Dividend Capture in the FixedReset Sector

Dividend Capture is an investment strategy that is based on the idea that market inefficiencies and differential taxation of capital gains and dividends can be exploited to produce excess returns by owning a security for a short period of time that includes the ex-Dividend date. One recommended strategy[1] is to "*Buy the stock the day before it goes X, capture the dividend, and sell it the next day. This is the most common Dividend Capture strategy, and the subject of the most academic research (Campbell and Beranck 1955, Durand and May 1960, etc). While the market is rising, this is the simplest, most efficient and least volatile way to capture dividends*."

The author of that exhortation is quick to note that *I have used Dividend Capture as a very profitable trading strategy for many years, but it's* [sic] *strength lies in actively using Dividend Capture* ***only*** *during prolonged bull markets. No matter how nimble you think you are, or how sophisticated your trading technology is, Dividend Capture will absolutely get you killed during a bear market.*

This qualification makes the advice worthless, but perhaps did not go far enough at that! One common strategy[2] in the early 1980's was to purchase common stock and simultaneously write a deep-in-the-money call; this was touted as a "virtually risk-free method to secure the cash payout", but corporations were required to hold the position for at least 46 days to secure the tax benefits, and interpretations of the tax code required an exercise price on the call of at least 80% of market. The DJIA dropped by 31% between October 13, 1987 and October 19, 1987, sufficient to put such positions significantly underwater. The Brady Report into the 1987 market crash[3] makes particular mention of this strategy and notes that many users of this strategy sold stock on October 19–20, 1987.

One example of the consequences of this faith in risk-free excess returns is the report that[4] *Anecdotal evidence of this conclusion is that immediately following the October 1987 crash, several corporate treasurers were dismissed when their dividend-capturing programs experienced large capital losses. For example, The Wall Street Journal reported on November 3, 1987 that "One of the hardest hit was Hawaiian Electric Industries Inc. Late last week, it announced that it had lost $11.3 million in the stock market, almost all in a dividend capture program. The treasurer of the unit responsible for the loss 'retired' last week*."

The Rationale Behind Dividend Capture Strategies

Dividend Capture became well-known in the early 1980's, when Japanese insurance companies found it desirable for reasons unrelated to investment returns. They were required to pay their policy holders from investment income rather than capital gains[5] and thus had a strong incentive to maximize this source of income, even at the expense of long-term performance. This often had a huge effect on trading volumes, with dividend-capture trading accounting for over 40% of US volume on some days in 1988.[6]

Even before then, however, there was an academic literature developing that can be sorted into four broad categories:[7]

- The first group holds that "if taxes enter investors' decisions, then the fall in price on the ex-dividend day should reflect the post-tax value of the dividend relative to the post-tax value of capital gains on that day. Because dividends in most time periods are taxed more heavily than capital gains, the theory suggests that if taxes affect investors' choices, the fall in stock price should in general be less than the dividend, and the drop could be used to infer marginal tax rates."
- The second group inspects the data bracketing changes in tax laws to see if price behaviour on the ex-date also changes.
- The third group states that the price change is limited because of arbitrage by short-term traders.
- The fourth group attempts to show that the price drop on the ex-dividend day is attributable to market microstructure rather than tax laws.

1 David Hartzell, *Welcome back…Dividend Capture!*, 2011-1-13, available on-line at http://seekingalpha.com/article/246330-dividend-capture-revisited (accessed 2011-5-9)

2 Keith C. Brown, Scott L. Lummer, *The Cash Management Implications of a Hedged Dividend Capture Strategy*, Financial Management, Winter 1984, available on-line at http://www.mccombs.utexas.edu/faculty/keith.brown/Research/FM-12.84.pdf (accessed 2011-5-12)

3 United States Presidential Task Force on Market Mechanisms, *Report*, 1988, available on-line via http://www.archive.org/details/reportofpresiden01unit (accessed 2011-5-12)

4 Kenneth M. Eades, Patrick J. Hess, E. Han Kim, *Time-Series Variation in Dividend Pricing*, The Journal of Finance, December 1994, available on-line at http://webuser.bus.umich.edu/ehkim/articles/time-series-jof1994.pdf (accessed 2011-5.9)

5 John H. Boyd, Ravi Jagannathan, *Ex-Dividend Price Behavior of Common Stocks*, Federal Reserve Bank of Minneapolis, Research Department Staff Report 173, June 1994, available on-line at http://www.mpls.frb.org/research/sr/sr173.pdf (accessed 2011-5-9)

6 James J. Angel, *Nonstandard-settlement transactions*, Financial Management, Vol. 27, No. 1, pp. 31-46, Spring 1998, available on-line at http://findarticles.com/p/articles/mi_m4130/is_n1_v27/ai_20991357/?tag=content;col1 (accessed 2011-5-9) citing Mitchell, M.L. and J.H. Mulherin, 1994, "The Impact of Public Information on the Stock Market," Journal of Finance (July), 923-950.

7 Edwin J. Elton, Martin J. Gruber, Christopher R. Blake, *Marginal Stockholder Tax Effects and Ex-Dividend-Day Price Behavior: Evidence from Taxable versus Non-taxable Closed-End Funds*, available on-line at http://pages.stern.nyu.edu/~eelton/working_papers/tax_effects.pdf (accessed 2011-5-12)

The tax arbitrage explanation, commonly referred to as the Tax Clientele Effect, which was introduced[8] in 1970. This theory holds that since stock prices are assumed to be rational and are assumed to be set by the marginal buyers and sellers then:

$$DOR = (P_{CUM} - P_{EX})/D = (1 - t_{DIV})/(1 - t_{GAIN}) \quad (1)$$

Where: P_{CUM} is the last cum-dividend price

P_{EX} is the ex-dividend price at the close of the first ex-date

D is the amount of the dividend

t_{DIV} is the tax rate on the dividend

t_{GAIN} is the tax rate on the capital gain

DOR is the Drop Off Rate (not defined as such in the original paper)

P_{EX} is defined the way it is because at the time the original paper was written, all orders on the specialists books on the NYSE were adjusted by the dividend, which could bias the estimation. Naturally, the insertion of a full trading day between measurements introduces some noise into the analysis.

The first analysis by Elton & Gruber resulted in an estimated Drop Off Rate of about 78%: that is, that the actual drop in the stock price is about 78% of the value of the dividend. This, together with the assumption that:

$$t_{GAIN} = 0.5 * t_{DIV} \quad (2)$$

allowed the authors to infer that the marginal tax rate, t_{DIV}, on the marginal traders for the sample data was about 36%.

Naturally, this assertion proved controversial, with the most important attack being instigated by Avner Kalay, who asserted[9] that short term traders anticipate and take market action based on an expected DOR of 1.0, and that the difference between this value and the observed value is probably due to frictional effects arising from transaction costs. Another way of framing this argument is to assert that the marginal investor during the ex-date period is a professional investor, pension fund, securities dealer, or other entity who is indifferent to tax effects on total return since for them,

$$t_{GAIN} = t_{DIV} \quad (3)$$

It was left to Karpoff & Walkling to suggest[10] that the theories could quite easily coexist: investors making decisions (particularly regarding the timing of the market action) may be influenced by Tax Clientele considerations, which provides an opportunity to short-term traders that are constrained by liquidity and transaction costs relative to the size of the dividend.

