

# Analyzing the Impact of Pension Plan Management on Corporate Profitability

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## Abstract

This paper establishes a framework to analyze the volatility of corporate profits as a result of variability in accounting for pension plans. It uses as a model a Canadian corporation that maintains a defined-benefit pension plan of the final-average-earnings type and that has adequate cash flow to fully fund the pension plan, should it wish. The reason for examining volatility of corporate profits is that many senior executives have some component of their compensation directly related to corporate profitability and consequently do not want any surprises with respect to actual profits compared to expected profits. The volatility management techniques considered are investment policies for the pension plan, funding the pension plan, and an alternative plan design. A simple model has been developed to quantify the impact of the various techniques. The analysis is timely since changes are proposed to the accounting standards to eliminate most smoothing techniques. The results suggest that, depending on the investment environment, reduced volatility may be accompanied by enhanced return, which is a result that few would expect.

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Although defined contribution (DC) is the most common type of pension plan for Canadian employers in the private sector to have, large Canadian employers are more likely to have a defined-benefit pension plan (DBPP). Under current financial statement accounting practice, the accounting for DBPP is relatively complex, and a variety of smoothing techniques are permitted. These techniques have been criticized because they make adjustments to market values. In the interests of greater accounting transparency, there is gradual progress to adopt revised accounting standards, which would present results on a mark-to-market basis and eliminate most, if not all, smoothing techniques. One concern with the removal of smoothing adjustments is that volatility will be introduced into the corporation's income statement. Since the variable component of many executives' compensation is dependent on the results presented in the income statement, volatility, especially volatility that reduces income, is considered undesirable. One response to volatility of corporate income associated with pension income volatility has been for corporations to consider closing or eliminating their DBPP or converting it to DC for new and/or existing members. This paper examines other methods that a corporation that maintains a DBPP might use that would assist in the management of volatility.

The methods examined in this paper are different investment policies for the pension plan, using different levels of funding of the pension plan, and modest variation to the final-average-earnings (FAE) plan design. The approach used is to:

- Create a hypothetical corporation's income statement, which is similar to the income statement of a large Canadian corporation with a significant DBPP for a relatively mature workforce; and
- Assume the smoothing techniques currently permitted by accounting regulations are removed; and
- Examine the impact on corporate income of the methods listed above for the period 1999 to 2010, using economic statistics published by the Canadian Institute of Actuaries.

Those who perceive fixed income as a less volatile asset class may treat the conclusion that investment of the pension fund in less volatile assets results in less volatility in the corporation's income as expected. However, this paper shows that the actual investment return achieved by investing the pension fund in fixed income investments, rather than investing a relatively significant portion of the assets in equities, is higher over the 12-year study period. This result is unexpected and contrary to some popular thinking regarding equity investments (e.g., Siegel, 2008).

There are three investment policies examined: 60 percent equity – 40 percent fixed income investment; 40 percent equity – 60 percent fixed income investment; and entirely fixed income investment. The first two asset mixes are consistent with those used by many large Canadian pension plans over the study period. The funding statuses examined are 80 percent funding, full funding, and 110 percent of full funding. The alternative plan design is a career-average-earnings (CAE) plan with periodic updates. The approach used is to calculate the impact on the pension plan of adopting each approach successively, then to determine what the impact on pension accounting would be in the absence of any smoothing adjustments, and then in turn to calculate the impact on the income statement.

The next section describes the characteristics of large Canadian companies that have been used to develop the hypothetical Canadian corporation's pension plan and income statement that pertain to this analysis. It states the economic returns used for the periods of analysis. As well as computing annual volatility in corporate income, which is typically what executives are concerned about (since bonuses are normally based on annual results), this paper also looks at what the total change to income would be in aggregate for the full study period, as that should be a consideration when trying to establish a long-term policy. The third section presents the results based on the various investment policies. The fourth section presents the results based on the different funding policies. The fifth section discusses the impact on the results of the alternative plan design. The final section summarizes the results and draws some conclusions.

Acheampong (2011) was involved in gathering some of the data for this research in connection with his postgraduate dissertation. His work provides additional detail regarding related literature and an extensive bibliography, which may be useful for those wishing to investigate this subject further.

