Loss Rate. If all correctly calculated yields-to-call were to be held more-or-less constant, the relationship would be 1:1

Repeating these calculations over the same period and sample as has been done previously allows the construction of Table 3. Preparation of Table 3 in turn allows us to prepare Charts 13–15, which correspond to Charts 9–11 shown in the section dealing with the Total Expected Loss Model.





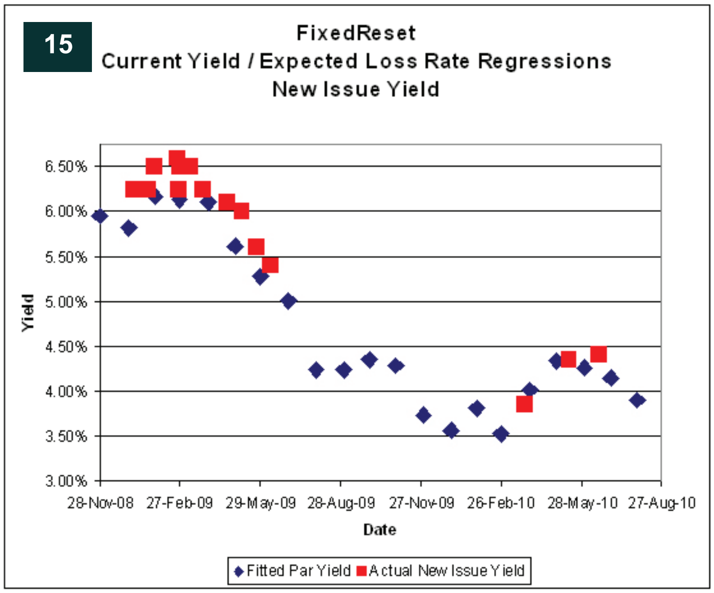


Table 3: Expected Loss Rate Model Regression Data

Date	Adjusted R-Square	Observations	Slope	Par Yield	Average Price
2008-10-31	-7.35%	9	+0.14	5.17%	23.97
2008-11-28	-7.50%	13	+0.02	5.95%	22.08
2008-12-31	0.57%	15	-0.05	5.82%	23.59
2009-1-30	74.76%	21	-0.19	6.17%	23.78
2009-2-27	30.93%	22	-0.11	6.13%	23.78
2009-3-31	40.73%	27	-0.16	6.11%	24.31
2009-4-30	81.76%	30	-0.29	5.61%	25.60
2009-5-29	86.26%	31	-0.50	5.28%	25.99
2009-6-30	70.21%	33	-0.40	5.01%	26.59
2009-7-31	86.85%	33	-0.70	4.24%	27.12
2009-8-31	89.91%	33	-0.68	4.24%	27.15
2009-9-30	79.26%	33	-0.59	4.35%	27.17
2009-10-30	85.03%	33	-0.74	4.29%	26.88
2009-11-30	89.57%	33	-0.84	3.73%	27.32
2009-12-31	80.94%	33	-0.78	3.57%	27.64
2010-1-10	85.76%	33	-0.76	3.81%	27.35
2010-2-26	92.92%	33	-0.86	3.52%	27.41
2010-3-31	86.99%	33	-0.58	4.01%	27.51
2010-4-30	89.95%	34	-0.90	4.34%	26.34
2010-5-31	86.05%	35	-0.76	4.26%	26.56
2010-6-30	88.61%	36	-0.63	4.14%	26.91
2010-7-30	94.54%	36	-0.71	3.90%	26.99

Charts 13 and 15 tell a similar tale as their counterparts in the Total Expected Loss Model: the quality of the regression has been improving steadily over time to quite respectable levels and the model serves as quite a good predictor of new issue yields.

It is Chart 14, that shows the slope of the regression line, that is of greatest interest. If expected capital losses were given an equal weight as dividend income, then the slope of the regressions would be -1.00 and all of the precisely calculated yields-to-call would be identical.