Transaction costs are important, as noted above. The 1975 deregulation of NYSE commission rates decreased transaction costs and changed the dividend capture effect on high-yielding common stocks from DOR < 1 prior to 1975 to DOR > 1 afterwards.[11]

Michaely & Vila then observed[12] that uncertainty regarding the relative influence of short-term traders and tax-clientele traders combined with uncertainty regarding the tax rate differential (which is more important for securities valuation on the ex-dividend date than on other dates) creates risk in the estimation of the Drop Off Ratio; this uncertainty should therefore lead to a higher required return for dividend capture strategies, which implies that the expected Drop Off Ratio will be reduced from what it would otherwise be expected to be. In their model, the measured DOR does not reflect the preferences of any particular group, but represents an equilibrium. They also show that the riskiness of the transaction is inversely related to the trading volume.

Other influences have been suggested as explanatory variables for the DOR. Since Hong Kong has no tax on either capital gains or investment income, the DOR is expected to be equal to one; but in fact the ratio was found[13] to be 0.43; however, this changed to a value very close to one when Hong Kong's market changed from physical to electronic settlement, which facilitated short term trading.[14] This should also serve as a reminder than commissions and taxes aren't the only source of trading frictions; the author also noted that "the evidence supports the argument that regulatory or institutional features which inhibit short-term trading will adversely affect pricing efficiency of financial markets."

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8 Edwin J. Elton & Martin J. Gruber, *Marginal Stockholder Tax Rates and the Clientele Effect*, The Review of Economics and Statistics, February 1970, available on-line at http://pages.stern.nyu.edu/~eelton/papers/70-feb.pdf (accessed 2011-5-9)

9 Avner Kalay, *The Ex-Dividend Day Behavior of Stock Prices: A Re-Examination of the Clientele Effect*, Journal of Finance 1982, partial text available on-line at http://www.jstor.org/pss/2327767 (accessed 2011-5-9); and *The Ex-Dividend Day Behavior of Stock Prices: A Re-Examination of the Clientele Effect: A Reply*, Journal of Finance 1984, partial text available on-line at http://www.jstor.org/pss/2327880 (accessed 2011-5-9); arguments summarized by Topic (2006) [infra]

10 Jonathan M. Karpoff & Ralph A. Walkling, *Short-term trading around ex-dividend days: Additional evidence*, Journal of Financial Economics (September 1988), available on-line via http://www.sciencedirect.com/science/article/B6VBX-45MFSBH-2C/2/37d810b0472a94f286237651ac439ca7 (accessed 2011-5-9), summarized by Topic (2006), infra.

11 Andy Naranjo, M. Nimalendran and Mike Ryngaert, *Time Variation of Ex-dividend Day Stock Returns and Corporate Dividend Capture: A Re-examination*, DOI: 10.1111/0022-1082.00290, Journal of Finance, 2000, available on-line at http://onlinelibrary.wiley.com/doi/10.1111/0022-1082.00290/abstract (abstract only – subscription required for paper) and http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.46.7395&rep=rep1&type=pdf

12 Roni Michaely & Jean-Luc Vila, *Investors' Heterogeneity, Prices, and Volume around the Ex-Dividend Day*, Sloan School of Management, April 1994, available on-line at http://dspace.mit.edu/bitstream/handle/1721.1/48273/investorsheterog00mich.pdf?sequence=1 (accessed 2011-5-11)

13 Murray Frank & Ravi Jagannathan, *Why Do Stock Prices Drop by Less than the Value of the Dividend? Evidence From a Country Without Taxes*, Federal Reserve Bank of Minneapolis, Research Department Staff Report 229, March 1997, available on-line at http://minneapolisfed.org/research/sr/sr229.pdf (accessed 2011-5-11)

14 Palani-Rajan Kadapakkam, *Reduction of Constraints on Arbitrage Trading and Market Efficiency: An Examination of Ex-Day Returns in Hong Kong After Introduction of Electronic Settlement*, 2000 available on-line at http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.40.9890&rep=rep1&type=pdf (accessed 2011-5-11)

This is of particular interest given the regulators' penchant for pandering to the mob with minimum holding periods enforced by differential taxation[15] and short-selling bans. One team of researchers[16] found abnormal short-selling around ex-dividend dates, which supported the conjecture[17] that dividend-capture traders tend to drive up prices beyond their fundamental value, which creates an opportunity for short sellers.

Of great interest was a paper by Balasubramaniam et al., who found[18] that while stock prices behaved in accordance with expectations in the twenty days prior to the ex-dividend date, there was significant underperformance in the twenty days following.

Beyond common equity, other markets have been examined. Scott Stickel studied non-convertible preferred shares[19] and found DOR<1, but approaches 1 with increasing liquidity, in contrast with another study performed with data for the period 1974–81, which found[20] DOR > 1. At the time of the latter paper, US corporations could exclude 85% of dividends received from taxable income, while short term capital gains were subject to tax at rates as high as 46%; which made DOR > 1 sensible. Interestingly, a later paper by the latter group[21] found very significant time-variation in the ex-day effect which they were unable to explain by changes in tax code – the most important exogenous explanatory variable they found was the deregulation of NYSE commissions.

One interesting result from this last paper was the apparent confirmation of an earlier assertion[22] that the relative price of dividends is countercyclical: high (DOR > 1) during recessions and low (DOR < 1) during expansions. This paper's conclusions, however, are made suspect by a sampling error: high yield utility stocks largely disappear from the sample in 1982 and reappear in 1986. After correction of this error[23], high-yield stocks are found to have DOR > 1 throughout the entire negotiated commission era.

Another market that has been examined is US municipal bond funds.[24] Since the dividends paid are tax free to US investors, while capital gains remain taxable, the tax-clientele theory predicts DOR > 1, which is confirmed by the data, however the implied capital gains tax rates are unreasonably low. The US Municipal Market is particularly interesting to students of Canadian preferred shares because the markets exist for similar purposes – reduction of tax on regular income – and are both heavily influenced by the behaviour of retail investors.[25]

The Canadian Income Trust market was also studied[26] in a paper to which this essay is indebted for its literature review.

Another method of looking at dividend effects is simply to compare monthly returns: if there is a preference for dividends, then "the presumed tax effect with that yield variable is essentially the average difference in rates of return on those shares that go ex dividend in a given month and those that do not.",[27] but the authors assert that short-term traders will dominate the short-term equilibrium and eliminate the tax effect, attributing any divergence from this rule to transaction costs.

In summary, the picture is murky, hopelessly confused by the investigation of different markets over changing tax regimes with varying degrees of structural constraints on market efficiency – not to mention outright errors. It is clear that there are a variety of market actors at work with varying constraints and goals, and that interplay of their market activity can significantly affect the DOR. I am not convinced, however, that the data can support any precise quantitative estimates of their influence and motivations.

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15 E.g., Australia, as described in Andrew B. Ainsworth, Kingsley Y.L. Fong, David R. Gallagher and Graham Partington, *Institutional Trading Around the Ex-Dividend Day*, 2008, available on-line at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1253282 (accessed 2011-5-11)

16 Benjamin M. Blau, Kathleen P. Fuller, Robert A. Van Ness, *Short Selling around Dividend Announcements and Ex-Dividend Days*, 2009, available on-line at http://faculty.bus.olemiss.edu/rvanness/Working%20Papers/ShortDividend.pdf (accessed 2011-5-11).

