APPENDIX D

DISCOUNTED CASH FLOW ESTIMATES

The DCF Model

The standard alternative to risk premium models is the discounted cash flow model. This model infers the required rate of return by replicating the actions of an investor in valuing the firm's securities. To do this we need to define the costs and benefits attached to an investment. The cost is simply the price of the security (P_0, price at time zero) and the benefits the stream of cash inflows expected at time t in the future (C_t). However, since the investor can always invest in alternative investments, future expected cash flows are not of equal value. As a result future cash flows are "discounted," or reduced in value, to reflect this "opportunity cost." This is the basic idea behind using the discounted cash flow model,

$$P_0 = \sum_{t=1}^{\infty} \frac{C_t}{(1+K)^t}$$

where K is the discount rate or investor's required rate of return.

Once we estimate the stream of future cash inflows, we can equate them to the current price and solve for the investor's required rate of return. For example, this is the standard way of valuing bonds. At the end of every business day investment banks simply take the coupon payments on a bond and its terminal value, and use the last trading value for the bond to solve the above equation for the bond's "yield to maturity." This yield to maturity is then published in the newspaper as an objective measure of the investors' required rate of return for a default free security. I already use this DCF estimate as part of my risk premium estimates. However, we can take this a stage further and estimate the DCF required return on equity directly using this same procedure.

The expected equity cash flows are the future expected dividends. Unlike the stream of cash flows on a bond the dividends are not contractual and are more difficult to forecast, particularly for individual stocks. Consequently the DCF model is only used for low risk dividend paying stocks or the market as a whole, where the expected dividends can be assumed to grow at some long run average growth rate g. In this case, each dividend is expected to grow at the rate g, so we can substitute $d_1 = d_0 * (1+g)$ into the valuation equation. If this growth rate is assumed to be constant *forever* we get:

$$P_0 = \frac{d_1}{K - g} \qquad (1)$$

where the stock price is equal to the expected dividend per share, divided by the investor's required rate of return, minus the dividend growth expectation, g. The advantage of this formulation of the problem is that we can easily rearrange the equation to obtain,

$$K = \frac{d_1}{P_0} + g \qquad (2)$$

which states that the investor's required rate of return can be estimated as the expected dividend yield plus the expected growth rate in dividends. This is the direct analogy with the yield to maturity on a bond. This formulation of the model is often called the Gordon (or dividend discount) model after my late colleague Professor Myron Gordon of the University of Toronto.

Further it is straightforward to show that increased dividends primarily come from increased future earnings, which are generated by the firm retaining some of its current earnings for re-investment. If we set X as the earnings per share and denote b as the fraction of earnings retained within the firm, then $(1-b)X$ is the dividend and bX, the retained earnings.[1] Provided the assumptions of the DCF model hold, it is straightforward to show that dividends and earnings will then grow at a long run growth rate estimated as the product of the firm's retention rate (b) and its return on common equity (r), which is referred to as it sustainable growth rate. Note that while K is the return that investor's

1 This assumes that the only change in shareholder's equity comes from retentions, that is, everything flows through the income statement.

require, r is the actual return on equity (*ROE*) the firm is expected to earn.[2]

An example may help to make these assumptions clear. Suppose, as in Schedule 1, the firm's book value per share is $20 and its return on equity expected to be 12%. In this case, its earnings per share are expected to be $2.40 and with a 50% dividend payout rate, its dividends per share and retained earnings are both expected to be $1.20. Moreover, since $1.20 has been retained and reinvested within the firm, next period's book value per share increases to $21.20. As a result, the firm is expected to earn $2.544 in the following year, i.e., 14.4 cents more. This additional 14.4 cents comes from earning the 12% return on equity on the $1.20 of retained earnings. The increase in earnings per share, dividend per share and retained earnings is 6% each year and is calculated directly as the product of the firm's return on equity of 12% and its retention rate of 50%. Moreover, the value of the firm's common stock can be calculated from equation (1), which also increases at this 6% rate, since only the dividend per share is expected to change.

The importance of Schedule 1 is in showing some of the implications of the dividend growth model. First, note that if the investor's fair rate of return is 10%, the stock price in Schedule 1 is $30, determined as the expected dividend of $1.20 divided by the discount rate minus the growth rate (or 0.04). This price exceeds the book value of $20 by 50%. This is because the firm's return on equity (*r*) is 12% and the investor's required or fair rate of return (*K*) is only 10%. This is the reason why economists look at market-to-book ratios to infer the investor's opportunity cost. If market-to-book ratios exceed one for a regulated company, most economists immediately assume that the firm's return on equity exceeds the return required by stock holders, implying that the regulator should <u>lower</u> the firm's allowed rate of return. In our example the *ROE* exceeds the required rate of return by 2% which results in a market to book ratio of 150%.

Second, it is the return on equity that drives the growth in both dividends per share and earnings per share, <u>provided</u> that the dividend payout is constant. If the dividend payout is gradually increased over time, then it is possible to *manufacture* a faster growth rate in dividends than earnings per share,

2 There is an additional term if the firm repeatedly sells shares at a premium to its book value, but this term is small and usually dwarfed by estimation problems.

from the same underlying level of profitability.

For example, in Schedule 2 the same data is used as in Schedule 1 except that the dividend payout starts at 50% and then increases by 2% per year. By the end of year 5 earnings per share have only risen to $2.99 instead of the $3.03 in Schedule 1, because less money has been reinvested within the firm. As a result, there is less capital to generate earnings. Thus the earnings in Schedule 2 only grow at a 5.6% compound growth rate, down from the 6% of Schedule 1. Conversely, since more of the earnings are being paid out as dividends, dividends per share are up to $1.73 instead of $1.52. This is a 9.6% compound growth rate, rather than the 6% in Schedule 1.

In the short-run, Schedule 2 demonstrates that the growth in dividends per share can be artificially manipulated by increasing the dividend payout. This is not sustainable in the long run, since the dividend payout cannot be increased indefinitely. Moreover, the manipulation can be detected by performing the basic 'diagnostic' check of tracking the behaviour of the firm's dividend payout over time, and the firm's return on equity. However, if the analyst is not aware of the change in the dividend payout, estimating the fair rate of return by adding this manipulated dividend growth rate to the expected dividend yield will overstate the investor's required rate of return. It is important in this case to base the estimate of the investor's required rate of return on a long run sustainable growth rate, estimated from the underlying growth in earnings and dividends and the two components of growth.

The third implication of Schedule 1 is that the DCF estimate using the historic growth rate is appropriate only when the assumptions of the model hold. This means that non-dividend paying firms, firms with highly fluctuating earnings and dividends, and firms with non-constant expected growth cannot be valued accurately using the formula. Usually these assumptions hold for regulated utilities, so the DCF estimate is particularly appropriate for use in determining the fair rate of return for a regulated utility. However, for non-regulated firms, these assumptions are frequently violated. As a result, estimating the investor's required rate of return by using the formula $K=d_1/P_0 + g$, is tenuous and subject to significant measurement error.

Finally, it is important to understand the assumptions underlying the DCF model. In particular equation (2) follows directly from equation (1). So if equation (1) does not hold, then neither does equation (2). In particular, it has to be remembered that the growth rate is a constant rate forever. This naturally puts bounds on the growth rate, since if the growth rate exceeds the long run growth rate in GDP then it means that each year the firm is becoming a larger slice of GDP and eventually it will dominate the economy. With real GDP growth of 2.5-3.5% and the Bank of Canada's long run inflation target of 2.0%, any long run growth rate for a particular company greater than 4.5-5.5% is by definition incompatible with the assumptions of the DCF model. So a forecast five year growth rate of 10% for example cannot be used with the DCF model, instead a two stage growth model is needed at a minimum.

For example, suppose security analysts forecast a five year growth rate for utility X of 10% and it currently has a 4% dividend yield. Using equation (2) would indicate a DCF cost of equity capital of 14.4% which is the 4.4% expected dividend yield plus the 10% growth rate. However, recognising equation (1), and the fact that the economy can only grow at a maximum of less than 6.0%, means that the DCF model cannot be used. In this case, we would use 10% for the dividend growth rate for the next five years, adjusted for analyst optimism, and then after five years a long run growth rate for a typical utility with a maximum growth rate that of the economy. If for example we use the 10% five year growth rate and a long run growth rate of 3% the actual discount rate is 9.10% or just over half the DCF estimate. It exceeds the 7.3% we would get from the forecast dividend yield plus the long run growth rate of 3% because there are more dividends over the next five years, so the discount rate is higher to bring their value down to equal the current stock price.

		1	2	3	4	5
Dividend		4.40	4.84	5.32	5.86	6.44
Price at t=5						122.81
Total cash		4.40	4.84	5.32	5.86	129.25
PV Factor		0.92	0.84	0.77	0.71	0.65
PV Cash	100.00	4.03	4.07	4.10	4.14	83.66

The important insight from the above discussion is that not any forecasted growth rate can be substituted into the DCF model to estimate the equity cost, even if that growth rate forecast is valid. For example, a utility holding company may have significant losses and the security analyst might then expect a rapid recovery and significant short run growth. However, this means using the two stage growth model since the standard DCF model will over-estimate the equity cost in the way just discussed.

Circularity

When we apply the DCF model to estimate a fair return we estimate the dividend yield and future growth rate. In the example in Schedule 1 the dividend is forecast to be $1.20 which with a $30 stock price means a 4% dividend yield. When this is added to the sustainable growth rate of 6% we get back the investor's fair rate of return of 10.0%. However, it is sometimes alleged that this DCF estimate is circular, since the ROE used to forecast the future growth rate of 12% differs from the investor's required or fair rate of return estimated at 10%. The allegation is that if a regulatory body were to accept the 10% estimate and reduce the allowed ROE then future growth will drop and with it the stock price. As a result there is an inconsistency between the forecast ROE and the DCF fair return estimate. However, this inconsistency or circularity is false.