To the extent that we believe in the theoretical relationship between yield and call probability shown in Chart 2, the slope should in fact be more than -1.0 (although this relies on the observation that Initial Yield and Issue Reset Yield are well correlated, which is true now but will not necessarily always be the case). Thus, the deviation from this ideal shown in the data, in which the slope has been hovering around -0.8, is at least in the right direction, although we cannot make any conclusions regarding the magnitude. This ties in well with our observation that Chart 2 shows "a slight indication that the theoretical relationship between price and yield-to-reset is influential in determining the relative pricing of FixedResets".

The magnitude of the Expected Loss Rate Effect may not be theoretically determined without making specific assumptions regarding risk aversion (or perhaps, estimating a value by comparison with other measures of risk). In the current environment we may approximate the call probability, which is dependent upon the Issue Reset Yield, by reference to the Initial Issue Yield, since these two measures are currently well correlated. This will not always be the case, but since it is now, we have drawn Chart 2 using Initial Issue Yield.

The magnitude of the Expected Loss Rate Effect will be related to the market's risk aversion; the more it is willing to pay for increased certainty that the issue will, in fact, be called, the greater the difference between the actual Expected Loss Rate Effect and -1 (the latter value resulting in all yields being approximately the same, regardless of the relative sizes of the dividend and expected capital loss components of yield).

Additionally, the magnitude will be affected by tax policy and the marginal investor's individual tax situation. Current tax policy in Canada results in capital gains being taxed more or less equally with dividends for many investors, but this is not always the case: Ernst & Young estimates[14] some marginal taxation rates as shown in Table 4.

Table 4: Estimated Marginal Tax Rates given Taxable Income of $75,000

Province	Marginal Taxation Rate on Eligible Dividends	Marginal Taxation Rate on Capital Gains
British Columbia	5.80%	16.25%
Alberta	5.80%	16.00%
Manitoba	15.02%	19.70%
Ontario	14.03%	17.70%

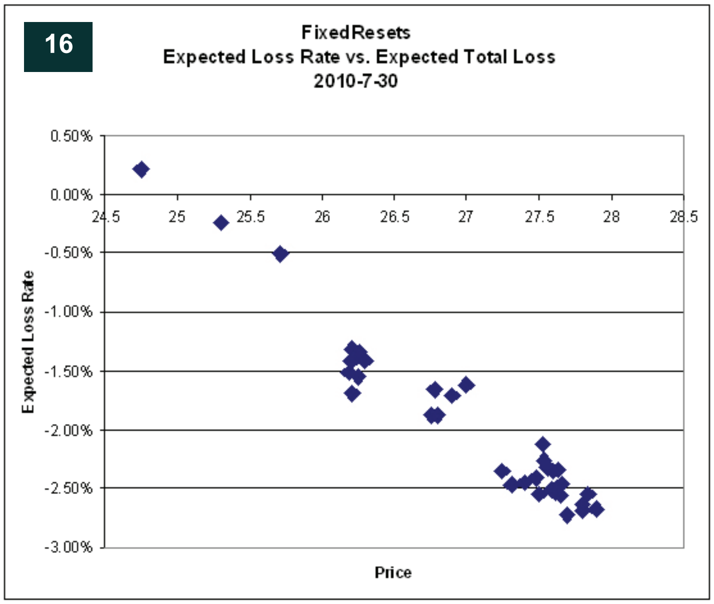
14 Ernst & Young, *2010 personal tax calculator*, available on-line at http://www.ey.com/CA/en/Services/Tax/Tax-Calculators-2010-Personal-Tax (accessed 2010-8-14)

An investor's willingness to allow expected capital losses to offset increased dividend income will be influenced by the difference in the taxation rates on these sources of income.

Additionally, as discussed in the March, 2010, edition of this newsletter, some investors might have relatively large amounts of capital losses already accumulated, in which case they will receive no immediate benefit from the ability to claim a capital loss once their investment is called for redemption. This effect will tend to drive the Expected Loss Rate Effect closer to 0 and farther from -1.

Which Model is Better?

I don't know. Chart 16 shows the current relationship between Total Expected Loss and the Expected Loss Rate for all issues in the sample as of the end of July – the Adjusted R-Square between the two variables is 94%. Given such confounding, it would be rash to make a firm judgment one way or the other.