## **1. Large Canadian Employers**

The following table was based on a report by the Financial Post (2011) regarding Canada's largest companies ranked by revenue, but supplementing it with information on pension assets reported in each company's 2010 annual report. In order to provide a sense of the range and magnitude of profit and pension fund assets, Table 1 shows the 10 largest companies and the 50th largest company defined by 2010 revenue.

**Table 1: Canada's Largest Companies Ranked by 2010 Revenue (all figures \$ millions)**

| Ranking | Company                   | Revenue | Profit | Pension Assets |
|---------|---------------------------|---------|--------|----------------|
| 1       | Manulife Financial        | 37,633  | -312   | 2,869          |
| 2       | Royal Bank of Canada      | 36,026  | 5,223  | 7,897          |
| 3       | Suncor Energy             | 33,961  | 3,571  | 2,335          |
| 4       | Power Corp. of Canada     | 32,896  | 907    | 3,363          |
| 5       | George Weston             | 32,008  | 452    | 1,514          |
| 6       | The Toronto-Dominion Bank | 25,409  | 4,644  | 2,829          |
| 7       | Imperial Oil              | 24,946  | 2,210  | 4,296          |
| 8       | Magna International       | 24,825  | 1,002  | 253            |
| 9       | Sun Life Financial        | 24,640  | 1,685  | 2,092          |
| 10      | Onex Corp.                | 24,366  | -51    | 1,400          |
| 50      | Canada Post Corp.         | 7,312   | 281    | 15,376         |

From Table 1 it can be seen that there is a wide range of profit reported, from negative \$312 million to \$5,223 million. Also, in a number of cases, pension fund assets are large compared to profit. Accordingly, if pension accounting standards are changed to remove smoothing techniques, so that investment returns on pension assets have a direct effect on the company's income, there is potential for significant volatility from year to year in company income. In this regard, the following table compiled from a report by the Canadian Institute of Actuaries (2011) illustrates the annual variability of returns for selected asset classes.

**Table 2: Annual Return on Asset Class (in Canadian \$)**

| Year | Long Bonds | Real Return Bonds | Corporate Bonds | Canada Equities | U.S. Equities | International Equities ex U.S. |
|------|------------|-------------------|-----------------|-----------------|---------------|--------------------------------|
| 1999 | -7.15      | 5.94              | -5.31           | 31.71           | 15.63         | 22.54                          |
| 2000 | 13.64      | 14.90             | 11.60           | 7.41            | -6.07         | -10.26                         |
| 2001 | 3.92       | -2.38             | 6.08            | -12.57          | -8.70         | -18.30                         |
| 2002 | 10.09      | 11.85             | 10.48           | -12.44          | -23.00        | -16.49                         |
| 2003 | 8.06       | 13.85             | 14.86           | 26.72           | 8.34          | 17.88                          |
| 2004 | 8.46       | 17.24             | 8.37            | 14.48           | 2.97          | 12.22                          |
| 2005 | 15.05      | 17.58             | 10.65           | 24.13           | -0.09         | 9.48                           |
| 2006 | 3.22       | -4.86             | 4.22            | 17.26           | 15.00         | 25.36                          |
| 2007 | 3.30       | -1.40             | 6.55            | 9.83            | -8.22         | -1.76                          |
| 2008 | 13.65      | 2.32              | -13.03          | -33.00          | -22.46        | -10.14                         |
| 2009 | -4.26      | 15.08             | 22.56           | 35.05           | 8.01          | 14.78                          |
| 2010 | 11.45      | 13.57             | 15.10           | 17.61           | 9.97          | 4.59                           |

Source: CIA (2011)

From Table 2 it can be seen that the returns on each asset class are volatile. There is no one asset class that delivers a higher return in every year, and all asset classes have at least two years when the annual return is negative.