17 Lakonishok, J., and T. Vermaelen, *Tax-Induced Trading Around Ex-dividend Days*, Journal of Financial Economics, not available on-line, cited by Blau et al, supra.

18 Vyas Balasubramaniam, William Bertin, Thomas Henker & Laurie Prather, *Dividend drop ratios and tax theory: An intraday analysis under different tax and price quoting regimes*, Bond University 2010, available on-line at http://epublications.bond.edu.au/cgi/viewcontent.cgi?article=1328&context=business_pubs&sei-redir=1#search="dividend+capture (accessed 2011-5-11)

19 Scott E. Stickel, *The Ex-Dividend Behavior of Nonconvertible Preferred Stock Returns and Trading Volume*, Journal of Financial and Quantitative Analysis, 1991, abstract available on-line at http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=4472828 (accessed 2011-5-11)

20 Kenneth M. Eades, Patrick J. Hess, E. Han Kim, *On Interpreting Security Returns During the Ex-Dividend Period*, Journal of Financial Economics, 1984, available on-line at http://deepblue.lib.umich.edu/bitstream/2027.42/24872/1/0000299.pdf (accessed 2011-5-11)

21 Kenneth M. Eades, Patrick J. Hess, E. Han Kim, *Time-Series Variation in Dividend Pricing*, Journal of Finance, 1994, available on-line at http://webuser.bus.umich.edu/ehkim/articles/time-series-jof1994.pdf (accessed 2011-5-11)

22 R. H. Gordon, D.F. Bradford, *Taxation and the stock market valuation of capital gains and dividends: theory and empirical results*, Journal of Public Economics, 1980, not available on-line. Cited by Eades, et al., 1994, supra. Abstract available on-line at http://www.nber.org/papers/w0409.pdf (accessed 2011-5-11)

23 Naranjo et al, 1998, supra.

24 Edwin J. Elton, Martin J. Gruber, Christopher R. Blake, *Marginal Stockholder Tax Effects and Ex-Dividend-Day Price Behavior: Evidence from Taxable versus Non-taxable Closed-End Funds*, available on-line at http://pages.stern.nyu.edu/~eelton/working_papers/tax_effects.pdf (accessed 2011-5-12)

25 E.g., see Bruno Biasis, Richard C. Green, *The microstructure o the Bond Market in the 20th Century*, 2007, available on-line at http://neeo.univ-tlse1.fr/502/1/bondmarket.pdf (accessed 2011-5-12)

26 Nicole Topic, *The Behaviour of Canadian Income Trust Funds During the Ex-Dividend Day Period*, 2006, available on-line at http://ir.lib.sfu.ca/retrieve/3739/etd2387.pdf (accessed 2011-5-12)

27 Merton H. Miller, Myron S. Scholes, *Dividends and Taxes: Some Empirical Evidence*, The Journal of Political Economy, 1982, available on-line at http://89.249.21.76/data/887/126/1231/miller_scholes_-_dividends_1982.pdf (accessed 2011-5-12)

Dividend Capture Funds

Two things will happen as soon as a simple investment strategy is discussed: somebody will think it's the best idea ever, and somebody else will sell him a fund based on that premise.

Dividend Capture funds were the subject of a breathless Business Week article published in April 2007,[28] which touted projected yields of 10%. Four such funds were launched in the first four months of 2007, while five more were waiting in the wings. The article highlighted Alpine Total Dynamic Dividend Fund (AOD), Eaton Vance Tax-Managed Global Diversified Equity Income Fund (EXG) and Eaton Vance Tax-Managed Diversified Equity Income Fund (ETY). Performance figures, with comparisons to the relatively pedestrian SPDR S&P Dividend ETF (SDY) and SPDR S&P International Dividend ETF (DWX) are shown in Table A1.

AOD explains its dividend capture strategy in this way:[29] *The Fund's dividend capture rotation strategy seeks to maximize the level of dividend income that the Fund receives by engaging in dividend capture trading. In a dividend capture trade, the Fund sells a stock on or shortly after the stock's ex-dividend date and uses the sale proceeds to purchase one or more other stocks that are expected to pay dividends before the next dividend payment on the stock being sold. Through this rotation practice, the Fund may receive more dividend payments over a given period of time than if it held a single stock. Receipt of a greater number of dividend payments during a given time period could augment the total amount of dividend income the Fund receives over this period. For example, during the course of a single year it may be possible through dividend capture trading for the Fund to receive five or more dividend payments with respect to Fund assets attributable to dividend capture trading where it may only have received four quarterly payments in a hold only strategy. The use of dividend capture strategies will expose the Fund to increased trading costs and potential for capital loss or gain, particularly in the event of significant short-term price movements of stocks subject to dividend capture trading.*

Table A1: Performance of Some Closed End Dividend Capture Funds

Ticker	AOD[30]	EXG[31]	ETY[32]	SDY[33]	DWX[34]
1-Year (to 2011-3-31)	+10.86%	+9.25%	+6.06%	+13.76%	+13.75%
3-Year (to 2011-3-31)	-9.24%	+1.64%	+2.59%	+5.91%	-1.69%

Note that SDY is an equity fund emphasizing dividend yield holding US instruments; it is shown as a comparator to the other three, which are equity funds emphasizing dividend capture. DWX is a similarly constructed international dividend fund.

While not specified, it appears that the fund makes a point of attempting to capture special dividends,[35] as opposed to regular.

Similar descriptions of dividend capture trading are found in the prospectuses for EXG[36] and ETY.[37]

Mathematical Interlude: Price Behaviour of Instruments with Maturities between Payment Dates

Note that equation (8) of the current derivation is identical to equation (23) in the derivation shown in the June, 2010, edition of this newsletter. My failure to proceed further at that time was due to my missing the approximation $P_{EX}/P \approx 1$, which allows the derivation of equation (11).

The full derivation of the equation showing the expected price behaviour between pay-dates of issues with maturities is shown, including a reprise of the lemma showing the closed form solution of the sum of a series, partly as a convenience to readers and partly because the lemma is my favourite mathematical proof.[38]

[28] Business Week, *Funds for the Dividend Junkie*, 2007-4-16, available on-line at http://www.businessweek.com/magazine/content/07_16/b4030095.htm (accessed 2011-5-11)

[29] Alpine Total Dynamic Dividend Fund, *Prospectus*, 2007, available on-line at http://www.sec.gov/Archives/edgar/data/1379400/000104746907000426/a2175730z497.htm (accessed 2011-5-12)

[30] http://www.alpinecef.com/aod-performance.html (accessed 2011-5-11)

[31] http://individuals.eatonvance.com/fundinforedesign/fundspecific.asp?Type=closedend&fund=EXG#StandardizedPerformance (accessed 2011-5-11)

[32] http://individuals.eatonvance.com/fundinforedesign/fundspecific.asp?Type=closedend&fund=ETY#StandardizedPerformance (accessed 2011-5-11)

