Comparison of Defined Benefit and Defined Contribution Pension Plans

Prepared for the SFU Faculty Association

Prepared by
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Background

At the request of the SFU Faculty Association (“SFUFA”), this report has been prepared to assist SFUFA members to better understand the value and features of defined benefit and defined contribution pension plans. The report presents a comparison between the SFU Academic Staff Pension Plan (a defined contribution pension plan) and the B.C. College Pension Plan (a defined benefit pension plan). The comparison is intended to provide members with information to better understand the differences between membership in the SFU Academic Staff Pension Plan and the B.C. College Pension Plan.

Defined Contribution (“DC Plan”) versus Defined Benefit (“DB Plan”)

The following table summarizes the main characteristics of DC Plans and DB Plans.

<table>
<thead>
<tr>
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<th>Defined Contribution</th>
<th>Defined Benefit</th>
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</thead>
<tbody>
<tr>
<td>Retirement Income at Retirement</td>
<td>Similar to a group RRSP. The amount of monthly income is unknown and has no guarantee until an annuity is purchased. Retirement income is based on the account balance and annuity purchase rates at retirement (or the post-retirement investment return if an annuity is not purchased).</td>
<td>Predefined formula contained in the plan rules – monthly income at retirement is dependent on salary and service. Example of a formula: 2% x years of service x highest average earnings = annual benefit. Retirement income is guaranteed, to the extent that the Plan is solvent.</td>
</tr>
<tr>
<td>Annuity Purchase Rate (Interest Rate) Risk</td>
<td>If a member purchases an annuity at retirement, the cost of the annuity purchase is dependent on interest rates at the time of purchase. The lower the interest rates are, the more expensive the cost of an annuity purchase is – the member’s account will produce a lower monthly pension as a result of the lower interest rates in place at retirement.</td>
<td>Annuity purchase rates do not have an impact on retirement income for the member at retirement.</td>
</tr>
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<td><strong>Contributions</strong></td>
<td>Contributions from the employer and/or member are allocated to each member’s account. Account balances increase each year with new contributions and are adjusted upwards or downwards based on actual investment returns net of all expenses, which can be significant. Members may choose how to invest their account balances, failing which, DC Plans contain a default investment option that may not be the best option for all members at all stages of their careers.</td>
<td>Contributions from the employer and/or member are put into a trust fund from which all pension payments are made. The Pension Board, with help from investment professionals, decides how best to invest the fund. To the degree that the Plan has a funding deficit, contribution increases are likely to occur in a jointly sponsored (employer and employee) model.</td>
</tr>
<tr>
<td><strong>Investment Risk</strong></td>
<td>Members bear all investment risk on an individual basis. Upturns and downturns in investment markets will directly affect member’s retirement income.</td>
<td>Investment risk is shared by all. Upturns and downturns in investment markets will not directly affect member’s retirement income. In most cases, funding shortfalls will be made up by increased contribution requirements (both member and employer).</td>
</tr>
<tr>
<td><strong>Longevity Risk</strong></td>
<td>Members bear longevity risk on an individual basis, i.e. the risk of running out of money in retirement. This can be mitigated through the purchase of an annuity at retirement.</td>
<td>Longevity risk is pooled. Some members may live a short life after retirement and some may live longer. As longevity improves the cost of benefits increases at the total plan level.</td>
</tr>
<tr>
<td><strong>Inflation Protection</strong></td>
<td>If the account balance is used to purchase an annuity at retirement, inflation protection can be attached to the benefit payments for an additional cost; otherwise no direct inflation protection.</td>
<td>Dependent on the plan design. Many plans have pre-retirement and post-retirement protection.</td>
</tr>
<tr>
<td><strong>Portability</strong></td>
<td>On termination of employment (including changing employers), members transfer their entire account balance to their locked-in RRSP or another DC plan.</td>
<td>On termination, the member may leave their earned pension in the Plan and collect a deferred pension or, prior to age 55, transfer out the commuted value of the benefit earned to their locked-in RRSP. Some DB Plans will allow a new member to transfer in his/her DB benefits from another DB Plan.</td>
</tr>
</tbody>
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As illustrated above, there is no right or simple answer to whether a DC Plan or DB Plan is better for members. Members at different ages and stages in their life will have different financial needs and experiences under the two plans.
For example, members who are just starting out in their career will have 20 or 30 years to accumulate assets/benefits in either a DC or DB Plan, whereas members who are close to retirement when they join a Plan will not have sufficient time to accumulate assets/benefit within the pension plan in order to provide sufficient retirement income. However, in general, the closer a member is to retirement the more valuable DB pension accruals become compared to DC pension accruals. This is especially true when the DB plan is a final average earnings plan like the B.C. College Pension Plan, because the benefit provided by the formula is generally greater than the member would earn under a DC Plan (i.e. there is not sufficient time for investment return growth on the DC contributions).