Based on information published by the Pension Investment Association of Canada (PIAC, 2011), Table 3 shows that the average asset mix of the pension fund assets for Canada's largest pension plans has changed gradually over the study period. The allocation to

fixed income has remained relatively stable in the 30 to 40 percent range, but there has been a gradual move to allocate more to other asset classes, such as real estate, infrastructure, venture capital, private equity and hedge funds, i.e., alternative investments, up from 7.3 percent in 1999 to approximately 25 percent in 2010. Consequently, the allocation to all types of publicly traded equity has dropped from 57.7 percent in 1999 to 43.4 percent in 2010. Reasons for the change may be for greater diversification by asset class and to seek enhanced returns from alternative sources.

**Table 3: Average Asset Allocation of Large Canadian Pension Funds at Dec. 31**

| <b>Year</b> | <b>Equity (%)</b> | <b>Fixed Income (%)</b> | <b>Other (%)</b> |
|-------------|-------------------|-------------------------|------------------|
| 1999        | 57.7              | 35.0                    | 7.3              |
| 2000        | 54.9              | 37.6                    | 7.5              |
| 2001        | 56.6              | 34.6                    | 8.8              |
| 2002        | 47.6              | 39.8                    | 12.5             |
| 2003        | 52.3              | 36.0                    | 12.0             |
| 2004        | 52.2              | 35.9                    | 11.9             |
| 2005        | 48.7              | 35.7                    | 15.8             |
| 2006        | 51.9              | 31.2                    | 16.9             |
| 2007        | 49.2              | 32.6                    | 18.1             |
| 2008        | 39.1              | 33.7                    | 25.2             |
| 2009        | 43.9              | 33.0                    | 23.1             |
| 2010        | 43.4              | 31.7                    | 24.9             |

Source: PIAC (2011); some totals do not add to 100%, especially 2008

In analyzing the impact on the income statement of the calculation of pension expense on an accounting basis, without smoothing adjustments, it is assumed that the baseline for eliminating volatility would be when the investment return on assets was exactly equal in the year to the investment return on obligations, i.e., liabilities. In such a situation the pension expense would be the value of benefits expected to accrue in the year less funding contributions. For a corporation managing a pension plan, this amount represents the fair cost of pension benefits in the year. For a corporation with a large pension fund, in the absence of extraordinary events, such as plant closures or mergers, the amount should be relatively stable. Hence, asset returns that track relatively well the return on obligations will result in less volatility of corporate income. The difference between the investment return on assets and the investment return on obligations will be compared to corporate income to measure volatility. For this purpose the corporate income, annual accrued benefits and pension liabilities of Canada Post Corporation have been used to model a hypothetical Canadian large employer with a significant pension fund.

## **2. Impact of Investment Allocation**

For the purpose of analysis, three different asset mixes were considered, as shown in the following table. None of these asset mixes was based on any individual pension plan. The first two asset mixes, with 60 percent equity – 40 percent fixed income and 40 percent equity – 60 percent equity, respectively, were selected to illustrate an approximate range of results for an average asset allocation over the study period. The third asset mix is entirely fixed income. It includes a higher allocation to long bonds and real return bonds than is typical for the average pension fund, but it has been selected in an attempt to have a duration of assets

closer to the presumed duration of obligations and to provide some link to inflation since most plans are FAE plans, and salary scales are impacted by inflation. The allocation to corporate bonds in the third asset allocation provides a link to the interest rate defined by accounting standards to calculate the present value of the obligations, namely the long-term yield on AA-rated corporate bonds. The three asset allocations are shown in Table 4.

**Table 4: Asset Mixes Used for Analysis**

| Asset Class          | Asset Mix 1<br>(% allocation) | Asset Mix 2<br>(% allocation) | Asset Mix 3<br>(% allocation) |
|----------------------|-------------------------------|-------------------------------|-------------------------------|
| Canadian equity      | 30                            | 20                            |                               |
| U.S. equity          | 15                            | 10                            |                               |
| International equity | 15                            | 10                            |                               |
| Long bonds           | 10                            | 10                            | 60                            |
| Corporate bonds      | 30                            | 40                            | 25                            |
| Real return bonds    |                               | 10                            | 15                            |
| <b>TOTAL</b>         | <b>100</b>                    | <b>100</b>                    | <b>100</b>                    |

As explained earlier, the measure of volatility is the extent to which the investment return on assets is equal to the investment return on obligations. To indicate the extent of volatility, any deviation is compared to the assumed corporate income, before tax, for year, assuming there was no excess return of investment income over the interest cost; i.e., pension expense was equal to accrued benefits less contributions. Table 5 shows the corporate income before tax, assuming no excess investment income and the results of the calculations for each asset mix. Chart 1 illustrates the volatility of corporate income before tax. All these calculations are based on a pension plan with assets exactly equal to obligations, i.e., full funding.