[33] https://www.spdrs.com/product/fund.seam?ticker=SDY (accessed 2011-5-11)

[34] https://www.spdrs.com/product/fund.seam?ticker=DWX (accessed 2011-5-12)

[35] Alpine Total Dynamic Dividend Fund, *Annual Report, October 31, 2010*, available on-line at http://www.alpinecef.com/pdfs/AOD/AOD-A10.pdf (accessed 2011-5-12)

[36] Eaton Vance Tax-Managed Global Diversified Equity Income Fund, *Prospectus*, 2007, available on-line at http://www.sec.gov/Archives/edgar/data/1379438/000095013507001012/b63412xxe497.htm (accessed 2011-5-11)

[37] Eaton Vance Tax-Managed Diversified Equity Income Fund, *Prospectus*, 2007, available on-line at http://www.sec.gov/Archives/edgar/data/1340736/000095013506007124/b62570eve497.txt (accessed 2011-5-12)

[38] I still remember learning that back in high school. I thought it was the most magical, elegant thing I'd ever seen! I would like to take this opportunity to emphasize that many entirely normal people have favourite mathematical proofs and regarding one with such affection is not a sign of nerdiness in any way whatsoever.

Let M = price at maturity
P = price of issue on pay date
i = period yield
N = number of remaining coupons
d = dividend per period

$$\text{Then } P = \sum_{n=1}^{N} \frac{d}{(1+i)^n} + \frac{M}{(1+i)^N} \qquad (1)$$

$$\text{Let } r = \frac{1}{(1+i)} \qquad (2)$$

$$\text{Then } \sum_{n=1}^{N} \frac{d}{(1+i)^n} = d \sum_{n=1}^{N} r^n \qquad (3)$$

Lemma:

$$\sum_{n=1}^{N} r^n = r + r^2 + \ldots + r^N$$

$$\frac{1}{r} \sum_{n=1}^{N} r^n = 1 + r + \ldots + r^{N-1}$$

$$\left(1 - \frac{1}{r}\right) \sum_{n=1}^{N} r^n = r^N - 1$$

$$\sum_{n=1}^{N} r^R = \frac{r^N - 1}{1 - {}^1/r} \qquad (4)$$

Substitute (2) into (4)

$$\sum_{n=1}^{N} \frac{1}{(1+i)^n} = \frac{{}^1/(1+i)^N - 1}{1 - (1+i)}$$

$$= \frac{{}^1/(1+i)^N - 1}{-i} = \frac{1 - \frac{1}{(1+i)^N}}{i} \qquad (5)$$

Substitute (5) into (3)

$$\sum_{n=1}^{N} \frac{d}{(1+i)^n} = d \left(\frac{1 - \left(\frac{1}{1+i}\right)^N}{i} \right) \qquad (6)$$

Substitute (6) into (1)

$$P = d \left(\frac{1 - \left(\frac{1}{1+i}\right)^N}{i} \right) + \frac{M}{(1+i)^N} \qquad (7)$$

and note that

$$\lim_{N \to \infty} P = \frac{d}{i}$$

which is correct

From (7)

$$i\,(1+i)^N P = d\,(1+i)^N \left(1 - \frac{1}{(1+i)^N}\right) + Mi$$

$$= d\,(1+i)^N - d + Mi$$

Now apply the first exponential approximation, which states that $(1+x)^y \doteq 1+xy$ for small x

$$i\,(1+Ni)P = d \bullet (1+Ni) - d + Mi$$

$$= d + dNi - d + Mi$$

$$= dNi + Mi$$

$$P(1+Ni) = dN + M$$

$$1 + Ni = \frac{dN + M}{P}$$

$$Ni = \frac{dN + M - P}{P}$$

$$i = \frac{d}{P} + \left(\frac{1}{N}\right)\frac{M - P}{P} \qquad (8)$$

Now let
g = number of days in each period
b = number of days until next pay date

If no dividend is received on the next paydate, then the price is P_{EX} and

$$P_{EX} = \frac{P}{(1+i)^{b/g}} \qquad (9)$$

Apply the first exponential approximation to (9) and then

$$P_{EX} = \frac{P}{1+ib/g}$$

$$\left(1 + \frac{ib}{g}\right) P_{EX} = P \qquad (10)$$

Now substitute (8) into (10)

$$\left[1 + \frac{b}{g}\left(\frac{d}{P} + \left(\frac{1}{N}\right)\frac{M-P}{P}\right]\right. P_{EX} = P$$

$$P_{EX} + \frac{b}{g}\left(\frac{d}{P} + \left(\frac{1}{N}\right)\frac{M-P}{P}\right) P_{EX} = P$$

$$P - P_{EX} = \frac{b}{g}\left(\frac{d}{P} + \left(\frac{1}{N}\right)\frac{M-P}{P}\right) P_{EX}$$

$$= \frac{b}{g}\left(d + \left(\frac{1}{N}\right)(M-P)\right)\frac{P_{EX}}{P}$$

and assuming $\frac{P_{EX}}{P} \approx 1$

then

$$P - P_{EX} = \frac{b}{g}\left(d + \left(\frac{1}{N}\right)(M-P)\right) \qquad (11)$$

Equation (11) describes the predicted price behaviour of the instrument when the first dividend is not paid.
If the first dividend is received, then the applicable price is P_{CUM} and

$$P_{CUM} = P_{EX} + \frac{d}{(1+i)^{b/g}}$$

On the ex-dividend date, we define b=x and

$$DOR = \frac{P_{CUM} - P_{EX}}{d} \qquad (12)$$

$$= \frac{P_{EX} + \frac{d}{(1+i)^{(x+1)/g}} - P_{EX}}{d} \qquad (13)$$

$$= \frac{1}{(1+i)^{(x+1)/g}} \qquad (14)$$

Note that equation (12) is not quite right because P_{CUM} should be measured at date x+1, while P_{EX} should be measured at date x. Thus, the two P_{EX} shown in equation (13) are not equal; they will differ as shown by equation (11).

The derivation of a more precise equation for DOR is left as an exercise for the student.

Equation (14) can be used to derive theoretical DORs, which will apply in a perfectly efficient market that maintains a constant pre-tax yield for all instruments. Sample calculations are shown in Table A2

Table A2: Calculation of Theoretical DORs for Representative FixedReset Issues

Days between Ex-Date and Pay-Date	Theoretical DOR
20	99.2%
28.8	98.9%
40	98.5%

Calculations are performed according to Equation (14) of the text. The market yield-to-maturity, i, is set to 3.50%. The period between pay-dates, g, is set to 91. The days between the Ex-Date and the Pay-Date, x, is set to a minimum of 20 days (BMO issues in August, 2009) and a maximum of 40 days (SLF issues in May, 2010). The average x for all issues in the sample (see below) is 28.8 days.

Dividend Capture for FixedReset Preferred Shares: Monthly Performance

Readers of this newsletter will be aware of my observation[39] that Current Yield (the annual dividend divided by the price) serves as an excellent explanatory variable for the relative pricing of FixedReset issues. This explanatory power is monitored in every edition in the regular appendix reviewing the state of this market and retains its credibility as the basis for a pricing model of the FixedReset universe.