Note that there will always be a difference between the forecast ROE and the investor's fair return, whenever the market to book ratio differs materially from 1.0.[3] However, this does not affect the estimate produced by the DCF model. Suppose for example the ROE was decreased to 10%, after the fair return is correctly estimated at 10% using the DCF model, what happens? In this case the forecast earnings per share drop to $2 from $2.40 and with the same 50% payout the dividend is cut to $1.0 and the forecast growth rate drops to 5% (50% retention times the 10% ROE). The stock price will then also drop and using the same DCF equation the market price will fall back to its book value of $20.

3 We see this every day in the bond market where a bond selling above (below) par has a stated coupon interest rate higher (lower) than the current market interest rate.

$$P_0 = \frac{\$1}{0.10 - 0.05} = \$20$$

However, at the new price the dividend yield now increases to 5% ($1/$20) so that with the new lower growth rate of 5% we again estimate the investor's fair return accurately at 10%.

Investors will be far from happy that the allowed ROE has been cut from 12% to 10%, but that does not invalidate the use of the DCF model to estimate their fair or required rate of return of 10%. Similarly, if the regulator for some reason increases the allowed ROE to 14% then the dividend would increase to $1.40 and the forecast growth to 7%. In this case the stock price would increase to $46.67 and the dividend yield drops to 3.0%, so again the dividend yield plus growth correctly estimates the investor's fair rate of return of 10.0%.

The fact is that the DCF model simply reverse engineers the forecast cash flows to extract the investor's fair rate of return; it says nothing about whether or not the investor would be happy if the firm earned that rate of return on its book value. Further proponents of this circularity argument often apply the DCF model based on analyst growth estimates and yet these same analysts have to get their forecast growth rates from somewhere and invariably they are based on future profitability, that is ROEs. Moreover, even if they are not explicitly based on a forecast ROE, one is always implicit in a growth forecast. For example if an analyst's growth forecast of 7% is used, then with a 50% dividend payout this means by definition the analyst is forecasting an ROE of 14%. ***It is impossible to ignore the result that any forecast growth rate carries with it a forecast ROE.***

DCF Estimates for the "Market" as a whole

In terms of DCF estimates we can go from the broad to the specific. By broad I mean the market as a whole, since by holding a diversified portfolio an investor reduces the possibility of gains from one firm resulting from losses by another. In Schedule 3 is a graph of the dividend yield on the TSX Composite along with the yield to maturity on the long term Canada (LTC) bond (Cansim V122501). At the end of September 2012 the TSX dividend yield was 3.00%, while the LTC yield (over tens) was 2.31%, which is somewhat unusual, since you have to go back to the mid 1950's for a similar situation. However, what we have in common with the mid 1950's is a period of low inflation, as shown in Schedule 4, with, as currently, a fear of lower inflation in the future; what is now needed is a forecast growth rate for the Canadian market.

In Schedule 5 is a graph of the after tax profits and dividends earned and paid in Canada from the GNP accounts back to 1961. In both cases they are scaled by GDP. The after tax profits are those reported for tax purposes and do not reflect the accounting games that go into GAAP profits. As is to be expected, aggregate dividends (right side axis) are more stable than aggregate after tax profits. Conversely after-tax profits plummeted during the recessions in 1981, the early 1990s and marginally in the early 2000s and over the last two years. Overall dividends on average have been 2.45% of GDP since 1961 and after tax corporate profits 6.42%, but much more variable. Recently after tax profits in particular have been above these long run averages at 7.0-11.0% even as the recession hit, since high resource prices have had a significant impact on the aggregate profits earned in Canada, which has been reflected in the performance of the TSX Composite index.

Note that dividends are more stable than earnings and usually do not exceed 3.0% of GDP as firms don't like to cut their dividends. This is important since some utility analysts "key" dividend growth forecasts off earnings forecasts. This is suspect since the greater variability in earnings means that their average growth rate always exceeds that of dividends in the same way that the arithmetic return always exceeds that of the geometric (compound) growth rate. However, with this caveat it is hard not to conclude that in the long-run dividends and after tax profits grow at about the same rate as the overall economy. The average real Canadian growth rate since 1961 has been about 3.40%[4] while the Bank of Canada's operating band for inflation centres on 2.0%, this implies a long-run growth rate in dividends and earnings at about ***5.50%***

4 Arguably this long run GDP growth rate may have fallen with the switch to a service and knowledge based economy.

(1.02*1.034). This is probably a low estimate for two reasons; first the GDP accounts have become less reliable as the economy has shifted to a knowledge based economy since it has become more difficult to estimate the value of productivity changes; second the arithmetic vs compound growth rate problem also affects the GDP accounts which are less variable than similar accounts for companies.

An alternative estimate of future growth for the market as a whole is to use the "*br*" growth rate. In Schedule 6 is the aggregate dividend payout from the GDP accounts. We can see very clearly the jump in the payout during the severe recessions in the early 1980s and 1990s when Corporate Canada had serious profitability problems. The median payout is 37%, the same as its most recent values. In Schedule 7 is the dividend payout based on the earnings and dividends of the TSX Composite. We can see the impact of the recessionary periods even more clearly, but this time the payout is truncated for the over 100% payout periods. The TSX data is based on GAAP profits and reflect "big bath" accounting, that when times are bad and the stock market expects bad news, firms tend to exaggerate their losses and build reserves that allow them to smooth profits in the future. The median payout for the TSX is higher at 50% for these reasons and the fact that it goes back to 1956, when payouts were generally higher. Overall I judge the dividend payout to be in a range 37-50% or a retention rate (*b*) of 50-63%.

From Schedule 1 of my main testimony the average ROE of corporate Canada back to 1987 has been about 9.2% and the median 9.70%. Multiplying these ROEs by the retention rates gives a sustainable growth rate range of 4.7% (0.50*9.2) - 6.1% (.63*9.70) which brackets the estimate of 5.5% from the long run GDP growth rate. However, given the recent higher ROEs and retention rates flowing from higher commodity prices I would judge 6.1% to be a reasonable forward estimator. If this is combined with the current TSX dividend yield of 3.00%, the DCF estimate for the market as a whole is 9.28% ((1.061*1.03)-1). This would be a reasonable estimate if the market were at the mid-point of the business cycle.

At the current point in time Canada has recovered from recession, but from Schedule 8 Corporate Canada is still running very slightly below normal, where the Governor of the Bank of Canada expects the remaining output gap to be closed by the end of 2013. The median capacity utilisation levels are 82-84% but currently they are at 81-82% indicating that we are still in the growth stage of the business cycle approaching the average rather than leaving it. This observation is confirmed by the current 7.4% unemployment rate which while above the non-accelerating unemployment rate of 6.0% is below the average rate since 1987 of 8.2% and median rate of 7.8%. Overall I would judge the fair rate of return on the Canadian market to be 9.3%, consistent with the Canadian market selling at a premium to book value and current average ROEs of 10.59%.[5]

In Schedule 9 is a graph of the dividend yield on the S&P500 index up to January 2011. The latest monthly data is not yet available but the current yield on the S&P500 is 2.00% (September 25, 2012). In Schedule 10 is a graph of the dividend payout rate on the S&P500 firms. The average dividend payout since 1967 is 49.3% while the median payout is 43% meaning that typically 57% of the earnings for S&P500 firms are reinvested to generate future growth in earnings. However, note from the graph that the S&P500 firms suffered significant problems in 2007-2009 during the financial crisis, which is not as evident in the Canadian data, particularly the tax data. In contrast, there is no evidence of the serious problems suffered by Corporate Canada in the recessions in the early 1980s and 1990s.

Since 1977 the average ROE for the S&P500 firms was 13.40% and the median ROE 14.04%. If I pair the median payout and ROE the "*br*" growth rate is 7.97%, and if I pair the averages the growth rate is 6.79% reflecting both the higher average payout and lower average ROE. Combining these with the current dividend yield on the S&P500 index of 2.00% gives a fair return on the US market of 8.93-10.01%. I would expect some greater short term growth in the US market, since the US is below capacity with 7.80% unemployment, where the NAIRU for the US is commonly put at a level below that for Canada. I would judge a fair return on the US market to be 9.5-10.5% or about at least 0.50% higher than in Canada.[6]

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[5] The fact that the required rate of return is less than the actual rate means that average shares sell at a premium to replacement cost or book value.

[6] When I say the US I mean the SP500 firms which are some of the most powerful firms in the world and generate a significant amount of their earnings from non-US sources.

S&P Utility DCF cost estimates

As well as the data for the S&P500 as a whole, Standard and Poors also publishes data on the utilities that meet the requirements to be included in the S&P500 index. In Schedule 11 is the summary data for the standard electric and gas utilities.

The schedules provide the basic data needed for a DCF analysis. The data includes dividends, earnings, book value per share, average market values and the return on equity. From this it is possible to calculate several pieces of useful information. First, is the average payout, which is in the fourth column and its inverse: the retention rate. Utilities as low risk and low growth investments have relatively high payouts: in not one year is the payout less than 50% for the electric utilities while the average payout is over 70% and the median 67%. For the gas utilities there are several years when the payout is less than 50% and the median (64%) payout is less, while the average is distorted by payouts over 100% in 1999, 2005 and 2006. The data indicates much more stability for the electric than the gas utilities since the number of gas utilities in the S&P500 index has been dropping.7

The very high dividend payouts in the electric utilities mean that the growth potential for these utilities is low, which reduces the error in using the DCF model. It also means that utilities are quintessentially dividend or income stocks. The average dividend yield on the electric utilities at the end of 2011 was 4.70% and for the gas utilities 3.08%; that for the electric utilities in particular is significantly higher than that on the S&P500 which in December 2011 was 2.10%.

