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ASSESSING THE SUSTAINABILITY OF THE CANADA PENSION PLAN

OFFICE OF THE PARLIAMENTARY BUDGET OFFICER
BUREAU DU DIRECTEUR PARLEMENTAIRE DU BUDGET

The Parliamentary Budget Officer (PBO) supports Parliament by providing economic and financial analysis for the purposes of raising the quality of parliamentary debate and promoting greater budget transparency and accountability.

This report provides a reconciliation of the assessments of the sustainability of the Canada Pension Plan prepared by the Office of the Chief Actuary and the Parliamentary Budget Officer.

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Summary

This report provides a reconciliation of the assessments of the sustainability of the Canada Pension Plan (CPP) prepared by the Parliamentary Budget Officer (PBO) and the Office of the Chief Actuary (OCA). The report details the approaches used to assess sustainability and highlights key differences in assumptions, in particular the rate of return on assets.

In its November 2020 Fiscal Sustainability Report Update, PBO indicated that the current structure of the CPP was not sustainable over the long term, "albeit to a modest extent".

PBO's assessment stands in contrast to the statutory evaluation prepared by the OCA in the 30th Actuarial Report on the CPP, which confirmed that the legislated contribution rates were "sufficient to financially sustain both the base and additional CPP over the long term".

When assessed in a framework comparable to that used by the Office of the Chief Actuary, PBO's November 2020 projections of the base and additional CPP indicate that the legislated contribution rates would not be sufficient to financially sustain the plans over the long term.

PBO's assessment of the sustainability of the base and additional CPP is due to an assumed ultimate yield on long-term Government of Canada bonds that is 135 basis points lower compared to the 30th Actuarial Report (3.25 per cent versus 4.6 per cent, expressed in nominal terms). Based on PBO's methodology, this difference translates one-for-one into overall rates of return that are lower than assumed by the OCA.

If the same rate of return assumptions used by the OCA in the 30th Actuarial Report were applied, PBO would assess both the base and additional CPP to be sustainable.

That said, it is important to acknowledge the binary nature of sustainability assessments and the uncertainty surrounding long-term projections. Despite our significantly lower assumed rate of return, the adjustment required to achieve sustainability in PBO's framework is relatively small, amounting to 0.1 per cent of GDP annually for the base CPP. This result speaks to the solid funding structure underlying the CPP.

1. Introduction

In its February 2020 Fiscal Sustainability Report (FSR), PBO assessed the current structure of the Canada Pension Plan (CPP) to be sustainable over the long term.[1] In its November update, this assessment was downgraded due to lower rate of return assumptions.[2] PBO indicated that the current structure was not sustainable over the long term, "albeit to a modest extent".[3]

PBO's latest assessment stands in contrast to the statutory evaluation prepared by the Office of the Chief Actuary (OCA) in the 30th Actuarial Report on the CPP.[4] The 30th Actuarial Report (AR30) confirmed that the legislated contribution rates were "sufficient to financially sustain both the base and additional CPP over the long term".

This report provides a reconciliation of the assessments of the sustainability of the CPP prepared by the PBO and the OCA. The report details the approaches used to assess sustainability and highlights key differences in assumptions, in particular the rate of return on assets.

The approaches PBO and OCA use to assess sustainability share similar features. Both focus on the stability of the relative size of financial assets over the long term.

Consistent with its treatment of federal, provincial and territorial governments, PBO examines CPP assets relative to the size of the economy as measured by gross domestic product (GDP). Consistent with the financing and legislated framework of the CPP, the OCA examines CPP assets relative to expenditures (excluding investment expenses).

To quantify the extent to which the CPP is sustainable, PBO uses the fiscal gap. This measure is defined as the difference between the projected operating balance (contributions less total expenditures) and the "stabilizing" operating balance. The stabilizing balance returns the CPP asset-to-GDP ratio to its current level at the end of the projection horizon. If the projected operating balance exceeds the stabilizing operating balance (in present-value terms), the plan is sustainable. PBO also uses this measure to assess the long-term sustainability of governments' fiscal policies.[5]

Analogously, the OCA compares the statutory contribution rate to the minimum contribution rate, which is the lowest contribution rate that sustains the plan by stabilizing the asset-to-expenditure ratio at specific points in time over the projection horizon.[6] A statutory contribution rate that exceeds the minimum contribution rate indicates that the plan is sustainable.