Readers all also doubtless aware that Current Yield is a very poor predictor of relative returns over longer time periods[40] which may include a redemption option for the issuer or, perhaps, merely the existence of redemption options for other issues which may serve to focus the market's attention on the potential for calls.

There are two reasons for this:

- Current Yield does not allow for the realization of a capital gain or loss when the issue is retracted or redeemed in accordance with its terms
- Current Yield does not allow for the influence of the proximity of the ex-Dividend date[41] which can have a significant effect on price (and therefore true yield) depending on the length of the period until the next ex-Dividend date (see the June, 2010, edition of this newsletter)

It is the second flaw that will be discussed in this section, as alert readers may have gleaned from the introductory work on dividend capture. If Current Yield serves as an explanatory variable for pricing at every month-end, then it seems apparent that the question of whether the issue pays a dividend in the month before or after is not considered relevant by the market – or, at the very least, is considered only to such a degree that this consideration is lost in the noise of routine fluctuations in market price.

[39] Primarily in the March, 2009; June, 2010; and August, 2010, editions of this newsletter.

[40] See my article *A Call, too, Harms*, Advisors' Edge Report, June, 2006, available on-line at http://www.himivest.com/media/advisor_0606.pdf

[41] For a review of relevant dates for dividend payments, see my article *Dividends and Ex-Dates*, Canadian Moneysaver, September 2006, available on-line at http://www.himivest.com/media/moneysaver_060901.pdf

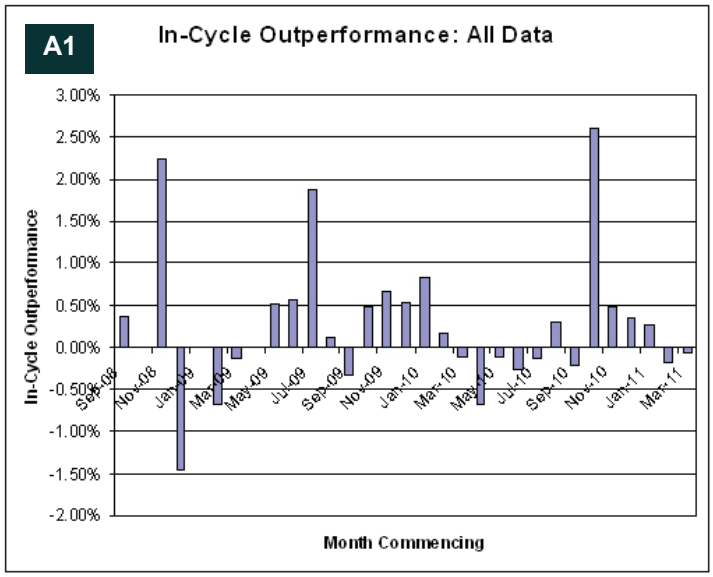
This in turn implies that excess returns can be earned by rebalancing one's portfolio at every month end to concentrate on issues which pay a dividend in the following month. We recognize that transaction costs may ruin this strategy. In the December, 2009, edition of this newsletter I examined naïve hedge funds in the Canadian Preferred Share Market and concluded that an informed policy of trading on price reversion with a 45-day time-horizon could be profitable, even after transaction costs – but transaction costs took a lot of the fun out of the game!

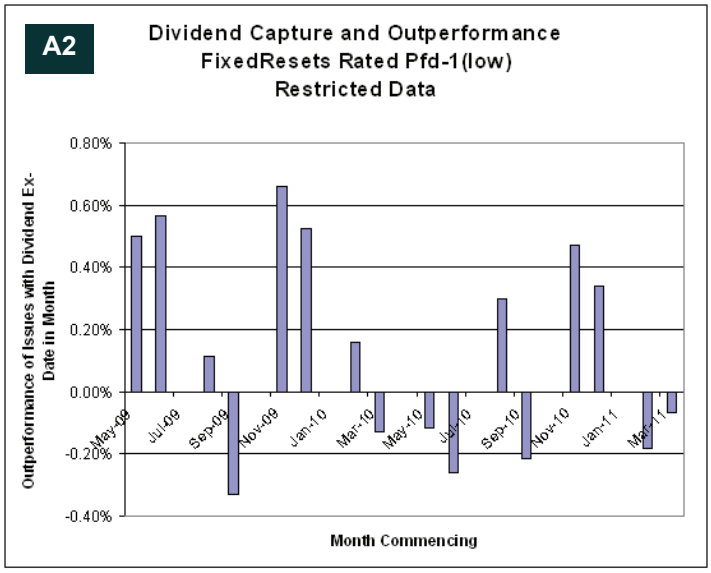
Nevertheless, it seems worthwhile to test this hypothesis. Accordingly, the thirty-seven FixedReset issues that are currently[42] rated Pfd-1(low) were examined on month-ends commencing 2008-9-30 (when there were nine such issues outstanding) and 2011-3-31 (when the full sample of thirty-seven issues was present). The total return for the following month was calculated and the data was sorted according to whether the issue went ex-dividend in that month.

The distribution of dividend cycles for the full sample is shown in Table A3. As only two issues have ex-Dividend dates in the cycle February/May/August/November (SLF.PR.F and SLF.PR.G), this cycle represents a special case, as the results are very sensitive to issue-specific and issuer risk.

Table A3: Distribution of Sampled Issues by ex-Dividend Date Cycle	
Jan/Apr/July/Oct	23
Feb/May/Aug/Nov	2
Mar/Jun/Sept/Dec	12

For every month during the period, the mean performance of the "out-of-cycle" issues (those that did not go ex-dividend during the month) was subtracted from the mean performance of the "in-cycle" issues. Individual issues were weighted equally, with no adjustments being made for shares outstanding or Average Daily Trading Value. Results are shown in Chart A1.





For the entire period, the mean outperformance of in-cycle issues (weighting all months equally) was +0.25% (standard deviation 0.81%)., while the period commencing 2009-4-30 (which measures relative performance during May, 2009) shows an average of +0.31% (standard deviation 0.70%) The cut-off date of 2009-4-30 was chosen as being the start of the period at which the pricing model based on current yield has a significant degree of explanatory power – I have been unable to determine any satisfactory model explaining relative prices in prior periods.

When the data are restricted to the effective period described above and the ex-Dividend date cycle commencing in February is ignored, we find that the mean outperformance is +0.15% (standard deviation 0.34%), with data plotted in Chart A2. It will be remembered that these figures refer to monthly values; if it were possible to earn a monthly increment of 15bp, the annual outperformance would be +1.80%. Additionally, a glance at the data indicates the possibility of a seasonal effect, as outperformance of in-cycle issues has been stellar in the both the November/December periods (which correspond to performance in December/January) for which data exist.

