

Notice of Intent

Determination of Pension Commuted Values in Economic Environments Where Bond Yields are Negative

Actuarial Standards Board

January 2021

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MEMORANDUM

To: All Fellows, Affiliates, Associates and Correspondents of the Canadian Institute of Actuaries, and other interested parties

From: Josephine Marks, Chair
Actuarial Standards Board

Marshall Posner, Chair
Designated Group

Date: January 28, 2021

Subject: **Notice of Intent Regarding the Determination of Pension Commuted Values in Economic Environments where Bond Yields are Negative**

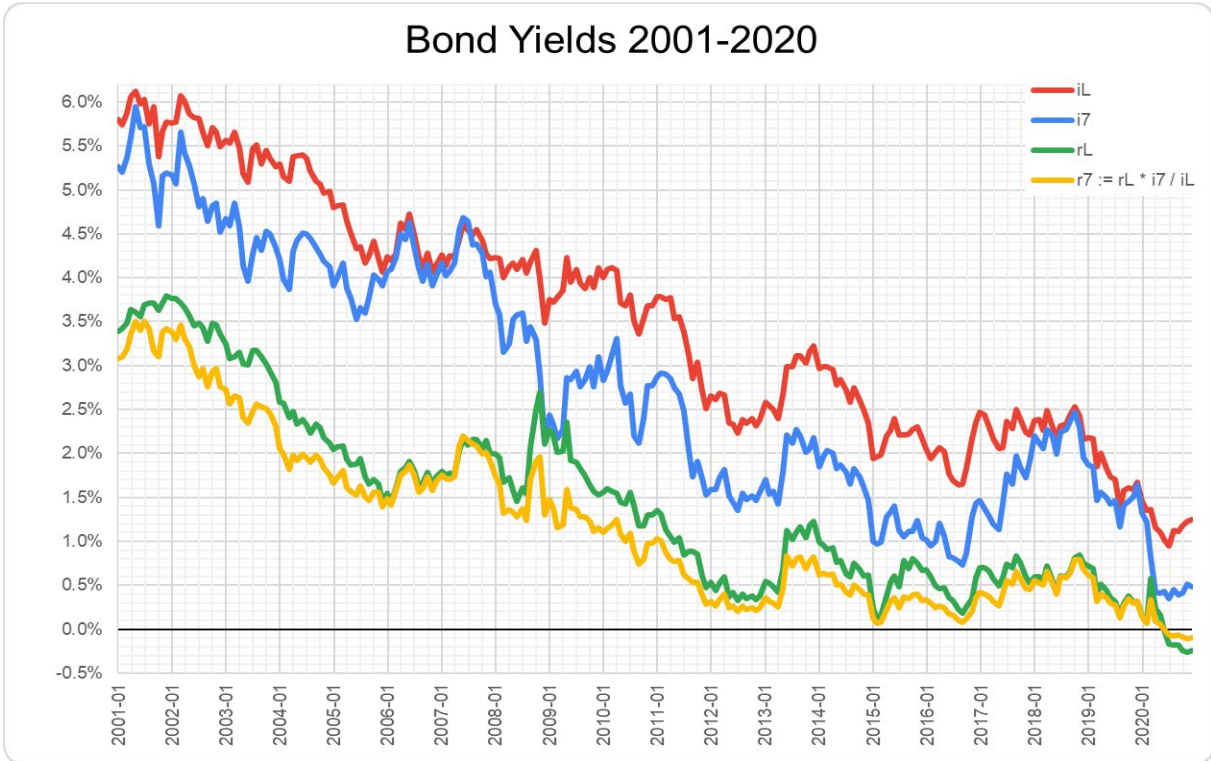
Comments Deadline: **February 19, 2021**