To reconcile PBO's assessment of the sustainability of the CPP, we first detail our projections for the base and additional CPP underlying our November update results. Next, we recast our projections of the plans in the OCA asset-to-expenditure framework and calculate a steady-state contribution rate, which is similar to the minimum contribution rate used by the OCA.

Having placed PBO's November update projections within the OCA framework, we then examine the sensitivity of our results to the rate of return assumptions used by the OCA.[7] With the exception of this sensitivity analysis, all PBO projections are taken from the November 2020 FSR Update.

2. The Canada Pension Plan

The CPP is a defined benefit public plan that provides inflation-indexed retirement, disability, survivor and other benefits to working Canadians. These benefits are funded by contributions, which are shared equally between employees and employers.

Contributions that exceed the amount required to pay for benefits and operating expenses are invested in financial assets, which are managed by the CPP Investment Board (CPPIB). Returns from these assets provide an additional source of funding: investment income.[8] These assets will fund future cash shortfalls as the number of beneficiaries relative to contributors rises with the ageing of the population. This approach also reduces the financial burden on future contributors.

The CPP is comprised of the base plan and since January 2019, the additional plan. The additional plan is an enhancement of the benefits payable to recipients, the amount of which is dependent on the number of years for which contributions to the additional plan are made. The additional plan increases the replacement rate of pensionable earnings from one-quarter to one-third and increases maximum pensionable earnings by 14 per cent (by 2025).

As required by legislation, the OCA is the entity responsible for evaluating the sustainability of the CPP, which it does in its actuarial valuation reports every three years as laid out in the *Canada Pension Plan Act* and related regulations. In these reports, the OCA provides estimates based on best-estimate assumptions about future financial flows, estimates the minimum contribution rates required to ensure CPP revenues are sufficient to cover future benefit payments, and conducts sensitivity analysis on its best-estimates. The base and additional plans are assessed separately.

If the minimum contribution rate for the base plan is higher than the legislated rate, or if the minimum contribution rates for the additional plan are outside prescribed ranges (either higher or lower than the legislated rates), the CPP statute stipulates corrective measures that are automatically triggered if the federal and provincial Ministers of Finance do not agree on a course of action.[9]

3. PBO's assessment of CPP sustainability

Consistent with the treatment of public pension plans in the System of National Accounts, the Government Finance Statistics Manual and Statistics Canada's practices, we include the CPP in the general government sector.[10] Consequently, we assess the sustainability of the CPP using the same approach that is applied to the federal, provincial and territorial governments in our analysis.

Specifically, that means PBO evaluates the sustainability of the CPP by comparing the (net) asset-to-GDP ratio projected at the end of the 75-year period to the ratio observed in the base year. In our latest assessment, 2019 served as the base year and 2094 was the last year of our projection horizon.

Further, we calculate the fiscal gap for the CPP as the difference (in present-value terms) between the projected operating balance and the "stabilizing" operating balance.[11] The stabilizing balance returns the CPP asset-to-GDP ratio to its 2019 level at the end of the projection horizon in 2094. In this way, either contributions and/or benefits could be adjusted to close the fiscal gap (if necessary).

In PBO's November 2020 FSR Update, the estimated fiscal gap for the combined base and additional CPP was 0.1 per cent of GDP (rounded up from 0.054 per cent of GDP). Given PBO's convention of rounding to the nearest tenth of a percentage point, the CPP was very close to being assessed as "sustainable" based on the fiscal gap measure.

While the November update presented our assessment of the sustainability of the base and additional plan jointly, they were projected and assessed independently.[12] Results for the base and additional plans underlying our November update are presented below. Based on our projections and fiscal gap measure, we found that the base CPP was not sustainable, whereas the additional CPP was sustainable.