Members who switch jobs more frequently than average may be attracted to a DC Plan because they can simply transfer the account balance in the DC Plan to another DC Plan or the member’s registered retirement savings account.

With a DB Plan, the amount a member can transfer (commuted value) to his/her savings account on termination is calculated actuarially. For example, for two members with the same annual benefit earned at retirement age, and the same service and salary characteristics, a younger member will receive a smaller lump sum amount than an older member.

Financial Literacy / Investment Management Knowledge: DB plans do not require a large amount of financial literacy or expertise with managing investments on the part of members. However, with DC plans, members do require the ability to navigate various investment options that will be appropriate for their risk tolerance, rate of return requirements/expectations and stage in their career. The success or failure by a member to choose the right mix of investments will have a major impact on the amount of income available upon retirement.

Annuity Purchase Rate: From the members’ perspective, the annuity purchase rate is not relevant for DB plans. For DC Plans, if the member wishes to reduce their longevity and investment risks at retirement, they have the ability to purchase an annuity from a life insurance company. The cost of purchase is dependent on different factors, with the major determinant being interest rates. The lower the interest rate available from an insurance company, the more expensive it is to purchase an annuity. Similarly, the higher the interest rate available, the cheaper it is to purchase an annuity. It is very difficult to predict what level interest rates will be at any given future date; the fluctuations can be stressful for members who wish to select a retirement date based on factors unrelated to prevailing interest rates.

Reinvestment Rate After Retirement: For those who retire from a DC plan and do not wish to buy an annuity, the account balance is generally transferred out of the plan and into a locked-in retirement vehicle. For such members, the rate of return on their account balance after retirement will have a direct impact on the amount of benefits they have. We have included examples in this report (page 6) that illustrate this point.

In Summary: DB Plans provide a much more certain retirement income as benefits are based on a predefined formula which only looks at the member’s salary, years of service, and an accrual rate (found in the plan rules); whereas retirement income from a DC Plan depends on many factors that are hard to predict, specifically: investment management and performance before retirement, annuity
purchase rates at retirement (or if an annuity is not purchased, investment returns in retirement) and longevity. The central question for retirement in a DC Plan is whether you will run out of retirement funds during your life.

Risks to members (such as investment and longevity) are mitigated in DB plans through pooling; however, DC plans provide more flexibility and along with the risk of unfavourable investment returns is the potential for higher investment returns. The impact of investment return fluctuations is borne by individual members in a DC Plan, whereas in a DB Plan the group as a whole shares the risk. The plan that provides the highest level of retirement income is very dependent on a number of variables which are illustrated in the following pages.

SFU Academic Staff Pension Plan versus B.C. College Pension Plan

In this section, we compare the main benefit features of the SFU Academic Staff Pension Plan (a DC Plan) and the B.C. College Pension Plan (a DB Plan). Please note that the College Pension Plan will be changing some of its terms in 2016. The summary below and examples later on assume these changes have been put in place. The contribution changes to the College Pension Plan in 2016 are not known at this point, however we have made an assumption below that is in-line with the new benefit structure (also outlined below); the College Pension Plan Board ultimately has discretion of what level contributions will be.

Note that the College Pension Plan is a jointly sponsored pension model where both employers and members share the risk of increased contributions should investment performance come in below sufficient levels to provide for promised benefits.

<table>
<thead>
<tr>
<th>Retirement Income</th>
<th>SFU Academic Staff Pension Plan</th>
<th>B.C. College Pension Plan</th>
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<tr>
<td>Retirement income based on assets accumulated in member’s account, which in turn is highly dependent on investment returns, and annuity purchase rates (if an annuity is purchased). Benefit not known until retirement.</td>
<td><strong>Annual income at retirement:</strong> 2.0% x (Highest Average Salary) x years of service. Easily predicted amount of income at retirement. e.g. 2% x $100,000 (HAE) x 25 years = annual pension of $50,000</td>
<td></td>
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| Contributions (As noted above, the Board of the College Pension Plan has ultimate discretion of what the new contribution level will be once the new changes are implemented.) | **Employer:** 10% x basic salary e.g. Salary = $100,000; ER Contributions = $10,000 **Member:** Default is 0%. Voluntary contributions can be up to 9% of Salary e.g. Salary = $100,000; Contribution rate is 9%; Contributions = $9,000 | **Employer:** 10.45% x Salary e.g. Salary = $100,000; ER Contributions = $10,450 **Member:** 10.35% x Salary e.g. Salary = $100,000; EE Contributions = $10,350 |
Comparison of Defined Benefit and Defined Contribution Pension Plans