To estimate the future growth rate I can assume that each year the utility is expected to earn its current *ROE* so that its earnings will grow by the retention rate times this *ROE*. For example, in 1993 the retention rate for the electric utilities was 10.57% and the ROE 11.25% for the electric utilities implying future earnings growth of 1.19%, which is the *g (b*ROE)* in the next column. For 1993 the dividend yield for the S&P Electric utilities was 5.73% (column 8), so that the DCF equity cost estimate was 6.99%, which is in column 10. In 1993 the average long term US Treasury yield was 5.87% (10 year) implying that the electric utility risk premium was only 1.12%. Column 11 gives the market to book ratio for these electric utilities, which in 1993 was 1.59, implying correctly that the ROE of these utilities of 11.25% exceeded their equity cost.

This calculation each year is a mechanical exercise. However individual values are affected by particular circumstances and unusually high or low earned ROEs, which can lead to counter intuitive results. For example, in 2000 for the electric utilities and 1999, 2005 and 2006 for the gas utilities, the retention rate was negative as low ROEs meant that earnings could not cover the dividend. As a result, forecast growth was negative and the implied risk premium unacceptably low. However, the opposite result occurs when earned ROEs were unusually high, such as in 2007 and 2008 for the gas utilities. In this case the retention rate is also very high implying unacceptably high estimated risk premiums.

To adjust for the volatile nature of earned ROEs for US utility holding companies (UHCs) and reduce estimation errors I repeat the analysis for each year from 1993 until 2011. This gives the average and median electric utility risk premium of 3.39% and 3.44% with 2.51% and 3.18% for the gas utilities. In this way the unacceptably low and high implied risk premiums balance each other out, as we would not expect earned ROEs to be persistently over or under those expected. Further in the last two columns I estimate the utility risk premium with two alternative growth expectations. URP2 assumes that the expected ROE is the long Treasury yield plus the average ROE earned over the US treasury yield which is 6.45% for the electrics and 6.20% for the gas utilities. This avoids part of the problem of fluctuating earned returns, while URP3 also assumes that the retention rate is the constant median rate for the whole period. In this way I avoid the problem of declining retention rates as earnings have been squeezed.

These assumptions tend to be conservative. URP3 assumes a higher ROE than was often earned, while assuming a constant retention rate allows both the higher dividend yield from a higher payout, without penalising growth expectations. Both of these assumptions tend to reduce the

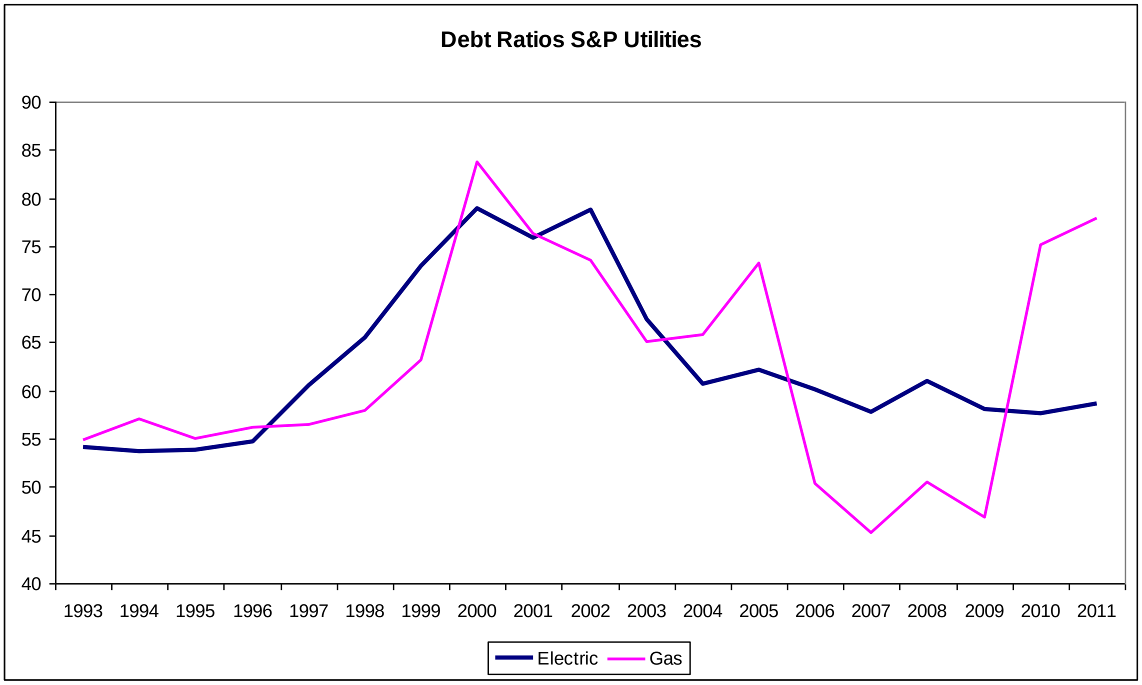
[7] As of 2011 there were 13 Electric UHCs but only 2 Gas UHCs: AGL Resources and Oneok.

volatility in the annual implied risk premium. The average and median URP2 is 3.23% and 3.14% for the electrics and 1.67% and 3.08% for the gas utilities and for URP3 the values are 3.64% and 3.61% for the electrics and then 2.71% and 1.78% for the gas utilities. However, given the much higher volatility of the ROE for the gas UHCs (3.33% versus 1.48%) I would place greater weight on the risk premium estimates from the electric companies.

From the data in Schedule 11, I derive the following conclusions:

- Risk premiums of the order of 3.00-3.50% for a typical US electric utility over ten year US government bond yields is reasonable as reflecting typical experience over the last almost 20 years.
- For the more stable US electric utilities the risk premium for the period 1993-2011 is slightly more stable at 3.39-3.44% since the dividend yield is a higher proportion of the investor's require rate of return
- At the end of 2011 the electrics dividend yield of 4.70% combined with a 31% retention rate and 10.30% ROE implied a forecast growth rate of 3.28% and an equity cost of 8.07%. This was a 5.29% over the average US treasury yield, indicating increased utility risk premiums.
- I would place no weight on the results for the US gas UHCs given their much higher ROE volatility that feeds in directly to the volatility in their estimated DCF risk premiums.

One final statistic from the SP500 UHC data is for their debt ratios. The following graph provides the debt ratio for the Gas and Electric UHCs from 1993-2011. The average over the entire period is almost identical for each class of UHC at 62-63% implying a common equity ratio on average of less than 37-38%. It is the debt ratios of the parent UHC that largely determine the S&P bond ratings, since S&P will not rate a subsidiary higher than its parent unless it is ring fenced (structurally insulated).



Individual company estimates

The DCF estimates for the market as a whole and the S&P utility indexes are more reliable than for individual companies due to the significant measurement error attached to forecasting future growth rates. For example, the forecast growth rate for the economy is more accurate since the growth rate in profits for the market as a whole is constrained by the growth rate in the economy. However, the growth rates are mechanically estimated and do not reflect market estimates. Consequently some use analyst forecast of earnings growth as a proxy for the sustainable growth rates in the former estimates. However, in my judgment these are no more reliable as can be illustrated by looking at the sample of US utilities that I analysed in Appendix C in terms of their relative risk adjustment.

The following table has data I extracted on October 26, 2012

			5 year analyst			
	DivY	Past G	Future g	K	ROE	M/B
AGL	4.6	-5.99	-5.7	-1.1	7.75	1.39
NEW JERSEY RESOURCES	3.6	-23.21	2.7	6.3	11.52	2.23
NORTHWEST	3.8	3.38	4.5	8.3	8.67	1.74
PIEDMONT	3.8	4.09	5.35	9.15	10.83	2.18
VECTREN	4.9	10.9	5	9.9	10.81	1.59
WGL	4.1	9.44	5.6	9.7	7.84	1.58
AVERAGE	4.13	-0.23	2.91	7.04	9.57	1.79
MEDIAN	3.95	3.74	4.75	8.73	9.74	1.67

Note that the dividend yield is the forward dividend yield and ranges from 3.60% to 4.90% due to the particular circumstances of each utility, but the median dividend yield of 3.95% is consistent with the high dividend payouts of utilities and the Electric and Gas UHC data from S&P.. However the problem is the five year forecast growth rates, which range from -5.7% to +5.6% with a median value of 4.75%.[8] As a result if these earnings growth rates are substituted into the DCF equation we get DCF equity cost estimates ranging from --1.10% to 9.90% with an average of 7.04% and a median of 8.73%. Again the median ROE for these utilities was 9.74% which exceeded their equity cost so they were selling at a premium to their book value (1.67).

There are some problems with the above approach. The most obvious is that AGL's growth forecast seems to come from one utility analyst, even for some of the others it is not obvious that each of them contributed to the reported growth estimate. The absence of meaningful data for the Canadian utilities is why this approach is even more problematic for them. A second problem is the well-known optimism bias attached to analyst forecasts, which means that growth forecasts are generally too high. At Schedule 12 is a Globe and Mail article that reports on an update of a study by the consulting firm of McKinsey. They report that analysts start out optimistic when making their five year forecast, but gradually as they get more information (generally from the company) they hone in on the correct number. This is a result that has been in the academic literature for some time and is not necessarily driven by any conflict of interest as was evident in

[8] Note that AGL is in the SP500 data.

the global settlement[9] but simply an attachment effect, where analysts tend to become attached to a stock and see good in it until proven otherwise. Notably the median growth rate of these utilities over the past five years was 3.74% or 1.0% less than the forecast growth rate for the next five years.

Recently, for example, Easton and Sommers[10] have documented the optimism bias at 2.84% and in their conclusions (page 1012) state:

> We show that, on average, the difference between the estimate of the expected rate of return based on analysts' earnings forecasts and the estimate based on current earnings realizations is 2.84%. When estimates of the expected rate of return in the extant literature are adjusted to remove the effect of optimistic bias in analysts' forecasts, the equally weighted estimate of the equity risk premium appears to be close to zero. We show, however, when estimates are based on value-weighted analyses, the bias in the estimate of the expected rate of return is lower and the estimate of the expected equity premium is more reasonable, 4.43%.