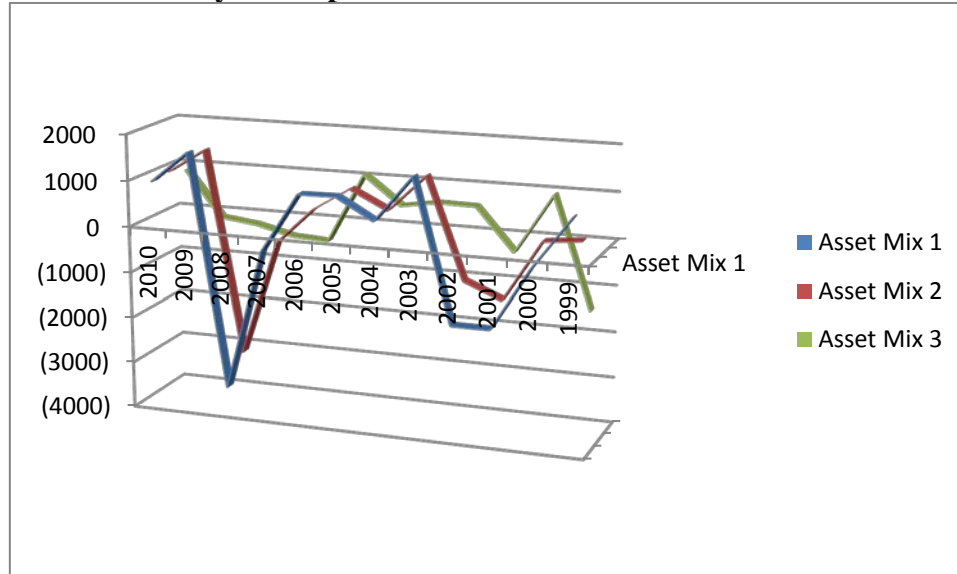
**Table 5: Corporate Income Before Tax Assuming Full Funding**

| Year         | Assuming No<br>Excess Return | Using Asset<br>Mix 1 | Using Asset<br>Mix 2 | Using Asset<br>Mix 3 |
|--------------|------------------------------|----------------------|----------------------|----------------------|
| <b>1999</b>  | -72                          | 891                  | 221                  | -1,466               |
| <b>2000</b>  | -65                          | -220                 | 144                  | 942                  |
| <b>2001</b>  | -67                          | -1,568               | -1,172               | -354                 |
| <b>2002</b>  | -79                          | -1,567               | -838                 | 567                  |
| <b>2003</b>  | -92                          | 1,473                | 1,323                | 583                  |
| <b>2004</b>  | -54                          | 484                  | 531                  | 455                  |
| <b>2005</b>  | -35                          | 940                  | 932                  | 1,070                |
| <b>2006</b>  | -74                          | 926                  | 428                  | -456                 |
| <b>2007</b>  | -139                         | -361                 | -356                 | -407                 |
| <b>2008</b>  | -160                         | -3,426               | -2,878               | -213                 |
| <b>2009</b>  | 136                          | 1,635                | 1,531                | -117                 |
| <b>2010</b>  | 64                           | 961                  | 1,014                | 897                  |
| <b>Total</b> | <b>-637</b>                  | <b>169</b>           | <b>881</b>           | <b>1,501</b>         |

From the foregoing it can be seen that, for the period through 2008, the company on which this case study was modeled would only earn positive corporate income if there were an excess investment return on its pension fund assets. Even in 2009 and 2010, corporate income before taxes would be small without any excess return on the pension fund. It can be seen from the total row that investment income on any one of the asset mixes was more than

sufficient to have positive corporate income before tax, in aggregate. However, an extremely interesting observation is that the corporate income before tax, in aggregate, would have been highest if the asset mix 3, which is an investment allocation to all fixed income assets, had been used.