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<th>SFU Academic Staff Pension Plan</th>
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<tr>
<td><strong>Early Retirement Benefits (prior to age 65)</strong></td>
<td>If a member retires early, the amount of the account balance must be utilized over a longer period of time and will provide a smaller income than if the member retired later in their career.</td>
</tr>
</tbody>
</table>
| **Inflation Protection** | Can be purchased through the account balance, but at a cost which will lower the initial monthly income. | Lesser of:  
1. % change in CPI, or  
2. Sustainable indexing rate determined by the Pension Board  
Cost included in contributions. |

To help visualize what the impact of the above table has, in the following pages are a number of graphs that approximate the retirement income members could receive depending on their current age (which is the assumed entry age in the plan) and when they retire under various return scenarios. The assumptions used in these projections are as follows:

1. **DC member contribution rate**: 9% of salary (assumes members will maximize their contributions – this is also similar to the member contributions required for the DB plan considered for indexed benefits).

   Note: While we have assumed a 9% contribution rate by members to make an apples-to-apples comparison, this has not been the current experience. Currently, only about 3% of members make voluntary contributions, and those who do contribute make an approximate 5% contribution. Therefore current experience shows much lower contributions for the vast majority of members and therefore less available income upon retirement from the pension plan than what is illustrated below. Of course, members may be contributing to retirement savings outside of the pension plan; however, we do not have access to that information. The question for individual members is whether they are doing so, and if so, is the amount being saved sufficient for their projected income needs in retirement.

2. **Salary increase**: 3% per year for the first 10 years; 1.5% per year thereafter.

3. **Retirement age**: Members will work until retirement age (either 60, 65 or 70).

4. **Investment return**: Scenarios showing 5.0%, 6.0%, or 7.0% per year net of all expenses from start date to retirement age.

5. **Annuity purchase rate (or post retirement investment rate if an annuity is not purchased)**: 3.5%, 5.0% or 7.0%, net of all expenses; this assumption has a direct impact on DC retirement income. (Historical annuity purchase rate are shown below for reference.) As long-term interest rates decrease, the cost of annuities increases. As noted above, if the DC member did not purchase an annuity, this assumption can be thought of as the reinvestment rate after retirement.
The graph above illustrates the inverse relationship between interest rates and the amount of money necessary to fund a certain level of retirement income. This relationship holds when thinking about the purchase of an annuity or the rate of return required during retirement to fund your required income needs. The table below selects, from the graph above, a few interest rates and associated amounts required to fund an annual retirement income of $50,000 starting at age 65. As a comparison, a DB Plan such as the College Pension Plan provides an annual retirement income of $50,000 to a member that retired with 25 years of service and highest average earnings of $100,000.

<table>
<thead>
<tr>
<th>Non-Indexed Annuity Purchase Rate or Post-Retirement Rate of Return (Net of All Expenses)</th>
<th>Cost of $50K Annual Annuity with No Indexation</th>
<th>Cost of $50K Annual Annuity with Full Indexation</th>
</tr>
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<tbody>
<tr>
<td>2.05% (annuity purchase rate as of 12.31.2014)</td>
<td>$927,576</td>
<td>$1,158,249</td>
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<td>3.0%</td>
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<td>4.0%</td>
<td>$753,511</td>
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<tr>
<td>5.0%</td>
<td>$680,159</td>
<td>$932,922</td>
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Note: Annuity amounts above are based on a life annuity guaranteed for 10 years, at age 65, based on mortality rates from the CPM Combined 2014 table with a 50/50 male/female split.
Pre-Retirement Rate of Return: 6.0%; Post-Retirement Rate of Return: 3.5%

Graph 1  DB vs. DC Monthly Pension at Retirement (age 60):
Indexing: 2.0%, Pre-Ret Ret ROR: 6.0%, Post-Ret ROR: 3.5%

Graph 2  DB vs. DC Monthly Pension at Retirement (age 65):
Indexing: 2.0%, Pre-Ret ROR: 6.0%, Post-Ret ROR: 3.5%

Graph 3  DB vs. DC Monthly Pension at Retirement (age 70):
Indexing: 2.0%, Pre-Ret ROR: 6.0%, Post-Ret ROR: 3.5%

Analysis

With an assumption for pre-retirement investment returns at 6.0% per year and post-retirement investment returns at 3.5% per year net of all expenses, the member is better off in the DB Plan except when retirement is delayed to age 70 and the member entered at age 30 or 40 and when the member retires at age 65 and enters at age 30.

