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A System to Evaluate and Compare Defined Contribution Plans

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Employers in many sectors of the U.S. and Canadian economy have been moving from defined benefit retirement plans to defined contribution (DC) savings plans over the past 30 years. As reliance on DC programs increased, did the knowledge base of individual users—employees—keep pace?

Participants in these programs receive communications prepared by their employers about plan design and plan features. But how do participants obtain independent information on the effectiveness of a program? And how can a participant compare two programs from two different potential employers? Does a wide range of investment choices improve the expected income at retirement? Or is it better to join a plan with higher company contributions? How do you weigh the dizzying array of plan features against each other?

Who better to address these issues than retirement actuaries? Our training and experience are focused on building quantitative models to assess the likelihood of good and bad outcomes. But access to actuarial analysis has traditionally been limited to institutional entities such as employers or labor groups representing large numbers of employees. An individual employee must rely on information at hand, which too often is in the form of a glossy folder with large photographs and small words.

The Society of Actuaries (SOA) Pension Section Research Committee and researcher Marc Des Rosiers recently completed a project to address these needs: "A System to Evaluate and Compare Defined Contribution Plans."

We were guided by two analogies as we set goals for this project:

1. When you buy a laundry washing machine, how do you know if it is expected to last two years or 20 years? You're not a mechanical engineer, and even if you were it would be impractical to disassemble and examine each offered machine to see which is made of the best materials. Instead, you can read *Consumer Reports*' evaluation of your choices. There you'll find a set of quantitative criteria describing features and quality of a wide range of washing machines. You'll make a more informed buying decision.

   The DC Evaluation System we constructed enables potential employees to evaluate DC programs on a range of plan features, to assess and compare relative strengths and weaknesses among different plans.

2. When you visit the grocery store, how do you know which foods are the best nutritional choice? Instead of running food samples through your home chemical laboratory, you rely on the nutritional information panel. In a standard format, you see quantified calories, carbohydrates, vitamins and minerals. The buyer still must take the initiative to read and act on this information. And it can still be tempting to let your taste buds make bad choices! But at least information is accessible to enable buyers to improve nutritional outcomes.

   The DC Evaluation System presents measures of employer contributions, plan fees, auto features and other metrics that can drive retirement readiness. Individual users will still need to make sound employment and savings choices, but it is our hope they may now do so with more information about the effectiveness of offered DC savings plans.

The tool and methodology from this project are designed to be used by an actuary to produce output that is accessible and understandable to DC savings plan participants.

APPROACH

In this project, we developed a framework to evaluate the value and effectiveness of a DC plan that highlights strengths and weaknesses and considers in the evaluation not only quantitative, but qualitative features.

The framework can be used to evaluate plan provisions on a stand-alone basis, as well as factoring in success measures for

existing plans. The value of each feature is arrived at by comparing a feature to the range of possibilities in a particular industry or the plan universe as a whole.

A report, spreadsheet and presentation are available for download.[1]

As this is an emerging area of research, we tried to make the model as flexible as possible to allow for users to modify it for their own purpose and views. The model can be modified by changing the weight of individual features—or exclude them altogether.

Also, there is leeway in evaluating qualitative criteria depending on what is considered valuable. For example, a large menu of investment options may be desirable in some cases, but detrimental in others. The model allows the user to evaluate these features according to their own informed judgment.

OVERVIEW OF MODEL

The "value" of the plan is calculated as the weighted average value of each feature, and is a number between 0 and 100 percent. In other words, the plan value is arrived at using an objective function.

The objective function has two versions: one based on plan terms only, without regard to existing participant experience; and another, based on both plan terms and existing participant experience.

$$\text{Plan value} = (\text{Provisions}) \times w_1 + (\text{Adequacy}) \times w_2 + (\text{Other criteria}) \times w_3 + (\text{Plan success}) \times w_4$$

The sum of w_1 to w_4 is 1. All plan criteria are grouped under four main categories:

"Provisions" combines the value of features such as employer contribution levels, employer matching, investment fees and options, availability of retirement income solutions, vesting, eligibility, auto-enrollment and auto-escalation, and communications.

"Adequacy" provides a measure of the value provided by the plan to a career employee, based on expected replacement ratios, using a simplified calculation approach.

"Other criteria" includes items such as plan governance, investment monitoring and review process, risk management framework and compliance, and a host of other qualitative criteria for completeness.

"Plan success" is an evaluation of the participation levels and the appropriateness of participants' investing, using a simplified approach to quickly determine the value.

While quantitative criteria use formulae for determining their value, qualitative criteria use a simple scale of "poor," "fair," "good," "very good" or "excellent" that maps to values between 0 and 1.

ANALYTIC HIERARCHY PROCESS

The weights for the objective function are derived using the Analytic Hierarchy Process (AHP), a branch of operations research, invented by mathematician Thomas L. Saaty in the 1970s. AHP is a structured technique for organizing and analyzing complex decisions. This method ensures the importance of each criterion is consistent with each other.

Using AHP to calculate all the weights of the objective function is the "secret sauce" of the model. AHP is an application of linear algebra concepts, in particular "eigenvectors." Interestingly, some of these linear algebra concepts are also used in Google's PageRank algorithm!

Since there are so many criteria to combine together, determining weights intuitively introduces a subjective element that could lead to inconsistencies between criteria.

For example, suppose we have four criteria: A, B, C and D. Combining those needs consideration of the relative importance of all possible pairs: A and B, A and C, A and D, B and C, B and D, and C and D. This results in a two-dimensional matrix. Using AHP allows us to convert all these relationships to a one-dimensional vector. Moreover, the method provides tests for verifying the consistency of the weights derived with AHP.

SUMMARY

Our research proposed a methodology for quantifying the value of a DC plan, taking into account not only employer contributions and matching, but also plan design elements, such as auto-enrollment and auto-escalation, investment options, fees and other nonmonetary features.

This framework compares various plan features against a range of existing possibilities. The weights for the objective function use a structured approach to ensure consistency. The system can be used to compare one program with those of other employers in the same industry or geographical area.

This rating system is well-suited to highlight strengths or weaknesses of the programs under review and helps users compare programs using a rational approach.

The author and project team encourage interested practitioners to use the tool on an open source basis, and welcome suggestions for wider dissemination and improvements.

Marc Des Rosiers is lead researcher and author of this project. Dylan Porter initiated the project and led the SOA project oversight group. The project received excellent input from many contributors, who are acknowledged in the full project report. ■

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ENDNOTES

1 *https://www.soa.org/Research/Research-Projects/Pension/system-evaluate-contributions.aspx*