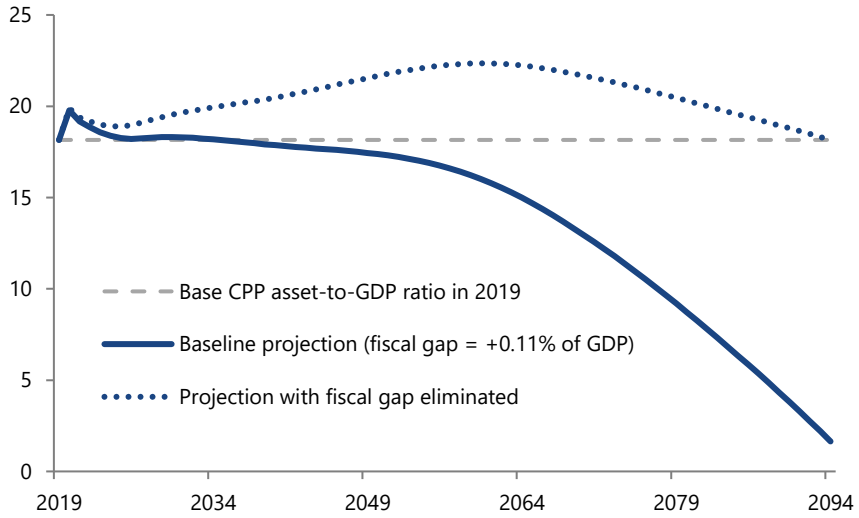
3.1. Base CPP assets relative to GDP

Under the current contribution rate and benefit structure, we projected that the base CPP asset-to-GDP ratio would decline steadily from 18.0 per cent of GDP in 2019 to 1.6 per cent after 75 years, resulting in a fiscal gap of 0.11 per cent of GDP (Figure 3-1). This deterioration reflects a larger-than-sustainable imbalance between contributions and expenses.[13]

To return the base CPP asset-to-GDP ratio to 18.0 per cent of GDP in 2094, we estimated that some combination of higher contributions and lower expenses, amounting to 0.11 per cent of GDP annually, would be required to close the fiscal gap (shown as the dotted line in Figure 3-1).

Figure 3-1 Base CPP asset-to-GDP ratio – PBO November 2020 FSR Update

Per cent of GDP



Sources: Statistics Canada and Parliamentary Budget Officer.

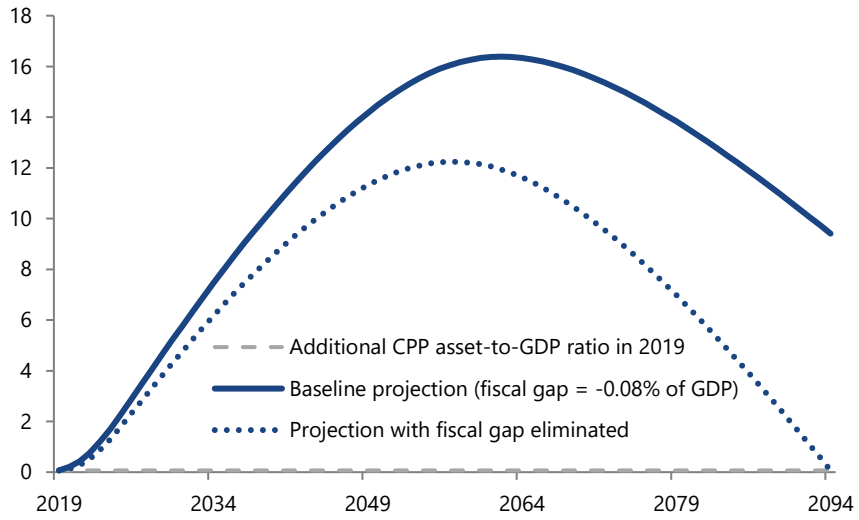
3.2. Additional CPP assets relative to GDP

For the additional plan underlying our November update, we projected that the asset-to-GDP ratio would reach 16.4 per cent of GDP in 2062 before falling to 9.4 per cent of GDP in 2094 (Figure 3-2).