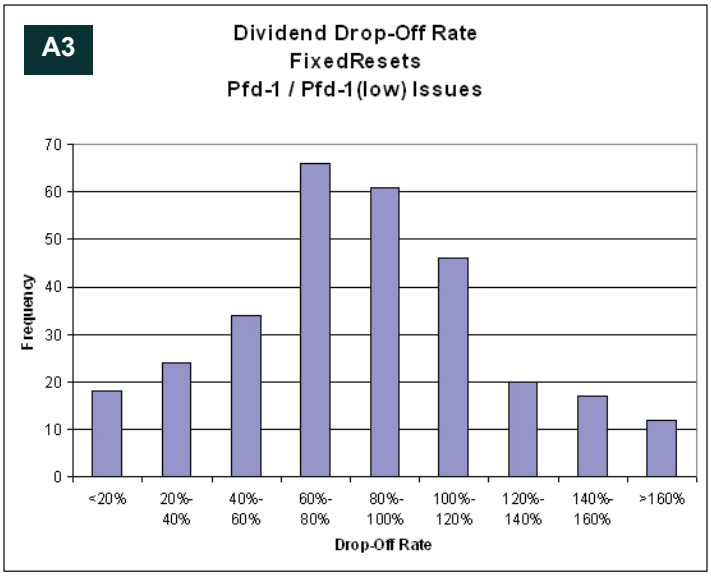
[42] I recognize that the sample definition introduces some sampling bias into the data, since MFC was at one point a member of this group but is not currently included. I consider this to be a minor defect.

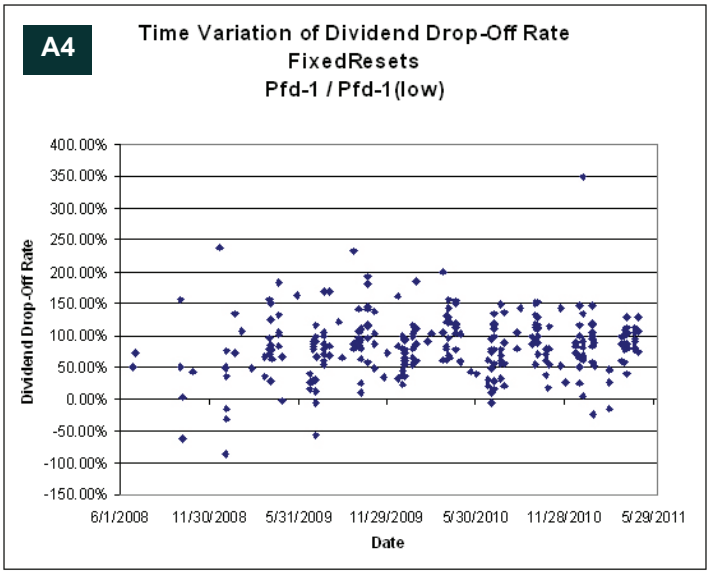
Dividend Capture for FixedReset Preferred Shares: Drop Off Ratios

Another way to examine the effects of ex-Dividend dates is to consider Drop Off Ratios which, of course, focus on a single day's performance rather than the full month as investigated above. Accordingly, the 298 dividend ex-Days for the 37 issues were examined and the DORs calculated.

Calculation of the DOR in Canada does not allow any but the most optimistic researchers to distinguish between the tax clientele and short term traders effects, since individuals are taxed on dividends and capital gains at very similar rates. Using generic marginal rates provided by Ernst & Young[43] we may derive theoretical DORs of 97% for BC investors and 94% for those in Ontario, a far cry from the 78% inferred in the original Elton & Gruber paper.

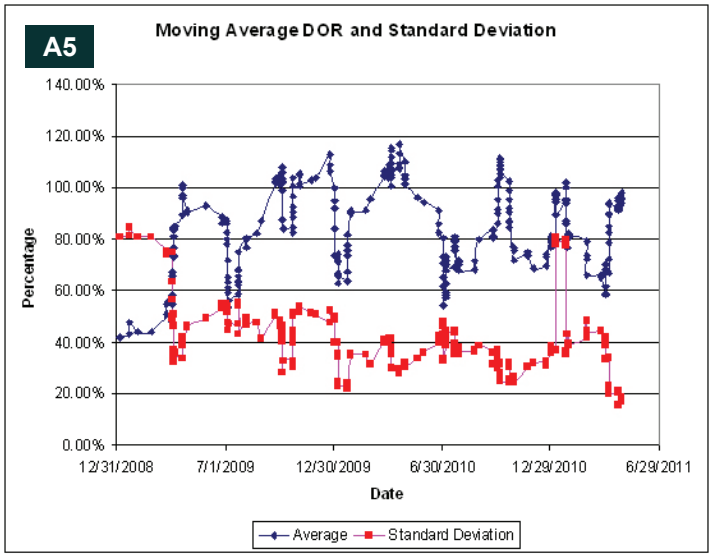
The DORs range from -86.40% (BNS.PR.Q in January, 2009) to +349.09% (PWF.PR.P in January, 2011) and are distributed as shown in Chart A3. The mean is 84.3% with a standard deviation of 46.4%.

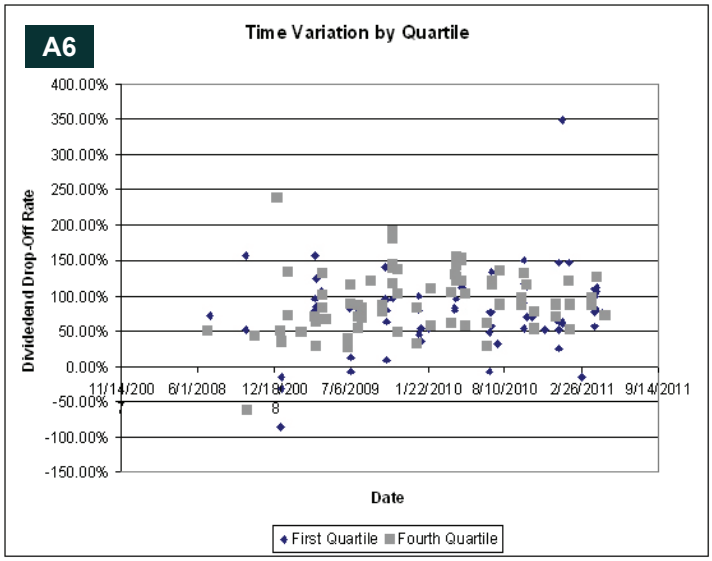




It is of great interest to learn whether there is any time variation in the data; the raw data are shown in Chart A4, but the only discernable patter is that there may be some reduction in the variability of the DORs over time. There are insufficient data for any meaningful statistical tests of this hypothesis, but Chart A5 shows the rolling 15-dividend average and standard deviation through the period. This is not a particularly good measure, since each issue's dividend is considered a data point; thus each average and standard deviation will contain a widely varying proportion of issuers, particularly when the ex-dividend dates for large issuers such as RY and TD (each with eight issues currently examined) are included in the sub-sample – these are the vertical lines plainly apparent in the graph. However, there does seem to be some support for the idea that the market is becoming more consistent in its treatment of ex-dividend days.

Finally, the data were separated into quartiles by dividend amount, to determine if any patterns could be discerned based on these data – the Short-Term Traders hypothesis of Dividend Capture theory implies that arbitragers will be more active with respect to larger dividends than smaller. However, this idea does not appear to be supported for this market by the data shown in Chart A6.





[43] see http://www.ey.com/CA/en/Services/Tax/Tax-Calculators-2011-Personal-Tax

Potential Data Problems

As I have always stressed when writing these essays, any quantitative investment data and theory derived from these data must be carefully examined for embedded assumptions – those assumptions made in the course of the analysis that are not immediately obvious when examining the theory.