A good test of the model will occur when the relationship between Total Expected Loss and the Expected Loss Rate breaks down, but that may be some time in future. In the interim, we can test the predictions of the models and make at least a preliminary decision based on the accuracy of these predictions. It will be noted from the regressions that we still do not have a model that can satisfactorily explain FixedReset pricing in the first quarter of 2009 while maintaining its accuracy in the current environment. It may be that such a model simply does not exist – that the pricing in 1Q09 was simply irrational.

Tables 1 and 3 showed a strong relationship between the dependent and independent variables, but not a complete one. We can use the empirical relationships from the regression to determine what the price of each instrument in the sample would be if the relationship was, in fact, perfect – the difference between these fitted prices and the actual prices of each instrument should give us some idea the expected future price behaviour of each issue, given an assumption that the market price will migrate towards its fitted price.

Table 5 calculates a disparity analysis for the Total Expected Loss model, given the data from the regression in Table 1. A little algebra is sufficient to show that for any issue, the fitted price is:

P' = (Current Yield – Intercept)/Slope

And for BMO.PR.M on 2010-7-30 this resolves to:

P' = (4.952% – (-12.064%)/0.006427
= 0.17016/0.006427
= 26.48

As this edition goes to press, I realize with some embarrassment that the above equation is not correct: the Current Yield is not a constant - the Current Yield given a price of P' will be different from the original Current Yield. This will change the equation for P' into a quadratic, making the solution a little more complex; deriving the formulae and adjusting the results are left as an exercise for the student. The effect is relatively small; the correctly fitted price for BMO.PR.M is 26.43. This error is probably comparable or slightly less than the error introduced by not accounting for the proximity of the ex-dividend date.

The five "cheapest" issues according to the analyses are bolded in both Tables 5 and 6.

Table 6 calculates a disparity analysis for the Expected Loss Rate Model, given the data from the regression in Table 3. The algebra is more annoying than for the TEL model, and will therefore be given in full:

CurrentYield = Intercept + Slope * ELR
ELR = (CurrentYield – Intercept)/Slope

And by definition:

ELR = (25 – P)/NP

So

(25 – P)/NP = (CurrentYield – Intercept)/Slope
25 – P = NP * (Current Yield – Intercept)/Slope
25 = (NP*(CurrentYield – Intercept)/Slope) + P
= P * [(N*(Current Yield – Intercept)/Slope) + 1]
P = 25/[(N*(CurrentYield – Intercept)/Slope) + 1]

This equation suffers from the same error regarding the variation of Current Yield as does the equation derived for the Total Expected Loss calculation.

Table 5: Disparity Analysis for the FixedReset Total Expected Loss Model, 2010-7-30

Issue	Bid Price	Current Yield	TEL Fitted Price	Disparity
BMO.PR.M	***26.25***	***4.95%***	***26.48***	***-0.23***
BMO.PR.N	***27.70***	***5.87%***	***27.90***	***-0.20***
BMO.PR.O	27.80	5.85%	27.87	-0.07
BMO.PR.P	27.00	5.00%	26.55	+0.45
BNS.PR.P	26.21	4.77%	26.19	+0.02
BNS.PR.Q	26.20	4.77%	26.19	+0.01
BNS.PR.R	26.30	4.75%	26.17	+0.13
BNS.PR.T	27.59	5.66%	27.58	+0.01
BNS.PR.X	27.62	5.66%	27.57	+0.05
BNS.PR.Y	24.75	3.89%	24.82	-0.07
CM.PR.K	26.78	4.99%	26.54	+0.24
CM.PR.L	27.80	5.85%	27.87	-0.07
CM.PR.M	27.84	5.84%	27.85	-0.01
GWO.PR.J	27.31	5.49%	27.32	-0.01
MFC.PR.D	27.90	5.91%	27.97	-0.07
MFC.PR.E	26.90	5.20%	26.87	+0.03
PWF.PR.M	27.25	5.50%	27.34	-0.09
PWF.PR.P	25.71	4.28%	25.43	+0.28
RY.PR.I	26.26	4.76%	26.18	+0.08
RY.PR.L	26.80	5.22%	26.90	-0.10
RY.PR.N	***27.40***	***5.70%***	***27.64***	***-0.24***
RY.PR.P	27.50	5.68%	27.61	-0.11
RY.PR.R	27.50	5.68%	27.61	-0.11
RY.PR.T	27.54	5.67%	27.60	-0.06
RY.PR.X	27.63	5.66%	27.57	+0.06
RY.PR.Y	27.53	5.54%	27.39	+0.14
SLF.PR.F	27.66	5.42%	27.21	+0.45
SLF.PR.G	***25.30***	***4.30%***	***25.46***	***-0.16***
TD.PR.A	26.21	4.77%	26.19	+0.02
TD.PR.C	***26.76***	***5.23%***	***26.91***	***-0.15***
TD.PR.E	27.65	5.65%	27.56	+0.09
TD.PR.G	27.48	5.69%	27.62	-0.14
TD.PR.I	27.60	5.66%	27.58	+0.02
TD.PR.K	27.56	5.67%	27.59	-0.03
TD.PR.S	26.19	4.77%	26.20	-0.01
TD.PR.Y	26.21	4.86%	26.34	-0.13