**Chart 1: Volatility of Corporate Income Before Tax Based on Full Funding**



From Chart 1 it can be seen that corporate income with asset mix 3 falls in a narrower range with fewer negative values, and so is less volatile than the other two asset mixes, which have significant equity allocations. The mean and standard deviations of the three asset mixes are shown in Table 6, which confirms that corporate income with the third asset mix of all fixed income securities is less volatile.

**Table 6: Volatility Measures of Corporate Income Full Funding**

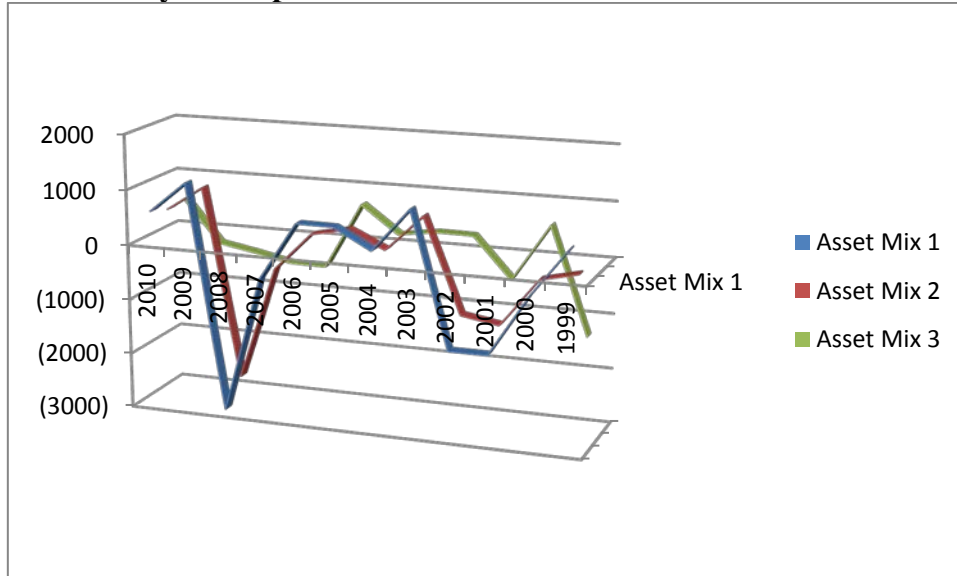
| Asset Mix                     | Mean | Standard Deviation |
|-------------------------------|------|--------------------|
| 60% Equity – 40% Fixed Income | 14   | 1,454              |
| 40% Equity – 60% Fixed Income | 73   | 1,188              |
| 100% Fixed Income             | 125  | 720                |

### 3. Alternative Funding

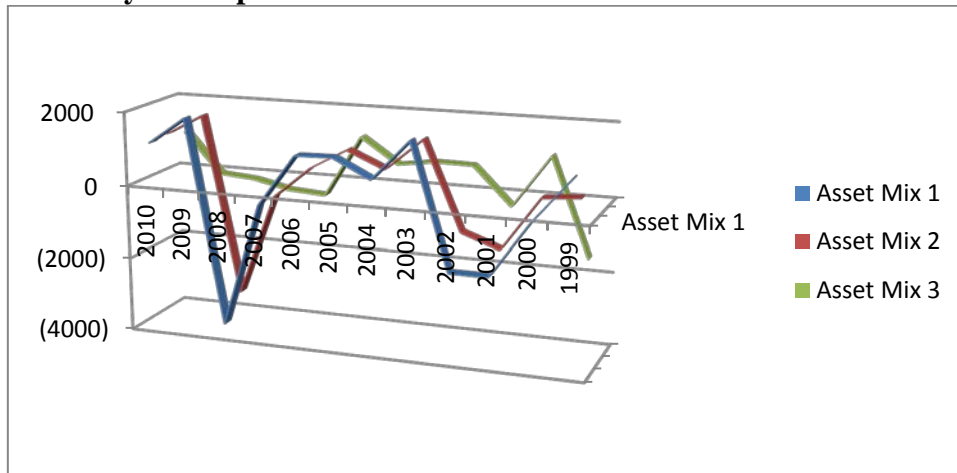
To analyze the impact of alternative levels of funding of the pension plan, the assumed funding was varied to be 80 percent of obligations, i.e., underfunded, and 110 percent of obligations, i.e., overfunded. The same approach was used to determine estimated corporate income before tax. The results are presented in the following two charts.