Easton and Sommers also state (page 986)

> Our estimate of the implied expected rate of return on the market from the value-weighted regression, after removing the effect of bias in analysts' forecasts, is 9.67% with an implied equity risk premium of 4.43%. Of course, this estimate of the equity risk premium is more reasonable than that obtained when all observations have equal weight.[8]

This optimism bias may also be evident in the earnings forecast for the utility industry and the overall S&P500 which at 7.87% and 9.99% exceeds what can be expected as long run growth estimates using reasonable assumptions on long run average retention rates and earned ROEs. A

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[9] This was the 2003 US$1.4 billion settlement between US Attorney General for New York Elliot Spitzer and a series of major US investment banks, where the investment banks admitted that security analyst compensation was tied to investment banking income and that analyst reports were in some instances fraudulent and lacked objectivity.

[10] "Effect of analyst's optimism on estimates of the expected rate of return implied by earnings forecasts, Journal of Accounting Research, 45-5, December 2007.

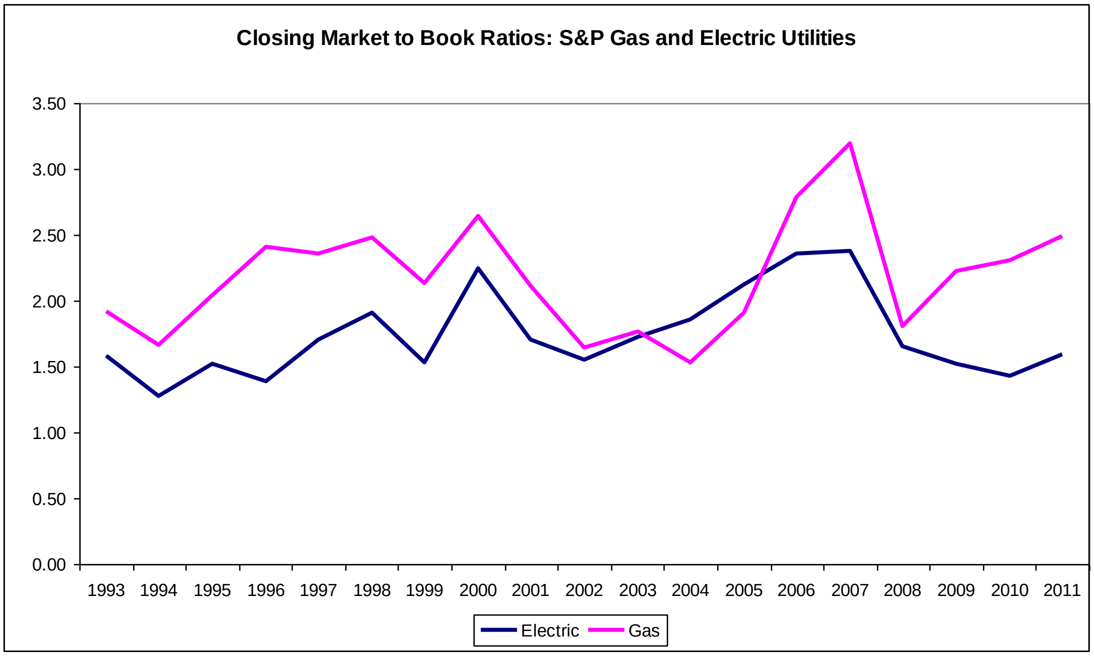
9.99% growth rate in aggregate earnings, for example, with a typical 50% retention rate implies a 20.00% incremental ROE and an extremely healthy US economy. More realistically these growth rates should be used with a two stage growth model.

A final problem with the use of analyst forecasts is that they are based on earnings not dividends. This is a problem since while the model assumes that earnings and dividends grow at the same rate in practice this is not the case. Firms tend to smooth their dividends, which means they do not cut them as much when earnings fall and then delay increasing them when earnings increase. In periods such as the present when earnings are expected to recover this leads to an over-estimate of the dividend growth rate and with it the investor's required rate of return. This is not to say the estimates above for the six US LDCs are wrong, as is well known a broken clock tells the correct time twice a day. However, generally I am extremely skeptical of results based on analyst forecasts, when we know that they are generally optimistic.[11]

Conclusion

I would judge the overall equity market return in Canada to be 9.30% and that in the US at least 0.50% higher. I would judge the large US utilities included in the S&P500 index to warrant a utility risk premium on average of about 3.4% over the long treasury yield. However, there is evidence that this utility risk premium has increased over the last few years due to very low US Treasury Yields. I would judge DCF estimates using analyst growth forecast to be less reliable than DCF estimates for the market as a whole, but they confirm the low risk nature of US utilities and a fair return for them of about 8.73%. This estimate is consistent with the average ROE of US gas and electric utilities of just over 11.0% since 1993 and the following graph that indicates that these utilities generally sell on market to book ratios well above 1.0. As a result the earned ROE over states the investor's required rate of return or the cost of equity capital.

11 This also applies to the forecast in Value Line.


Closing Market to Book Ratios: S&P Gas and Electric Utilities
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011
Electric
Gas

YEAR	BEGINNING BOOK VALUE PER SHARE	EARNINGS PER SHARE	DIVIDEND PER SHARE	RETENTIONS PER SHARE
1	20.00	2.40	1.20	1.20
2	21.20	2.54	1.27	1.27
3	22.47	2.70	1.35	1.35
4	23.80	2.86	1.43	1.43
5	25.24	3.03	1.52	1.52

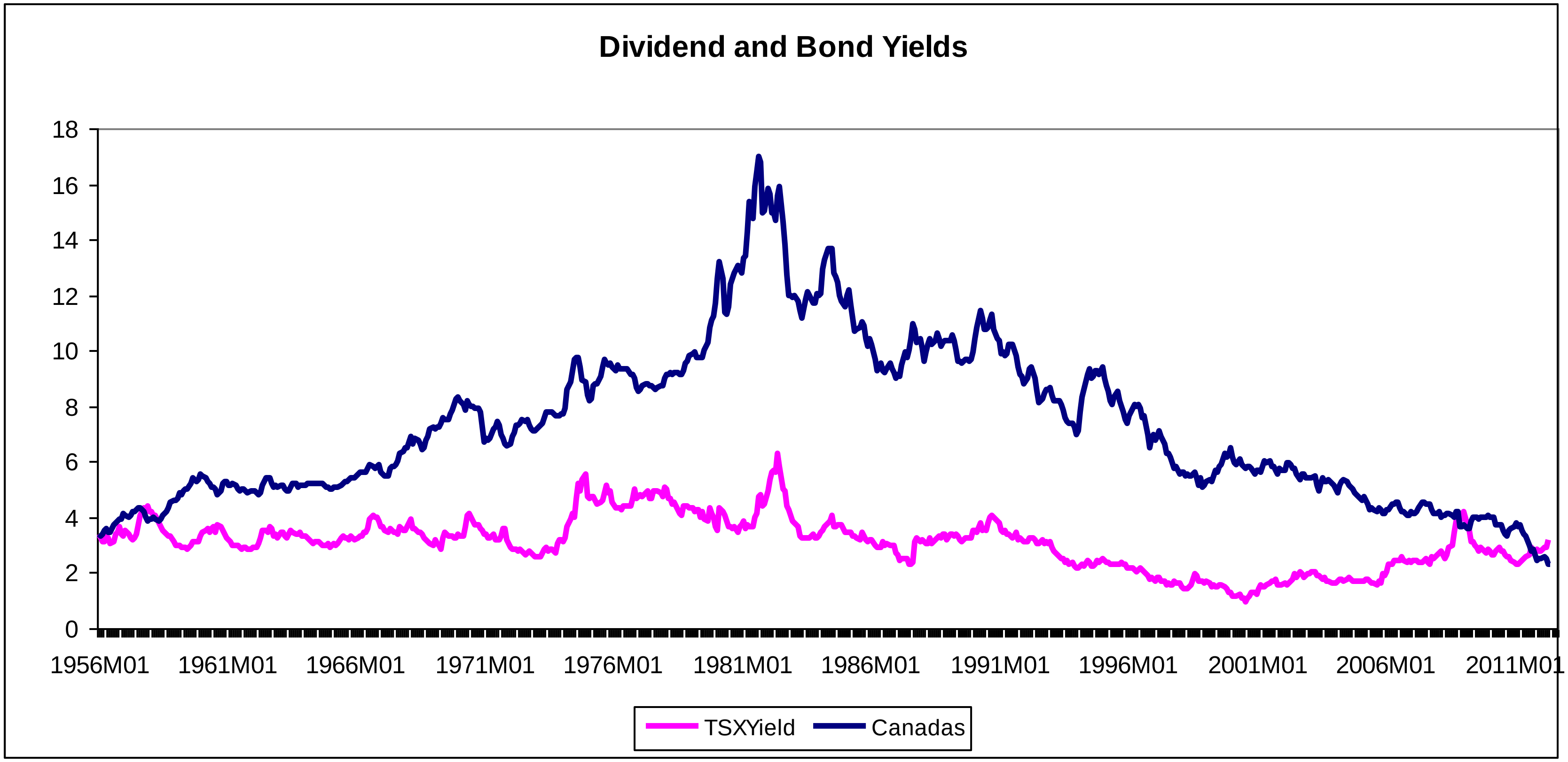
ASSUMPTIONS: Return on Equity = 12%
Dividend Payout = 50%
Cost of Equity = 10%