Table 6: Disparity Analysis for the FixedReset Expected Loss Rate Model, 2010-7-30

Issue	Bid Price	Current Yield	Term to Reset Date	ELR Fitted Price	Disparity
BMO.PR.M	26.25	4.95%	3.07	26.20	+0.05
BMO.PR.N	27.70	5.87%	3.58	27.76	-0.06
BMO.PR.O	27.80	5.85%	3.82	27.93	-0.13
BMO.PR.P	27.00	5.00%	4.58	26.92	+0.08
BNS.PR.P	26.21	4.77%	2.74	25.87	+0.34
BNS.PR.Q	26.20	4.77%	3.24	26.04	+0.16
BNS.PR.R	26.30	4.75%	3.50	26.10	+0.20
BNS.PR.T	27.59	5.66%	3.74	27.57	+0.02
BNS.PR.X	27.62	5.66%	3.74	27.56	+0.06
BNS.PR.Y	***24.75***	***3.89%***	***4.74***	***24.98***	***-0.23***
CM.PR.K	26.78	4.99%	4.01	26.65	+0.13
CM.PR.L	27.80	5.85%	3.75	27.88	-0.08
CM.PR.M	***27.84***	***5.84%***	***4.01***	***28.08***	***-0.24***
GWO.PR.J	27.31	5.49%	3.42	27.09	+0.22
MFC.PR.D	27.90	5.91%	3.89	28.11	-0.21
MFC.PR.E	26.90	5.20%	4.14	27.07	-0.17
PWF.PR.M	27.25	5.50%	3.51	27.16	+0.09
PWF.PR.P	25.71	4.28%	5.51	25.76	-0.05
RY.PR.I	26.26	4.76%	3.58	26.14	+0.12
RY.PR.L	26.80	5.22%	3.58	26.79	+0.01
RY.PR.N	27.40	5.70%	3.58	27.51	-0.11
RY.PR.P	27.50	5.68%	3.58	27.47	+0.03
RY.PR.R	27.50	5.68%	3.58	27.47	+0.03
RY.PR.T	***27.54***	***5.67%***	***4.07***	***27.84***	***-0.30***
RY.PR.X	27.63	5.66%	4.07	27.81	-0.18
RY.PR.Y	***27.53***	***5.54%***	***4.32***	***27.78***	***-0.25***
SLF.PR.F	27.66	5.42%	3.92	27.31	+0.35
SLF.PR.G	***25.30***	***4.30%***	***4.92***	***25.71***	***-0.41***
TD.PR.A	26.21	4.77%	3.51	26.13	+0.08
TD.PR.C	26.76	5.23%	3.51	26.13	+0.08
TD.PR.E	27.65	5.65%	3.75	27.56	+0.09
TD.PR.G	27.48	5.69%	3.75	27.62	-0.14
TD.PR.I	27.60	5.66%	4.01	27.77	-0.17
TD.PR.K	27.56	5.67%	4.01	27.78	-0.22
TD.PR.S	26.19	4.77%	3.01	25.96	+0.23
TD.PR.Y	26.21	4.86%	3.26	26.16	+0.05

After examination of the tables we may select issues that are considered most cheap – this selection is shown in Table 7.