Background

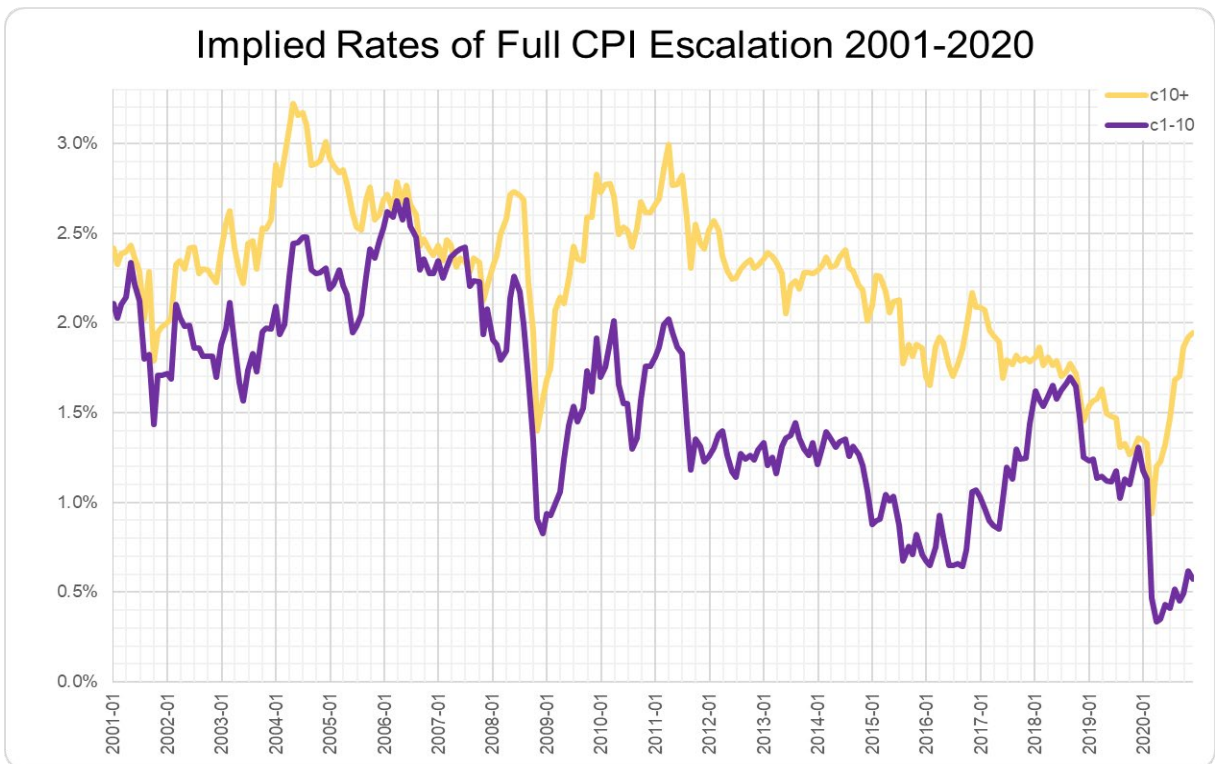
For many years, Government of Canada (GoC) bonds trading in secondary financial markets have been steadily trending to lower yields. Since mid-2020, yields on long term real return GoC bonds have been consistently below zero. This phenomenon has never occurred before in Canada. In various other world markets, long-dated bonds commonly considered risk-free (i.e., issued by financially stable governments) have also lately experienced negative yields – even nominal bonds have that distinction in some cases.

Section 3500 of the *Standards of Practice*, which applies to the actuary's advice on the computation of commuted values with respect to pension plans, includes direct references to GoC bond yields. At the time the various formula definitions in subsection 3540 were developed, bond yields were positive. This remained true during the recently-concluded review of Section 3500 which, among other things, resulted in changes to the methodology for calculating the bond yield spreads, and became effective on December 1, 2020.

Found in paragraph 3540.06, one particular formula of note is $r_7 = r_L * (i_7 / i_L)$. Because a public source is not readily available, this formula is intended to estimate r_7 , the yield on a seven-year real return GoC bond, based on publicly available yields of long-term real return GoC bonds (r_L), seven-year GoC benchmark non-indexed bonds (i_7), and long-term GoC benchmark non-indexed bonds (i_L). The Bank of Canada regularly publishes data to allow for easy computation of r_L , i_7 , and i_L . The recent decline in r_L to below zero raises the question as to whether formulas such as the one to estimate r_7 should be reviewed.



The four factors i_7 , i_L , r_7 , and r_L are used in other formulas within subsection 3540 to establish select and ultimate interest rates (i_{1-10} and i_{10+}), and, for pensions that are fully or partially indexed to inflation, select and ultimate rates of pension escalation (c_{1-10} and c_{10+} for full indexation).



With the recent decline in r_L to below zero, and a possibility that i_7 and even i_L could decline to below zero at some point in the future, the Actuarial Standards Board (ASB) established the Designated Group on Pension Commuted Values when Bond Yields are Negative (DG). The DG has the following mandate:

To recommend any changes to subsection 3540, particularly the formulas that develop the interest rates and rates of pension escalation for pension commuted values, to ensure these formulas are reasonable in economic environments where bond yields are zero or negative, and to ensure that these changes integrate with the rest of subsection 3540.

Preliminary efforts

The DG has discussed the matter and has the following observations and thoughts:

1. In times when $r_L < 0$ and $i_7 < i_L$, as has been the case since the middle of 2020, the formula for r_7 results in $r_7 > r_L$. This implies an inverted real yield curve when there is a normal upward sloping positive nominal yield curve. While this situation is certainly possible, it is inconsistent with the assumed relationship between r_7 and r_L in normal times, that is, $r_7 < r_L$ when $r_L > 0$ and $i_7 < i_L$. Perhaps more important is what this inconsistency means for the two rates of pension escalation, c_{1-10} and c_{10+} , defined in paragraph 3540.09. c_{1-10} is smaller than it otherwise would be and c_{10+} is larger than it otherwise would be, simply because r_L is negative.
2. It is plausible that yields will decrease further, to the point where both r_L and i_7 are negative. If that happens, then the result will be $r_7 > 0$ (assuming i_L is still positive). This situation implies a real yield curve with a slope having opposite sign to the nominal yield curve's slope and $c_{1-10} < 0$. In other words, an assumption of price deflation for the first 10 years. Again, this situation is possible, but it is not necessarily appropriate to anticipate deflation solely because the seven-year nominal bond yield is negative.
3. The formulas for r_7 , and by extension, c_{1-10} and c_{10+} , clearly result in inappropriate values if i_L either approaches or is equal to zero.
4. The DG's mandate is to adjust the formulas for calculating commuted value interest rates and rates of pension escalation to the extent needed to avoid implausible and arguably unintentional values for r_7 , c_{1-10} and c_{10+} in abnormal yield curve environments.
5. The DG does not intend to review or change the spread formulas in paragraphs 3540.06.1 and 3540.06.2.
6. The DG will only propose changes with prospective effect.
7. The DG does not intend to address fundamental aspects of the interest and escalation rates such as the number of tiers, the length of the select period, the CANSIM series used, or having a fixed or floating rate in the ultimate tier.

- 8 The DG reviewed some historical GoC bond data (not publicly available) for the period since 2014 (when the remaining term to maturity on the first ever GoC real return bond issued in 1991 reached seven years). For most historical periods available, the geometric difference between the yields on long non-indexed bonds and on long real return bonds has been very close to the geometric difference between the yields on seven-year non-indexed bonds and on interpolated seven-year real return bonds. In other words, the data suggest most of the time, the bond market behaves as though near-term inflation expectations are close to long-term inflation expectations. It should be stressed that the data are derived from a somewhat illiquid market with a relatively sparse number of data points. Nevertheless, if a CANSIM series existed on which r_7 could be directly computed (i.e., the yield on a seven year real return GoC bond), the data show that its rates would likely be close to $(1+i_7)/(1+BEIR) - 1$ where $BEIR$ is $(1+i_L)/(1+r_L) - 1$. This $BEIR$ formula matches the **break-even inflation rate** defined in paragraph 4530.09 in the actuarial evidence standards.
9. The DG is considering two different approaches for adjusting subsection 3540:
- For abnormal economic environments such as the one at the time of this publication where r_L is negative, **r_7 is assigned a value equal to r_L** . r_7 would retain its current form in normal economic environments.

For the month of January 2021, if this adjustment *i* was in effect, it would have resulted in increasing c_{1-10} from 0.57% p.a. to 0.72% p.a. and decreasing c_{10+} from 1.95% p.a. to 1.87% p.a. (ignoring rounding).

This approach is consistent with the existing formulas when long term real bond yields (r_L) are very close to zero.
 - For *any* economic environment, **c_{1-10+} and c_{10+} are both assigned a value equal to $(1+i_L)/(1+r_L) - 1$** . The formula for r_7 would be eliminated.

For the month of January 2021, if this adjustment *ii* was in effect, it would have resulted in increasing c_{1-10} from 0.57% p.a. to 1.49% p.a. and decreasing c_{10+} from 1.95% p.a. to 1.49% p.a. (ignoring rounding).
10. There is no intention to place a floor of zero on interest rates or rates of pension escalation used for commuted values. The DG advises practitioners to test that administration systems can perform calculations using negative interest rates.

Timeline

Given the potential urgency of effecting an appropriate change to the standards (in the event that bond yields decline significantly further), the ASB believes a short comment period is warranted, while respecting the ASB's due process and the public interest. After considering comments and feedback received on this notice of intent, the ASB is targeting to publish an exposure draft within a month following the comment deadline. The ASB may conclude at that time that a short comment period is again warranted.

If circumstances permit, the DG will coordinate with the three designated groups currently reviewing Part 3000 of the Standards, to attempt to minimize the number of exposure drafts published. However, with a desire to effect a change to standards before the economic environment changes further, it is likely that the ASB will publish an exposure draft on this topic alone.

Desired feedback

The DG and ASB are soliciting feedback on this notice of intent from members of the CIA and any other interested groups.

Feedback is welcomed on the proposals described above as well as the following questions:

1. Do you agree that the existing formula for estimated r_7 should be reconsidered when interest rates are negative, and that an adjustment is in order?
2. If you agree that the formula for r_7 should be modified, do you prefer the approach in paragraph 9*i* or in paragraph 9*ii* above and why? If neither, what other approach would you suggest?
3. Will a change to any of the formulas in subsection 3540 which are mentioned above, on short notice, cause problems for plan administrators to implement?
4. Do you have any other comments on the above observations and thoughts?

Please send comments **by February 19, 2021** to Marshall Posner at marshallposner@gmail.com, with a copy to Chris Fievoli at chris.fievoli@cia-ica.ca. No other forums for obtaining feedback are contemplated at this time.

The members of the DG are Lydia Audet, Gavin Benjamin, Doug Chandler, Marshall Posner (Chair), and Jingjing Xu.

The ASB's due process has been followed in the drafting of this notice of intent.

JEM, MP