SCHEDULE 2

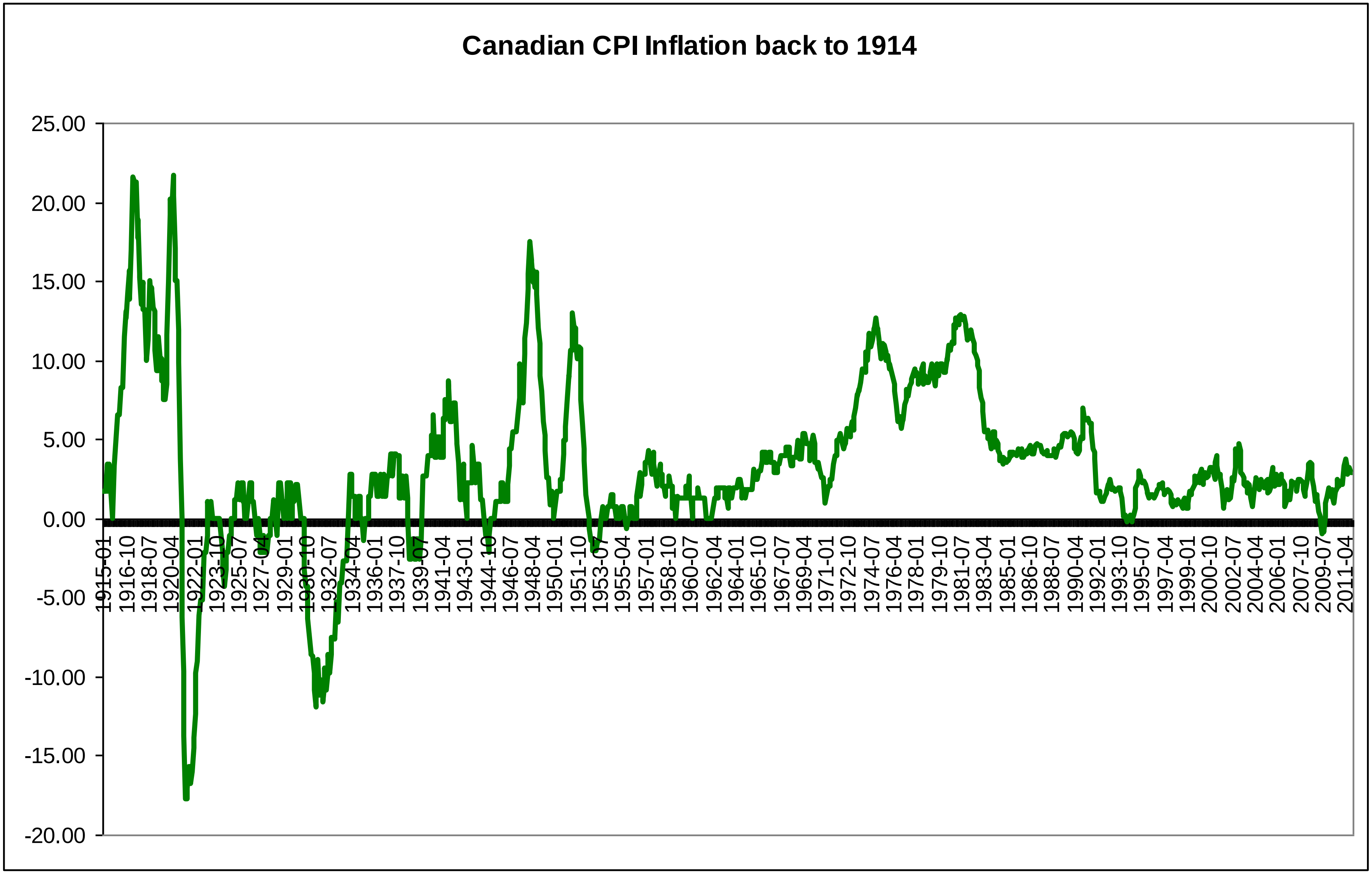
YEAR	BEGINNING BOOK VALUE PER SHARE	EARNINGS PER SHARE	DIVIDENDS PER SHARE	RETENTIONS PER SHARE
1	20.00	2.40	1.20	1.20
2	21.20	2.54	1.32	1.22
3	22.40	2.69	1.45	1.24
4	23.70	2.83	1.59	1.25
5	24.90	2.99	1.73	1.26

ASSUMPTIONS:	Return on Equity	=	12%
	Dividend Payout	=	50% + 2% p.a.
	Required Return	=	10%