It will not escape notice that the selections of 'cheap' issues according to the Expected Loss Rate model are highly skewed towards those issues with a long term to their expected call date. To the extent that this preference is persistent, this is a point against the model: deviations from prices implied by a perfect model will be random.

Table 7: Selection of Cheapest FixedResets in Sample According to the Models

Total Expected Loss Model	Expected Loss Rate Model
BMO.PR.M	BNS.PR.Y
BMO.PR.N	CM.PR.M
RY.PR.N	RY.PR.T
SLF.PR.G	RY.PR.Y
TD.PR.C	SLF.PR.G

The artistry of quantitative analysis comes from recognition of patterns in model data and the ability to develop valuation models that exploit those patterns. It will be noted that pricing models, such as are described in this essay, seek only to describe the world as it is; a valuation model builds on the pricing model in an attempt to forecast expected returns, which is not quite the same thing. If, for instance, the market had an aversion to three-letter ticker symbols, this irrational prejudice would be incorporated into a pricing model and exploited in a valuation model.

We have now achieved our first objective: we have made predictions from the models that are different – we may now see which model's predictions are most accurate.

A Word of Caution

It should be borne firmly in mind that the two models presented above are incomplete and untested – they should not be used for portfolio management purposes. If we were to do such a thing, we would be declaring ourselves members of the Look-Mummy-I-Got-A-Spreadsheet! School of investment management and would have to go work for a bank.

Firstly, there are several elements of data that are clearly missing from the models. The most notable is the proximity of the ex-Dividend date. Clearly, all else being equal, it is better to buy an issue the day before the ex-Date rather than the day after – but neither model can account for this. Similarly, the Issue Reset Spread appears nowhere in the analysis. And, not to be forgotten, there is my mathematical error in accounting for Current Yield that needs to be fixed in a final version.[15]

Secondly the fact that a particular issue is cheap according to the model does not necessarily mean that it is expected to outperform. It might always be cheap due to factors not considered in the model – most egregiously the Issue Reset Spread mentioned above. But what if there is something about the potential voting rights in the prospectus that the market doesn't like and therefore knocks a dime off the price all the time? Or what if the problem is that the issuer simply has too many issues outstanding and they are all a little cheap because a prudent manager simply can't fit all of them in his portfolio (this happens with the BAM preferreds, for instance). A snapshot of their cheapness may return a false picture; the disparity must be compared with its usual, historical value. This, of course, is related to the distinction between a pricing model and a valuation model, discussed briefly in the previous section.

Thirdly, we have no idea how to evaluate potential trades in practice. Once we have a valuation model with which we are satisfied, we must determine how much extra valuation (with its uncertain promise of future excess returns) is required to justify the absolutely certain transaction costs incurred when trading. Clearly, we should expect to cover our costs 'plus a little extra' ... but how much extra?

Quantitative Analysis is a long process and any model likely to work in the long term will be far more complex than the models presented here.

For all that, we have seen that the models have some predictive ability (in terms of new issue yields) and more importantly, can be justified in terms of rational (mostly!) economic objective functions. Further development will almost certainly reward quantitative analysts who are prepared to do the work.

Finally, we must consider the problem of the relative valuation of FixedResets and PerpetualDiscounts. The Bozo Spread measures the differences in Current Yields between the two asset classes, but it may very easily be argued that a better indicator of valuation for the FixedReset sector is the (derived) new issue yield. Against this point is the volatility of Break Even Rate Shock, as shown in Chart 6: a stable spread of this nature would result in a stable BERS. Resolution of this argument can only be expected when the high-dividend members of the current FixedReset class are called, changing the Current Yield of the class without necessarily changing the required new issue yield ... and by that time, we may well have experienced a regime shift in market pricing and have to come up with a new model. Ain't investing fun?

[15] Hell.