This example uses a slightly aggressive assumption prior to retirement and a relatively conservative assumption post-retirement (more in-line with non-indexed annuity purchase rates in 2014). In today’s annuity environment, even 3.5% would be considered aggressive.
Pre-Retirement Rate of Return: 5.0%; Post-Retirement Rate of Return: 5.0%

Analysis

With an assumption of both pre and post-retirement investment returns at 5.0% net of all expenses, the member is better off in the DB Plan except when retirement is delayed to age 70 or when the member entered at age 30 and retired at age 65.

This example uses a more realistic investment return assumption but caution must still be observed with the post-retirement return assumption. As the member moves into retirement, a more conservative, high fixed income, type of allocation is more suitable; this translates into a lower investment return. In this case, 5.0% may be an aggressive assumption.
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**Pre-Retirement Rate of Return: 7.0%; Post-Retirement Rate of Return: 7.0%**

**Analysis**

With an assumption of both pre and post-retirement investment returns at 7.0% per year, the member is better off in the DC Plan in almost all cases.

Caution must be observed with this example since a rate of return assumption that averages 7.0% per year net of expenses for the rest of the members’ life is likely unrealistic.

The typical member (with limited investment experience) will likely struggle to meet this assumed rate of return assumption.
Summary

Generally speaking, DC plans are more volatile and shift the majority of the financial risk onto a member compared with the employer and member jointly holding the financial risk in a Defined Benefit plan (under a jointly sponsored model like the College Pension Plan). Specifically, investment risk, inflation risk and longevity risk are more pronounced for a Defined Contribution member.

With the analysis in the report, we have looked at the current DC option that members belong to (SFU Academic Staff Pension Plan) and a potential DB option (B.C. College Pension Plan). There are scenarios where a member is better off in the DC plan; however, in some of those scenarios, the investment return assumptions tend to be aggressive. The other scenarios where DC tends to outperform are where members enter the plan at a young age and retire after age 65.

To complete a proper comparison, it is important to have similar contribution levels between the two plans. In our examples we have assumed a 9% employee voluntary contribution into the DC Plan. It is clear from actual experience that the voluntary contributions within the SFU Academic Staff Pension Plan are not fully utilized. As a result, members are encouraged to take stock of their total combined retirement savings, both within the DC Plan and in outside accounts such as RRSPs. When making comparisons, members can take into consideration their DC account balances along with other retirement savings to gain an appreciation of the relative benefits of a DC or DB Plan.

It is clear that if members are not making additional voluntary contributions to their DC Plan or other retirement vehicle, it is virtually impossible to match the level of retirement income that the DB Plan will provide. If members are maximizing contributions to their DC Plan and/or other retirement vehicles, and either annuity purchase rates and/or post retirement investment returns are favourable, the retirement income under both the DB and DC Plans will be comparable.

In an earlier table (reproduced here) we described the amount of funds required (either from a members’ DC account or personal retirement savings) to provide for $50,000 of annual retirement income at age 65.

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Note: Annuity amounts above are based on a life annuity guaranteed for 10 years, at age 65, based on mortality rates from the CPM Combined 2014 table with a 50/50 male/female split.
With a DB benefit similar to the College Pension Plan, this equates to a career with 25 years of service and highest average earnings of $100,000 (this is one of many scenarios to arrive at a pension of $50,000 per year). With those assumptions in place, the member could retire as early as age 60 with an indexed pension of $50,000 per year. As noted above, to receive a similar benefit with a DC Plan, a member would require approximately $1,000,000 at age 65 to produce a similar amount of benefit in the current interest rate environment (and even more funds if they want to secure this with an annuity to eliminate investment and mortality risk or to retire earlier than age 65).

In general, the financial literacy of pension plan members is not as strong as most professional advisors. Secondly, the contribution history within the current DC Plan suggests that most members do not contribute a significant portion of their earning to the Plan. Using these two facts, most members would be better off in a DB plan that forces savings, takes investment risk off the table and provides predictable pension income for the remainder of the members’ life.