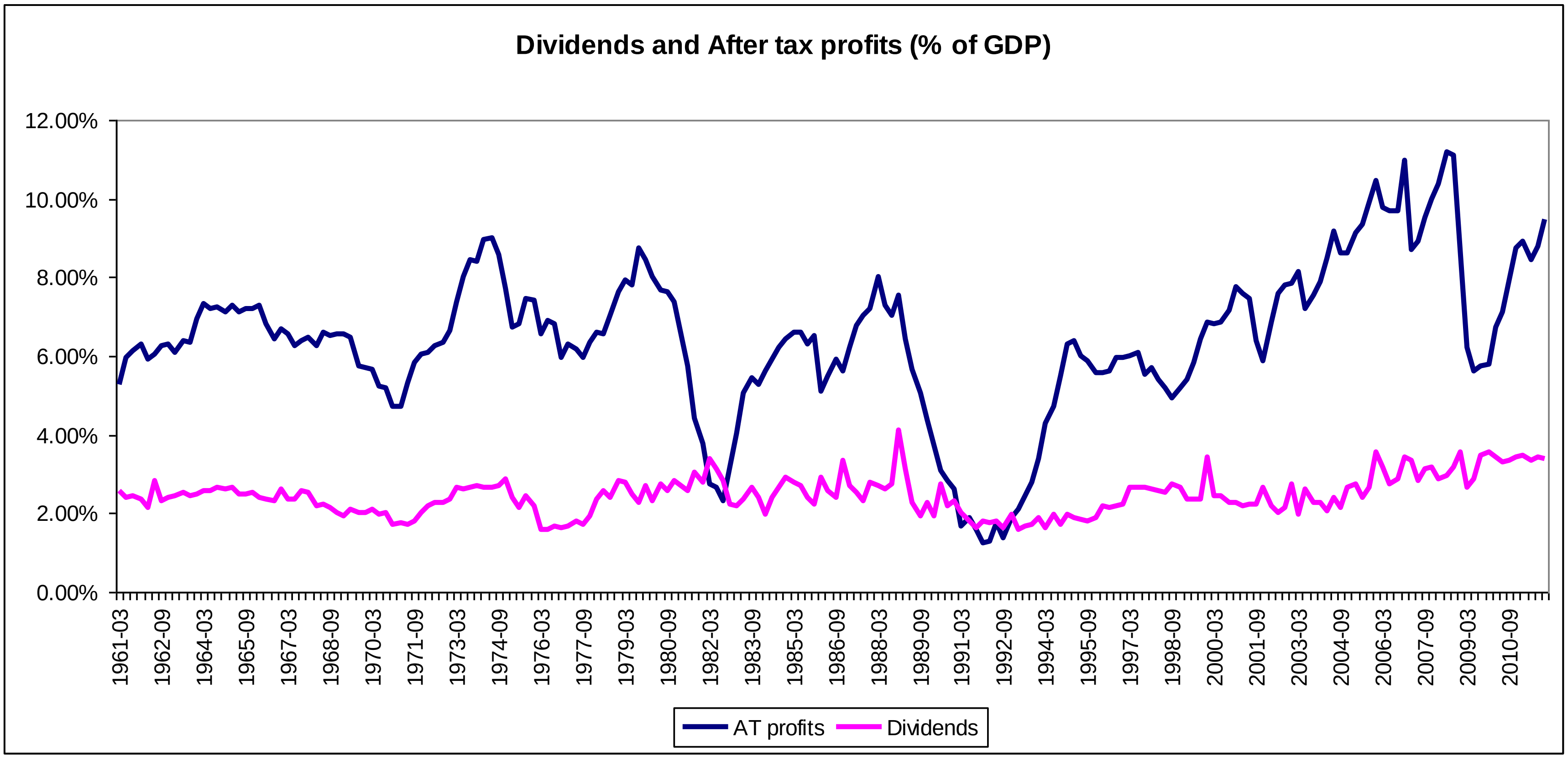
SCHEDULE3

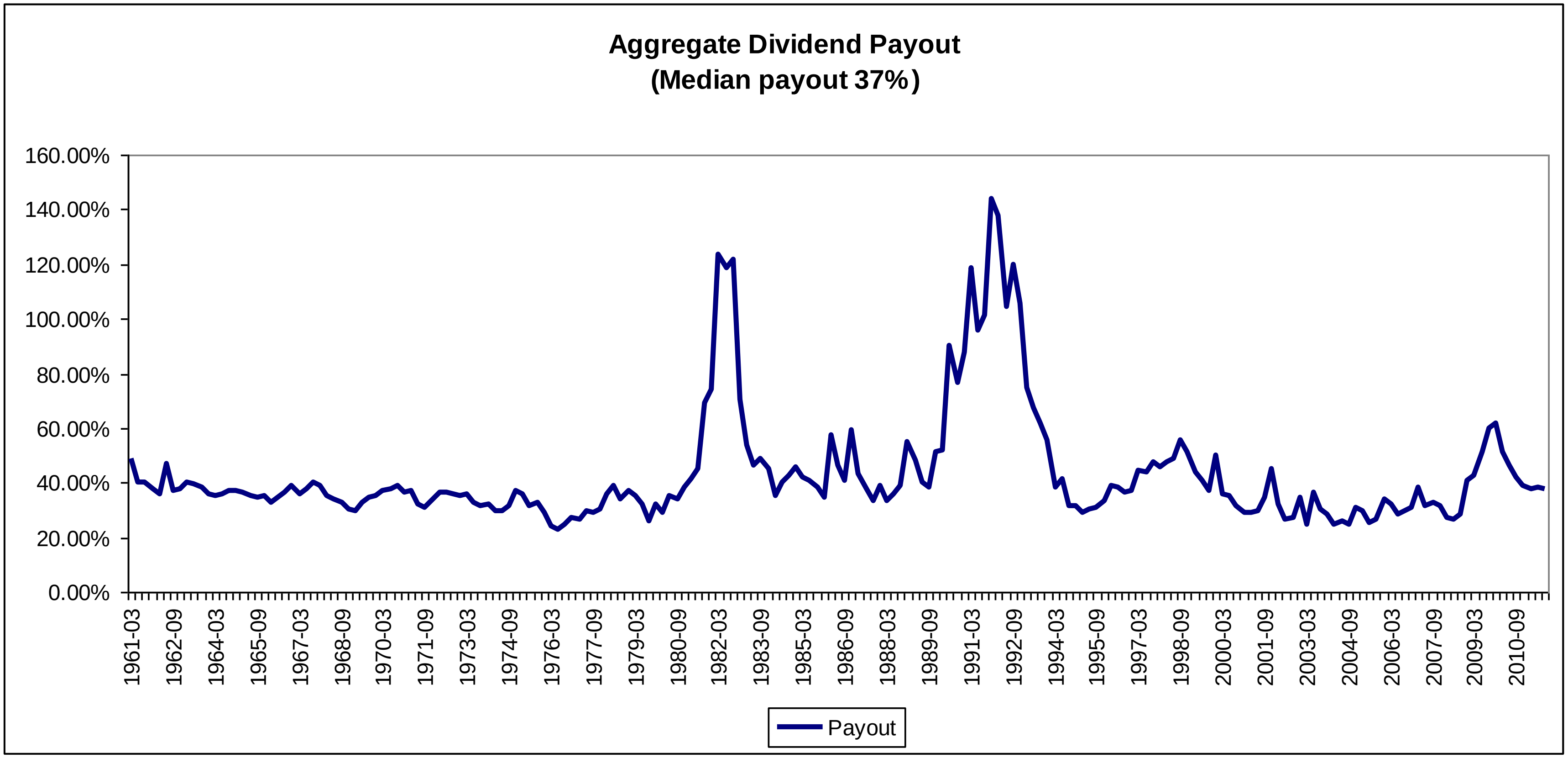


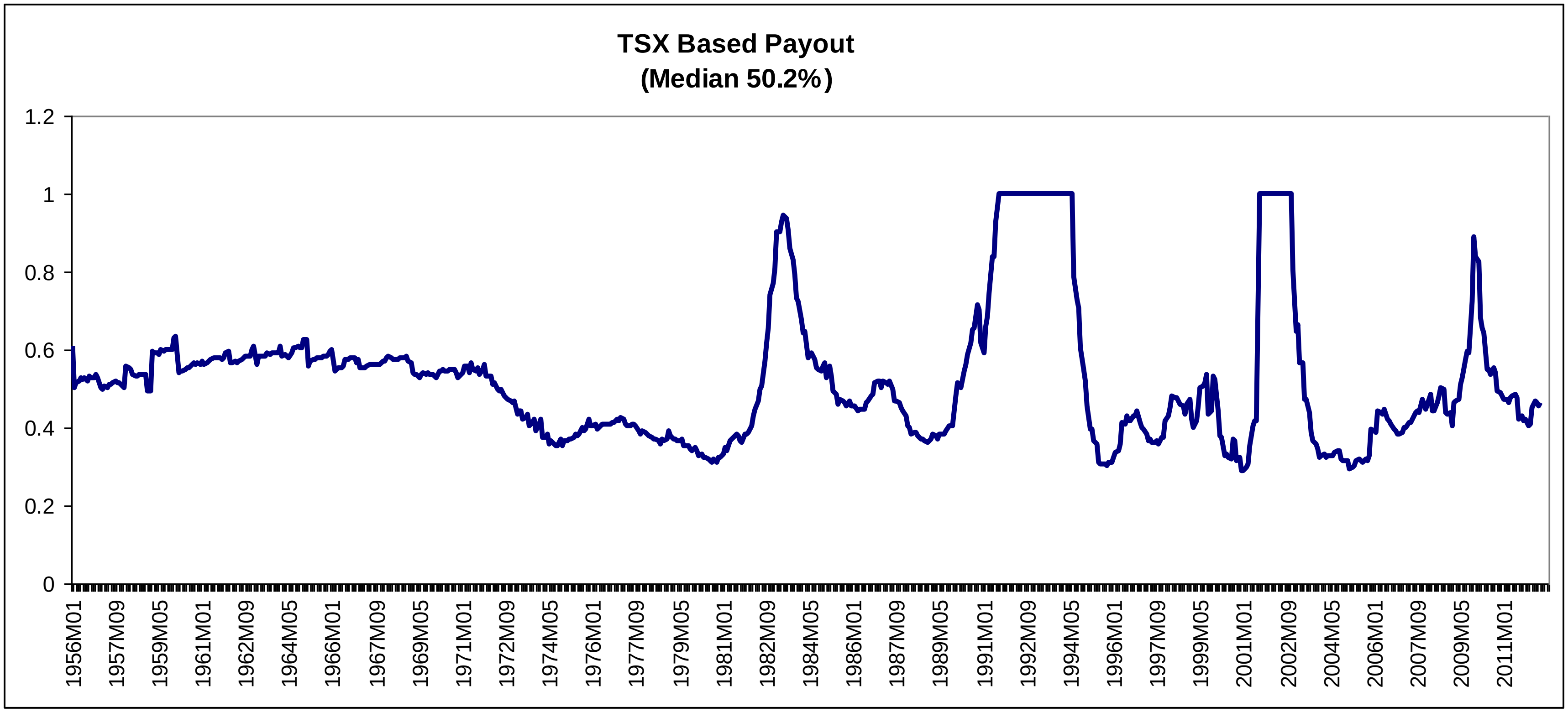
Dividend and Bond Yields
18
16
14
12
10
8
6
4
2
0
1956M01
1961M01
1966M01
1971M01
1976M01
1981M01
1986M01
1991M01
1996M01
2001M01
2006M01
2011M01
TSXYield
Canadas


Canadian CPI Inflation back to 1914
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
1915-01
1916-10
1918-07
1920-04
1922-01
1923-10
1925-07
1927-04
1929-01
1930-10
1932-07
1934-04
1936-01
1937-10
1939-07
1941-04
1943-01
1944-10
1946-07
1948-04
1950-01
1951-10
1953-07
1955-04
1957-01
1958-10
1960-07
1962-04
1964-01
1965-10
1967-07
1969-04
1971-01
1972-10
1974-07
1976-04
1978-01
1979-10
1981-07
1983-04
1985-01
1986-10
1988-07
1990-04
1992-01
1993-10
1995-07
1997-04
1999-01
2000-10
2002-07
2004-04
2006-01
2007-10
2009-07
2011-04

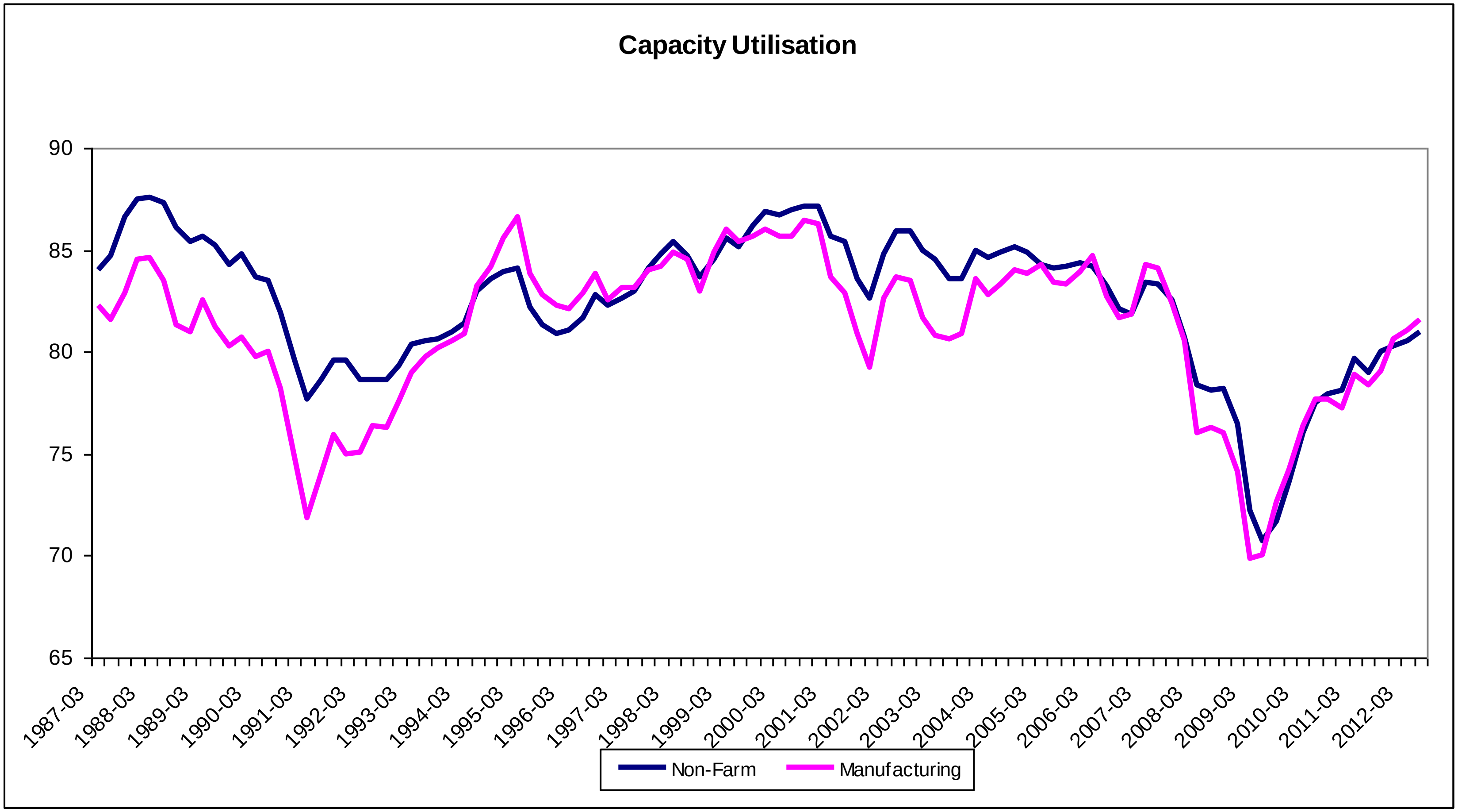
SCHEDULE 5


Dividends and After tax profits (% of GDP)
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
1961-03
1962-09
1964-03
1965-09
1967-03
1968-09
1970-03
1971-09
1973-03
1974-09
1976-03
1977-09
1979-03
1980-09
1982-03
1983-09
1985-03
1986-09
1988-03
1989-09
1991-03
1992-09
1994-03
1995-09
1997-03
1998-09
2000-03
2001-09
2003-03
2004-09
2006-03
2007-09
2009-03
2010-09
AT profits
Dividends