These two funding levels were chosen for the following reasons. If a plan falls below 80 percent funding it may have solvency funding concerns requiring accelerated funding contributions, so it is difficult to operate a funding policy requiring low funding levels, i.e., less than 80 percent funding. Few plan sponsors desire to have their pension funds overfunded by a significant amount, as the contributions to the pension fund might have been better employed for other purposes. Hence the maximum target for overfunding has been capped at 110 percent.

**Chart 2: Volatility of Corporate Income Before Tax Based on 80% of Full Funding**



**Chart 3: Volatility of Corporate Income Before Tax Based on 110% of Full Funding**



From these charts it can be seen that it is the asset mix that has a greater impact on reducing volatility of corporate income before tax, than does the funding level. However, the lower the level of funding is, the greater the potential for negative corporate income. However, given that over the study period investment return exceeds interest cost, the plan with 80 percent funding has lower volatility of corporate income, as shown in the following table.

**Table 7: Volatility Measures of Corporate Income Different Funding Levels**

| Asset Mix                     | Mean – 80% Funding | Standard Deviation – 80% Funding | Mean – 110% Funding | Standard Deviation – 110% Funding |
|-------------------------------|--------------------|----------------------------------|---------------------|-----------------------------------|
| 60% Equity – 40% Fixed Income | -156               | 1,170                            | 99                  | 1,596                             |
| 40% Equity – 60% Fixed Income | -200               | 916                              | 165                 | 1,304                             |
| 100% Fixed Income             | -68                | 575                              | 221                 | 793                               |



#### **4. Alternative Plan Design**

Accompanying the concern regarding the impact of pension plan investment performance on volatility of corporate income has been an investigation of alternative DBPP designs that might make the cost of the pension plan more manageable, and hence have a positive impact with respect to corporate income. In this regard, a potential design is to replace the FAE formula with a CAE formula that could be updated periodically. If there are periodic updates, then this approach will deliver approximately the same pension benefit as a comparable FAE plan. However, from a funding perspective, the current service cost is less, since the value of CAE benefits does not include an allowance for future salary increases. When an upgrade is made it is viewed as a past service amendment and the past service cost may be paid from plan surplus or may be spread into the future for 15 years (in Canada). In developing the basis for this paper, it was decided to analyze the impact of this revised pension plan design on the volatility of corporate income.

A review of the accounting standards for CAE plans with periodic upgrades indicates there are two significant differences between accounting practice and funding practice. The accounting standards require that earnings be projected for the full career using a salary scale and then benefits be prorated on service, whereas the funding practice is not to include a salary scale. The accounting standards also require that where there is an established pattern of providing upgrades, then this should be treated as part of the plan design and should be included in the determination of pension expense, whereas the funding practice is to value the upgrade when it is granted.

The impact of these two differences in accounting standards from funding practice means that a CAE plan with periodic upgrades would have its pension expense determined in a similar manner to a comparable FAE plan. Consequently, this revised plan design would not affect the calculation of pension expense.

One area in which the analysis might be impacted is the following: The funding requirements for a CAE plan with periodic upgrades would be less than a comparable FAE plan; however, the pension expense requirements for these two plans would be the same. Accordingly, if the plan were fully funded on a funding basis, it might be considered underfunded on a pension accounting basis. As shown in Chart 2, negative corporate income is more likely when the pension plan is deemed underfunded. However, if the likelihood of excess investment return is reduced, volatility of corporate income is also reduced.