One of the assumptions embedded in the preceding discussion of dividend capture in the FixedReset sector has been that the bid prices used in the determination of monthly returns and the DOR are accurate reflections of the market, but this is not necessarily the case. Figures released at the end of the day by the TMX to websites such as Yahoo Finance, services such as Bloomberg[44] and its own DataLinx service are not the "closing price" but are actually the "last price".

The two prices differ through the effects of the Extended Trading Session; during the Extended Trading Session:

- Orders on the books as of the close may be cancelled
- New orders may not be entered at any price other than the Last Sale Price

The potential for differences, particularly in a thin market, was well illustrated by the case of GWO.PR.J on December 2, which traded 2,831 shares in a range of 27.41-64 and for which the TMX reported a "Last Quote" of 24.81-27.54, 4x9. – a bid-offer spread of nearly three dollars!

After I complained about the shoddy market, I was informed that the closing quote was actually 27.04-54; the bid for 27.04 had been cancelled during the Extended Trading Session.[45] Now, as it happens, December 2 was neither the ex-date nor the last cum-date for GWO.PR.J, but it should be apparent that the calculated, "Last", DOR would have been wildly different from the "Closing" DOR had either of those possibilities been realized.

In response to my complaints and suggestion that the TMX make the Closing quotes available for purchase through their DataLinx service (through which the Last quotes are made available), the TMX surveyed its customers and reported that there was "limited interest from our clients with respect to the 4:00 PM closing bid/ask information"[46] although they do intend to add these data to their offerings at some time in the future.

It would be most interesting to learn just who, precisely, answered the survey on behalf of the TMX customers. Financial statements which include securities must be valued at "Unadjusted quoted prices in active markets for identical assets or liabilities" in order to be ranked as Level 1 (the most reliable) line items[47] and my reading of the definition of an "active market"[48] indicates that the Extended Trading Session cannot be regarded as such. It is unclear whether the actual respondents to the survey queried their own customers, the investment managers and accountants reliant on these data to prepare accurate financial statements.

One way or another, it should be apparent that the "Last" quotes have no independent value whatsoever: their value is entirely dependent upon their accuracy in reflecting the "Closing" quotation.

With the exception of activity within the Extended Trading Session that increases the bid price from the closing bid to the Last Sale Price, any changes in the reported bid will be as the result of cancellations of orders on the books at the close and thus the reported bid, if different, will (almost) always be lower than the Closing bid – sometimes by a substantial amount, as noted with GWO.PR.J on December 2.

If these inaccurate data are used to calculate DORs (which they may have been, perforce, in the data discussed in this essay) and represent the last cum-dividend date, the DOR will be inaccurately low; if they are for the ex-dividend date, the DOR will be inaccurately high. In total, the refusal of the TMX to publish Closing quotations in a cost effective[49] manner will lead to higher variability of calculated values. This is exacerbated, of course, by the fact that the quotation tick size of one cent is relatively large compared to dividend amounts.

The Dividend Capture Optimizable Parameter in HIMIPref™

Dividend Capture has been recognized as an element of preferred share valuation by my analytical software, HIMIPref™ since inception and is calculated as:[50]

REWARD_COMPONENT_SPOT_DIVIDENDCAPTURE = (100 / "price") * accruedDividendFlatValue * "dividendCapture" * priceVolatilityScalingFactor

It is a small component of "Reward", but by no means insignificant, as indicated by Table A4 and Chart A7.

The calculated R-squared of 0.14 overstates the importance of the dividend capture parameter as there is a high degree of confounding amongst the twenty-three components of 'Reward' in the analysis. For example, if current yields are kept constant (or at constant relationships, as is the case with FixedResets) then properly calculated yields will be positively correlated with dividend capture – and yield is an important element of total valuation. No attempt has ever been made to orthagonalize the components of valuation in HIMIPref(TM).

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[44] See my blog post *More on the TMX Last != Close*, on-line at http://www.prefblog.com/?p=13796

[45] See my post *TMX DataLinx: "Last" != "Close"*, on-line at http://www.prefblog.com/?p=13456

[46] See my post *TMX to Report Closing Quotes … Someday*, on-line at http://www.prefblog.com/?p=14625

[47] Price Waterhouse Coopers, *The new financial instruments disclosures: Recent amendments to CICA 3862, Financial Instruments – Disclosure*, May 2009, available on-line at http://www.pwc.com/en_CA/ca/investment-management/publications/financial-instruments-disclosures-2009-05-en.pdf (accessed 2011-5-14)

[48] CICA Handbook] Para. 3855.A44, cited by CICA *Financial Reporting by Investment Funds, Draft Discussion Paper on a Key Issue*, available on-line at http://www.cica.ca/research-and-guidance/research-activities/activities-in-progress/accounting/item12691.pdf (accessed 2011-5-12)

[49] It is possible to get a report of all changes in quotations from TMX DataLinx for a specified period. However, the minimum time increment is one second and there could be literally thousands of quote changes within this period, making purchase of the data extremely costly. If, on the other hand, there are no quotation changes in the specified period, no data is returned and a new time increment must be selected.

[50] HIMIPref™ Glossary, *dividendCapture*, available on-line at http://www.prefshares.com/glossary.html#dividendCapture

Table A4: Results of Regressing Trading Valuation vs. Dividend Capture Contribution on HIMIPref™ "Portfolio" valuation, 2011-5-13	
Credit Class 1 Regression Line	15.2 +/- 37.9
Credit Class 2 Regression Line	9.1 +/- 35.0
Credit Class 3 Regression Line	7.3 +/- 35.5
R-Squared	0.14
F Statistic	8.15
Observation Count	201
Rejection Threshold	3.0 Standard Deviations
Rejection Count	2