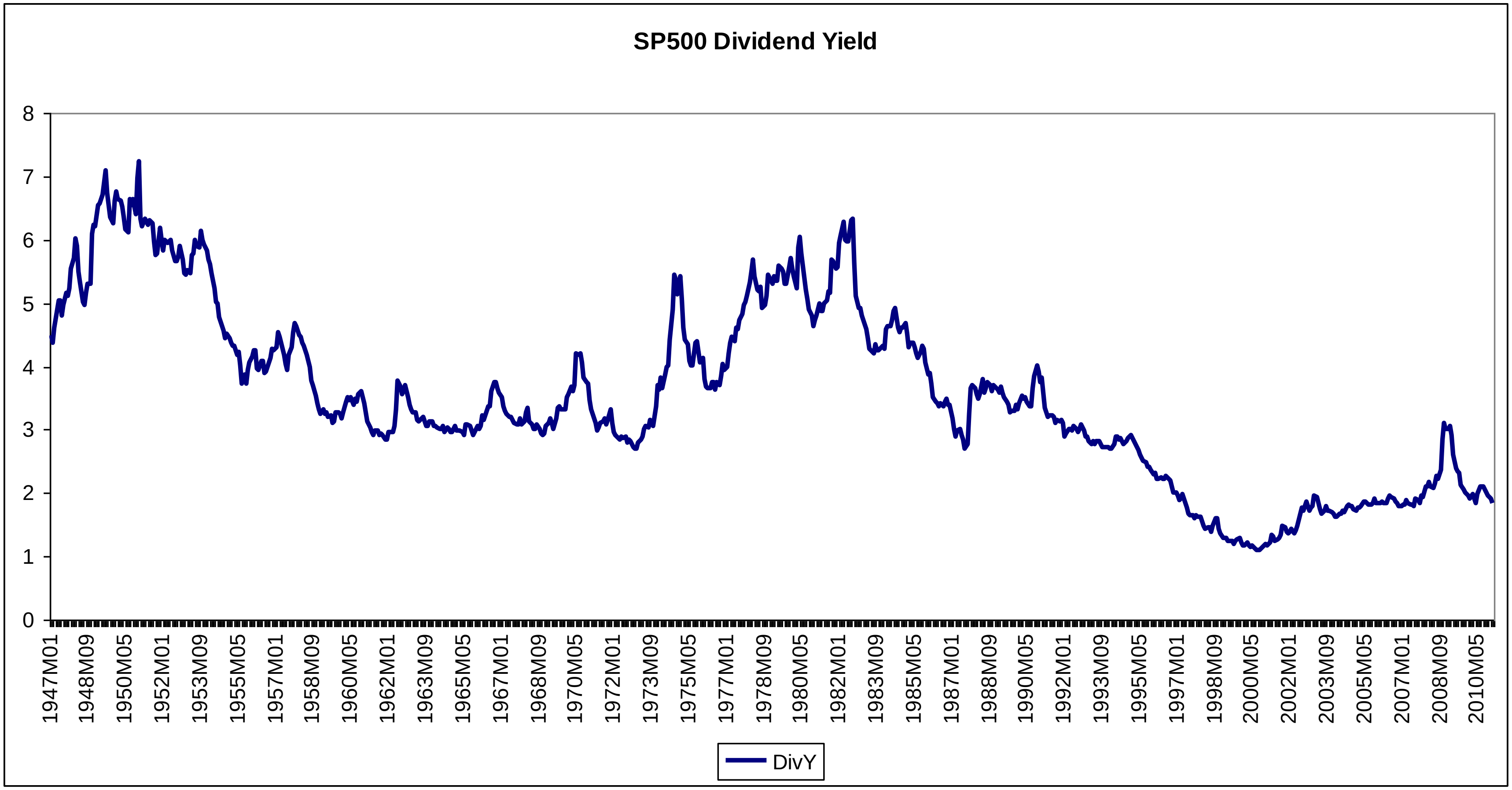

Aggregate Dividend Payout
(Median payout 37%)
160.00%
140.00%
120.00%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
1961-03
1962-09
1964-03
1965-09
1967-03
1968-09
1970-03
1971-09
1973-03
1974-09
1976-03
1977-09
1979-03
1980-09
1982-03
1983-09
1985-03
1986-09
1988-03
1989-09
1991-03
1992-09
1994-03
1995-09
1997-03
1998-09
2000-03
2001-09
2003-03
2004-09
2006-03
2007-09
2009-03
2010-09
Payout


TSX Based Payout
(Median 50.2%)
1.2
1
0.8
0.6
0.4
0.2
0
1956M01
1957M09
1959M05
1961M01
1962M09
1964M05
1966M01
1967M09
1969M05
1971M01
1972M09
1974M05
1976M01
1977M09
1979M05
1981M01
1982M09
1984M05
1986M01
1987M09
1989M05
1991M01
1992M09
1994M05
1996M01
1997M09
1999M05
2001M01
2002M09
2004M05
2006M01
2007M09
2009M05
2011M01

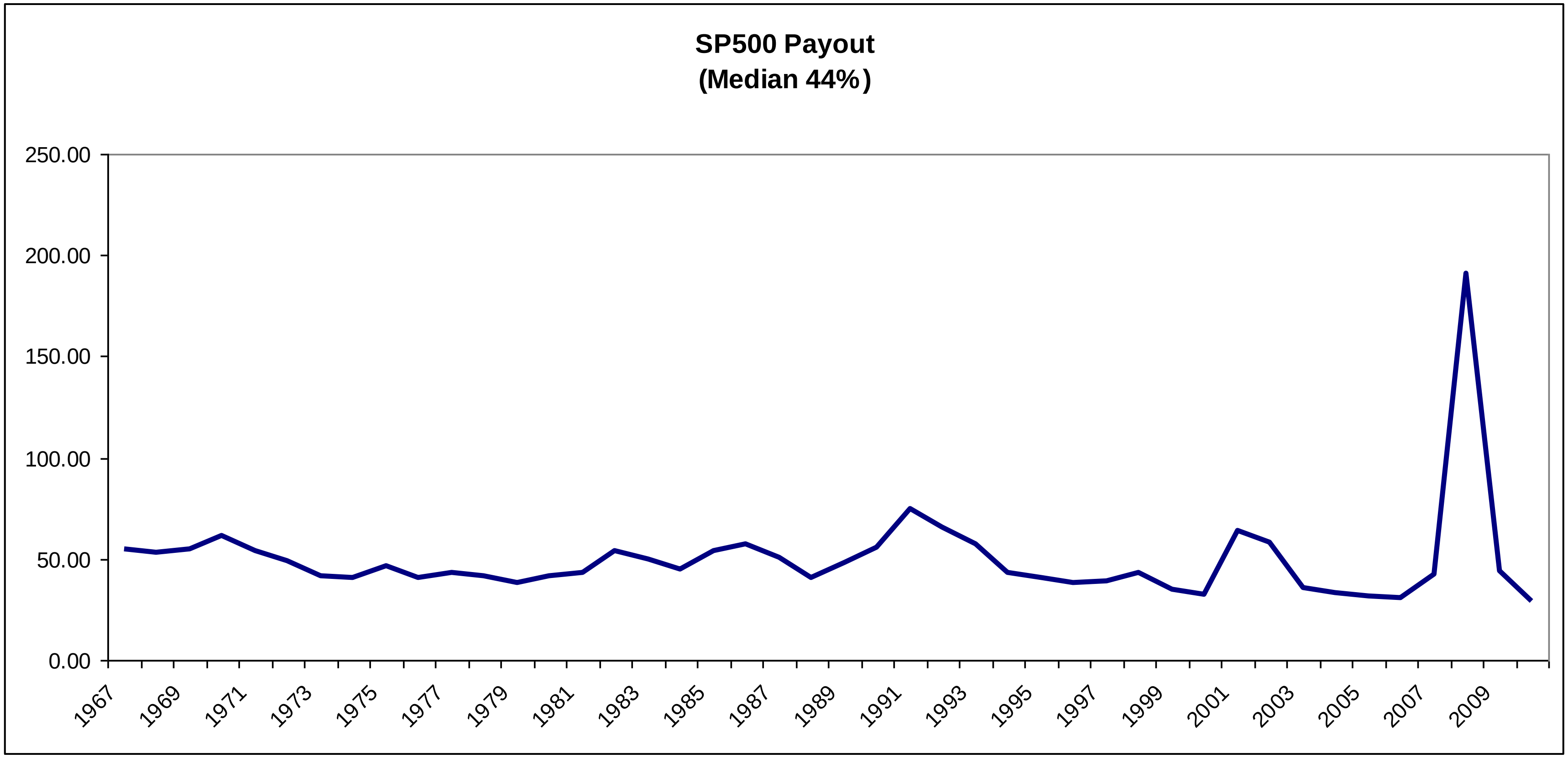
SCHEDULE 8



Capacity Utilisation
90
85
80
75
70
65
1987-03
1988-03
1989-03
1990-03
1991-03
1992-03
1993-03
1994-03
1995-03
1996-03
1997-03
1998-03
1999-03
2000-03
2001-03
2002-03
2003-03
2004-03
2005-03
2006-03
2007-03
2008-03
2009-03
2010-03
2011-03
2012-03
Non-Farm
Manufacturing