#### **5. Conclusions**

The framework for analysis of volatility used in this paper is how pension expense will affect corporate income in the absence of smoothing adjustments. It treats a pension expense equal to the accruing benefits in the year less any funding contributions as the absence of a volatility effect on corporate income. In the absence of smoothing adjustments, this occurs when the investment return on assets is equal to the interest cost, i.e., the required return on obligations. Under the accounting standards, the value of obligations is calculated based on the long-term return on AA-rated corporate bonds. The paper shows that over the 12-year study period, investing the pension fund in a portfolio of fixed income securities would result in less volatility in corporate income. However, the typical approach to investing the pension fund's assets is to have an allocation to equities in the range of 40 to 60 percent. The paper

shows that such an asset allocation resulted in greater volatility of corporate income over the study period.

Of particular interest, over the study period, an investment in the portfolio of fixed income securities would have resulted in greater corporate income before tax, in aggregate, than having invested in either of the other two portfolios with significant equity allocations. This result contradicts a commonly expressed view that equities will provide greater returns in the long run (Siegel, 2008).

This result is remarkable. Some might query whether it occurs solely because of the study period selected. Table 8 shows that, for eight of the periods ending in 2010, this same result holds.

**Table 8: Total Corporate Income Before Tax Full Funding for Various Time Periods**

| Time Period Ending 2010 and Beginning | Asset Mix 1 | Asset Mix 2 | Asset Mix 3 |
|---------------------------------------|-------------|-------------|-------------|
| 2010                                  | 961         | 1,014       | 897         |
| 2009                                  | 2,596       | 2,545       | 780         |
| 2008                                  | -830        | -332        | 567         |
| 2007                                  | -1,190      | -688        | 160         |
| 2006                                  | -265        | -261        | -295        |
| 2005                                  | 675         | 671         | 775         |
| 2004                                  | 1,159       | 1,202       | 1,230       |
| 2003                                  | 2,632       | 2,525       | 1,813       |
| 2002                                  | 1,066       | 1,687       | 2,380       |
| 2001                                  | -502        | 516         | 2,026       |
| 2000                                  | -722        | 660         | 2,968       |
| 1999                                  | 169         | 881         | 1,501       |

It was not possible in this study to develop an investment portfolio to test that had very similar characteristics to the obligations. This would have required an analysis of the obligations, including information on duration and cash flows. However, it is my opinion that an investment portfolio that closely replicated the liabilities when calculated using the long-term return on AA-rated corporate bonds would reduce further the volatility impact on corporate income.

The extent of funding of the pension plan does not have as great an impact on the volatility of corporate income as does the investment policy of the pension plan. However, the lower the funded ratio, the greater the risk that the return on assets will not equal or exceed the required interest cost; hence, having a negative impact on corporate income.

In response to the variability in funding cost associated with FAE pension plans, some plan sponsors have been revising their plan to be a comparable CAE plan with periodic upgrades. For funding purposes, the current service cost is calculated based on the actual CAE benefits in place at the valuation date, and when there is an upgrade a past service liability arises, which may be paid from any surplus in the pension fund or in installments over a future period of 15 years. As noted in this paper, this approach to funding is not the approach to accounting. The accounting standard would require a CAE plan to use a salary scale, and such a plan that made periodic upgrades would be required to treat the plan design as one including upgrades. Accordingly, the value of accrued benefits would be calculated in a very similar manner to the way that they would be calculated for a comparable FAE plan.

The consequence to a company that maintained a CAE plan with regular upgrades is that the pension expense would be approximately the same but the plan would appear less well funded for accounting purposes than for funding purposes. As noted above, lower funded ratios for accounting purposes create a greater risk of the required interest cost not being met (or exceeded) and so increase the chance of negative corporate income.

It would be useful for the accountants and actuaries involved in setting accounting standards to discuss this difference in funding and accounting practice and to determine whether it is justifiable. This question is particularly relevant since the accounting standard is moving toward mark-to-market. In such a context, it would seem more appropriate in a CAE plan to base the valuation on the actual benefits, not the benefits involving salary projection and the assumption of future upgrades.

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