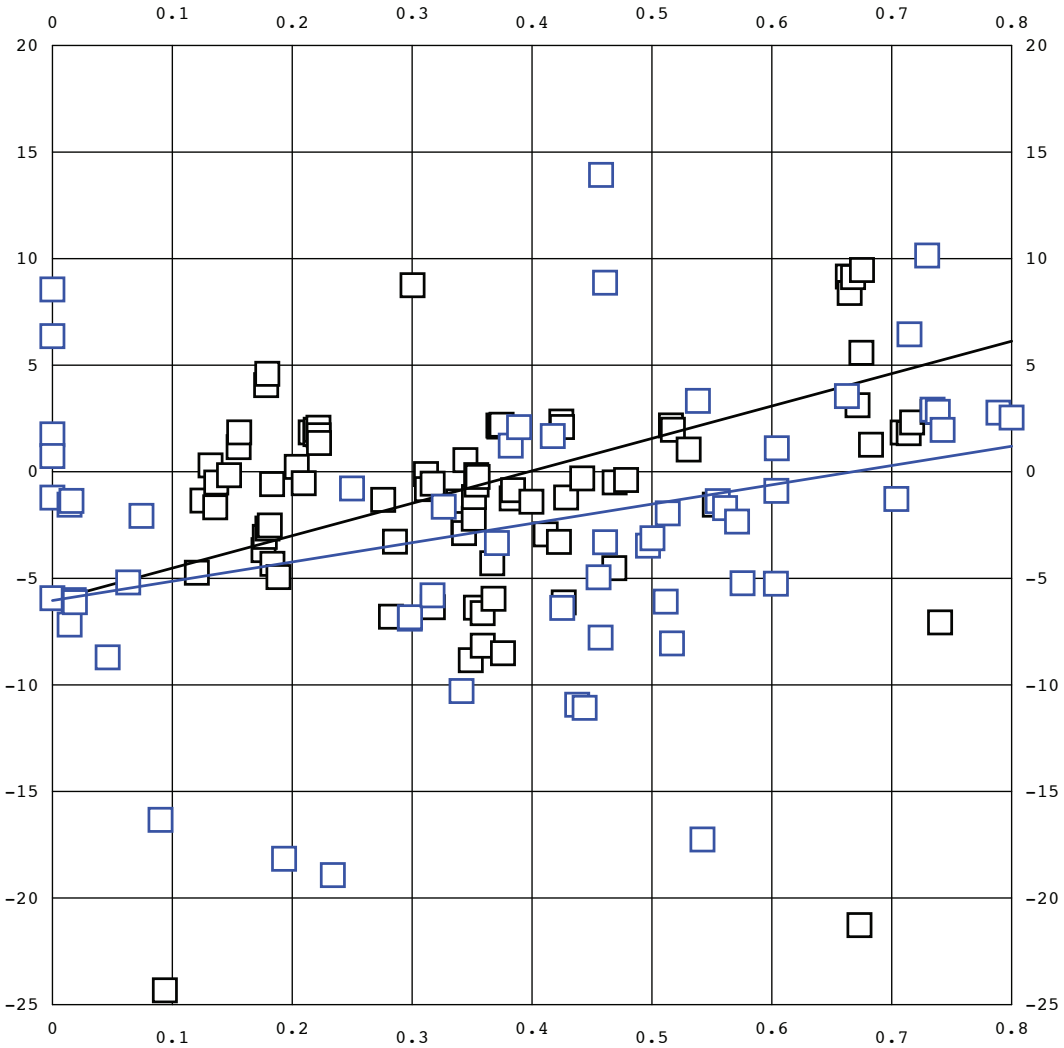
A7

Universe Properties as of 2011-05-13 (Purchaseable)

Tax Identifier: 13

Credit Class One
Credit Class Two

X-Axis: Bid valuation - dividend Capture
Y-Axis: Trading Valuation (Bid)



An Example of Dividend Capture

Perhaps the greatest value of the concept of dividend capture in the Canadian preferred share market is the fact that the variability of the values found is so high. To take a very recent example, consider the activity shown by the various MFC issues when their issues went ex-dividend on May 13, 2011, as listed on Table A5.

The most important result is that the DORs are highly variable, irrespective of their absolute values. While I have not done any quantitative work to test the hypothesis in a quantitative manner, is has been my observation that trading opportunities abound on ex-dividend dates, as each issue will have a different mix of dividend capturing traders and dividend avoiding players.

In fact, I was able to execute a small trade within the MFC issues for one account under management on 2011-5-13 at better than the reported bid-to-bid levels as the two quotations lined up for just long enough for a trade to be triggered by the relative valuations and executed. A small trade, but as I always say, the cash is better off in my clients' pockets than anywhere else, even if it's only a few dollars!

Table A5: DOR Calculations for MFC Issues, 2011-5-13

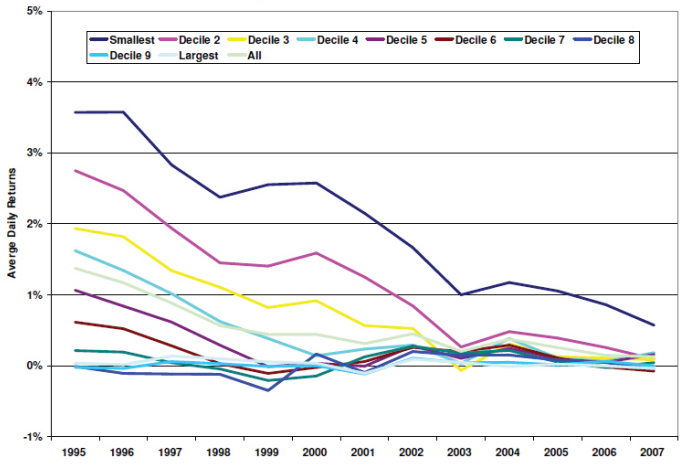
Issue	Last Cum-Dividend Bid	First Ex-Dividend Bid	Dividend	DOR
MFC.PR.A	25.65	25.55	0.25625	39.02%
MFC.PR.B	22.14	22.15	0.290630	-3.44%
MFC.PR.C	21.50	21.45	0.281250	17.78%
MFC.PR.D	27.51	25.37	0.41250	33.94%
MFC.PR.E	26.87	26.73	0.35	40.00%
MFC.PR.F	25.11	25.11	0.2877	0.00%

Investment Conclusions

It seems to me that the arguments emphasizing short-term traders as an explanation for equity behaviour on ex-dates are more convincing than those arguing for the tax-clientele theory; but I do not believe that the data will support any quantitative explanations. Qualitative observations of the existence of both elements (e.g., Closed End Funds set up with the explicit purpose of dividend capture; Corporate treasurers choosing retirement when a tax-arbitrage programme goes wrong) are, I think, the best we will ever get.

I was most impressed by the evidence from the Hong Kong market proffered by Kadapakkam (discussed in the introduction) regarding the change in the DOR following the conversion of settlement from paper-based to electronic, but regard market microstructure arguments to be merely as subset of the Short-Term Traders explanation.

A8 Average Daily Returns of Contrarian Trading Strategy By Year and Market-Capitalization Deciles, 1995 to 2007



It would, however, be most interesting to revisit the results of the naïve hedge funds with contrarian investment strategies[51] with an eye to disaggregating the data according to ex-date proximity. Chart A8 shows steadily increasing equity market reversion on a day-to-day basis over the decade prior to 2007 and – if the disaggregated data reflect the aggregate data – would seem to indicate that DORs are now very close to one. In other words, whereas tax-clientele traders might have given arbitrageurs opportunities in the 1980's, the situation is now reversed, to the benefit of those trading highly liquid stocks for tax-impacted dividend-capture purposes!

Ex-Date effects have been shown to be important when considering relative monthly returns for FixedReset issues, but the effect is too small to overcome transaction costs – the most important being the bid/ask spread – for most market participants. However, only a fool would trade on a single strategy. Dividend Capture is a small but useful adjustment to valuation and may, from time to time, sway the balance between trading and walking away. The variability of DORs suggests that market participants should be particularly vigilant when checking for trades near, and particularly on, the ex-Date.

Market efficiency is key; and in addition to the Hong Kong evidence, there is also the US experience of the result to the end of fixed commissions. There is reason to believe that Section 260(6) of the Income Tax Act[52] decreases the efficiency of Canadian equities markets by making it very expensive to be short on an ex-dividend day.

[51] Amir E. Khandani and Andrew W. Lo, *What Happened To The Quants in August 2007?*, available on-line at http://web.mit.edu/alo/www/Papers/august07.pdf (accessed 2011-5-14)

[52] see http://laws-lois.justice.gc.ca/eng/acts/I-3.3/page-462.html#s-26