SP500 Dividend Yield
8
7
6
5
4
3
2
1
0
1947M01
1948M09
1950M05
1952M01
1953M09
1955M05
1957M01
1958M09
1960M05
1962M01
1963M09
1965M05
1967M01
1968M09
1970M05
1972M01
1973M09
1975M05
1977M01
1978M09
1980M05
1982M01
1983M09
1985M05
1987M01
1988M09
1990M05
1992M01
1993M09
1995M05
1997M01
1998M09
2000M05
2002M01
2003M09
2005M05
2007M01
2008M09
2010M05
DivY

SCHEDULE 10



SP500 Payout
(Median 44%)
250.00
200.00
150.00
100.00
50.00
0.00
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009

SCHEDULE 11

S&P Electric UHC Data

	EPS	DPS	PAYOUT	RETAIN	ROE	g (B*ROE)	YIELD	US TSY	K	MB	URP	URP2	URP3
1993	7.95	7.11	89.43	10.57	11.25	1.19	5.73	5.87	6.99	1.59	1.11	1.23	4.15
1994	8.45	7.05	83.43	16.57	11.71	1.94	6.55	7.08	8.62	1.37	1.54	1.86	4.23
1995	9.23	6.97	75.51	24.49	12.36	3.03	6.23	6.58	9.45	1.39	2.87	3.04	4.22
1996	9.07	6.96	76.74	23.26	11.64	2.71	5.86	6.44	8.73	1.43	2.29	2.60	3.92
1997	7.63	6.64	87.02	12.98	10.16	1.32	5.49	6.35	6.88	1.49	0.53	0.89	3.59
1998	8.52	6.5	76.20	23.80	11.05	2.63	4.45	5.26	7.19	1.82	1.93	2.09	3.22
1999	9.31	6.24	67.02	32.98	12.36	4.08	4.60	5.64	8.87	1.69	3.23	3.14	3.14
2000	6.06	6.36	104.95	-4.95	7.04	-0.35	4.40	6.03	4.04	1.80	-1.99	-2.27	2.67
2001	10.58	5.42	51.23	48.77	13.63	6.65	3.41	5.00	10.28	1.88	5.28	4.18	2.31
2002	7.31	5.93	81.12	18.88	10.18	1.92	4.82	4.53	6.83	1.63	2.30	2.46	4.08
2003	8.44	5.29	62.68	37.32	10.61	3.96	4.31	4.02	8.44	1.51	4.42	4.37	3.89
2004	11.12	5.77	51.89	48.11	12.37	5.95	3.74	4.28	9.91	1.68	5.63	4.81	3.13
2005	10.22	6.85	67.03	32.97	11.86	3.91	3.69	4.31	7.75	2.04	3.44	3.07	3.07
2006	12.35	6.99	56.60	43.40	12.68	5.50	3.37	4.82	9.06	2.13	4.24	3.60	2.39
2007	14.82	7.85	52.97	47.03	12.81	6.02	3.09	4.54	9.30	2.20	4.76	3.88	2.28
2008	15.27	8.57	56.12	43.88	12.83	5.63	3.75	3.57	9.59	1.92	6.03	4.75	3.61
2009	13.37	8.8	65.82	34.18	10.53	3.60	5.01	3.27	8.79	1.38	5.52	5.23	5.11
2010	14.56	9.06	62.23	37.77	10.96	4.14	4.96	3.28	9.30	1.38	6.02	5.53	5.04
2011	13.94	9.49	68.08	31.92	10.11	3.23	4.70	2.79	8.07	1.47	5.29	5.00	5.10
average			**70.32**	**29.68**	**11.38**	**3.53**	**4.64**	**4.93**	**8.32**	**1.67**	**3.39**	**3.23**	**3.64**
Median			**67.03**	**32.97**	**11.64**	**3.60**	**4.60**	**4.82**	**8.73**	**1.63**	**3.44**	**3.14**	**3.61**

S&P Gas UHC Data

	EPS	DPS	PAYOUT	RETAIN	ROE	g (B*ROE)	YIELD	US TSY	K	MB	URP	URP2	URP3
1993	6.11	3.43	56.14	43.86	11.55	5.07	3.15	5.87	8.37	1.93	2.50	2.74	1.78
1994	7.21	3.82	52.98	47.02	12.29	5.78	3.57	7.08	9.56	1.78	2.48	2.96	1.47
1995	5.25	4.02	76.57	23.43	8.28	1.94	3.45	6.58	5.45	1.75	-1.13	-0.04	1.65
1996	9.75	4.36	44.72	55.28	13.75	7.60	2.78	6.44	10.59	2.14	4.15	3.52	1.04
1997	6.25	5.01	80.16	19.84	8.19	1.62	2.74	6.35	4.41	2.15	-1.94	-1.05	1.06
1998	5.89	5.36	91.00	9.00	7.85	0.71	2.69	5.26	3.41	2.32	-1.85	-1.52	1.68
1999	7.4	9.34	126.22	-26.22	6.57	-1.72	3.84	5.64	2.05	1.99	-3.59	-5.02	2.65
2000	18.7	8.43	45.08	54.92	12.96	7.12	2.61	6.03	9.91	2.18	3.88	3.47	1.12
2001	9.87	8.16	82.67	17.33	7.33	1.27	2.47	5.00	3.77	2.38	-1.23	-0.54	1.62
2002	13.45	8.58	63.79	36.21	13.69	4.96	4.01	4.53	9.17	2.15	4.64	3.53	3.53
2003	14.77	7.23	48.95	51.05	13.82	7.06	4.24	4.02	11.59	1.57	7.57	5.66	4.08
2004	13.37	9.92	74.20	25.80	9.84	2.54	4.99	4.28	7.66	1.43	3.38	3.55	4.70
2005	10.42	19.06	182.92	-82.92	10.14	-8.41	9.05	4.31	-0.12	2.03	-4.42	-4.75	8.90
2006	8.26	8.89	107.63	-7.63	9.59	-0.73	3.94	4.82	3.18	2.62	-1.64	-1.76	3.26
2007	16.54	4.39	26.54	73.46	17.95	13.19	1.63	4.54	15.03	2.92	10.48	5.11	1.04
2008	19.61	4.21	21.47	78.53	18.46	14.50	1.60	3.57	16.33	2.48	12.76	5.82	1.62
2009	11.17	4.73	42.35	57.65	10.15	5.85	2.32	3.27	8.31	1.85	5.03	4.64	2.56
2010	12.04	7.48	62.13	37.87	9.7	3.67	2.91	3.28	6.69	2.07	3.41	3.32	3.16
2011	15.48	10.83	69.96	30.04	9.3	2.79	3.08	2.79	5.96	2.11	3.18	3.08	3.65
average			**71.34**	**28.66**	**11.13**	**3.94**	**3.42**	**4.93**	**7.44**	**2.11**	**2.51**	**1.67**	**2.71**
Median			**63.79**	**36.21**	**10.14**	**3.67**	**3.08**	**4.82**	**7.66**	**2.11**	**3.18**	**3.08**	**1.78**

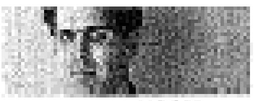
URP assumes actual br growth, URP2 assumes that the expected ROE is the Treasury yield plus 5.0% and URP3 also assumes retention at the median retention rate. Source data is from Standard & Poors Analyst's Handbook 2012. Graphic can be expanded by pulling on the handles.

B14 Globe Investor Weekend
The Globe and Mail, Saturday, May 22, 2010

ECONOMY AND MARKETS

MARKET LAB

Wall St.'s woeful forecasting not getting better



DAVID PARKINSON
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Nearly a decade ago – about the time the bursting tech bubble had raised serious questions about conflicts of interest in Wall Street equity research – consulting firm McKinsey & Co. did a study on the accuracy of analysts' company earnings forecasts. The results were discouraging: Analysts were routinely over-optimistic about earnings growth, too slow to revise forecasts when economic conditions changed, and prone to increasingly inaccurate forecasts when the economy slowed.

Since then, major scandals involving tainted research have come to light, Wall Street's biggest firms have paid $1.4-billion (U.S.) in penalties for those practices, and regulators have put rules in place aimed at creating equity research with more independence and distance from the investment-banking side of the business. Unfortunately, McKinsey reports, the changes have had little effect on the accuracy of analysts' projections.

OFF THE MARK

Analysts are often too optimistic and their forecasts exceed companies' realized earnings per share. Over the past 25 years, actual growth surpassed forecasts only twice. Both times were during the recovery following a recession.

THE GLOBE AND MAIL ■ SOURCE: THOMSON REUTERS I/B/E/S GLOBAL AGGREGATES; MCKINSEY ANALYSIS

DOWNTURN REVEALS SAME OLD HABITS

In an update of the 2001 study, McKinsey researchers found that from 2003 to 2006, analysts' earnings projections actually did look less unrealistically rosy. In each of those years, analysts, on average, actually underestimated S&P 500 annual earnings for significant portions of the year – and undershot through the entire year in 2005 and 2006.

But lest we think this was evidence of a new kind of thinking within Wall Street research departments, the Street's wide-eyed optimism came back with a vengeance starting in 2007.

Going back over the past 25 years, McKinsey found that, on average, analysts' earnings-growth forecasts "have been nearly 100-per-cent too high." Annual S&P 500 consensus growth forecasts have typically been in the 10- to 12-per-cent range, while actual earnings growth has averaged 6 per cent.

BROKEN-CLOCK ACCURACY

Looking at five-year rolling average growth estimates, there have only been two periods in the past 25 years when the earnings met or exceeded analysts' forecasts. Both were in recovery periods after the U.S. recessions of the early 1990s and the early 2000s.

"This pattern confirms our earlier findings that analysts typically lag behind events in revising their forecasts to reflect new economic conditions," McKinsey researchers wrote. "When economic growth accelerates, the size of the forecast error declines; when economic growth slows, it increases."

This pattern means that when the analysts are accurate with their forecasts, it's sort of the same way a broken clock is accurate – twice a day.

"As economic growth cycles up and down, the actual earnings S&P 500 companies report occasionally coincide with the analysts' forecasts."