Given that the initial asset-to-GDP position was effectively zero (with the inception of the plan in 2019), we estimated the fiscal gap for the additional plan to be –0.08 per cent of GDP. That is, there was room available to reduce contributions and/or increase expenses (by a total of 0.08 per cent of GDP annually), while returning the asset-to-GDP ratio to its current level after 75 years.

Figure 3-2 **Additional CPP asset-to-GDP ratio – PBO November 2020 FSR Update**

Per cent of GDP



Sources: Statistics Canada and Parliamentary Budget Officer.

4. The Office of the Chief Actuary's assessment of CPP sustainability

The CPP legislation and associated regulations require an actuarial evaluation to assess whether the legislated contributions rates are sufficient to finance the base and additional CPP over the long term.

Every three years the Chief Actuary is the entity responsible for reviewing the financial state of the CPP. To assess the base CPP, the Chief Actuary calculates the contribution rate such that asset-to-expenditure ratio is the same in the 13th and 63rd year following the date of the actuarial valuation,[14] taking into account any new or increase in benefits.[15] This rate is defined as the minimum contribution rate and the reference years in the 30th Actuarial Report are 2031 and 2081, respectively.

In AR30, the OCA estimated the minimum contribution rate for the base CPP plan to be 9.72 per cent (for the year 2034 and thereafter), which is somewhat lower than the legislated rate of 9.9 per cent. Thus, based on the statutory evaluation and the OCA projections, the base CPP is sustainable.

To assess the additional CPP, the Chief Actuary must determine the first and second minimum contribution rates such that the following three conditions are met: if the projected asset-to-expenditure ratios in the 50th and 60th year following the end of the review period are the same; future assets of the additional plan must be at least equal to future expenditures of the plan; and, the second additional contribution rate must equal four times the first additional contribution rate.[16] For the OCA's latest report, the stabilization years for the asset-to-expenditure ratio are 2088 and 2098, and the corresponding ratio for those years is equal to about 25.

Recall that the legislated first additional contribution rate (2.0 per cent) applies to base contributory earnings, while the legislated second additional contribution rate (8.0 per cent) applies to earnings between the Year's Maximum Pensionable Earnings (YMPE) and the Year's Additional Maximum Pensionable Earnings (YAMPE).

In AR30, the OCA estimated the first additional minimum contribution rate to be 1.98 per cent (for the year 2023 and thereafter) and the second additional minimum contribution rate to be 7.92 per cent (for the year 2024 and thereafter). Based on the statutory evaluation and the OCA projections, the additional CPP is sustainable.

The actuarial report itself presents projected data over a 75-year horizon following the end of the three-year review period.[17] For AR30, this means providing projections up to and including 2095.

5. Putting PBO's CPP projections in the OCA framework

To help reconcile the sustainability assessments, we first recast our projections of the plans in the OCA asset-to-expenditure framework and calculate a steady-state contribution rate, which is similar to the minimum contribution rate used by the OCA.

In its asset-to-expenditure framework, the OCA includes benefit payments and operating expenses but excludes the operating expenses of the CPPIB, which are accounted for in its investment expenses assumption. Consistent with the treatment in the Canadian Economic Accounts, PBO combines all operating expenses and projects them as an aggregate.[18]

To put the projections on a comparable basis, we use benefit payments as the expenditure against which assets are compared for both the PBO and OCA. Given that operating expenses (excluding investment expenses) are a marginal fraction of benefit payments, this adjustment does not materially affect the assessment of sustainability within the asset-to-expenditure framework.

However, switching from PBO's asset-to-GDP framework to OCA's framework raises the threshold for measuring sustainability, given that growth in expenditures is projected to outpace GDP growth over the long term due to population ageing.

For ease of explanation, hereafter, benefit payments are referred to as "expenditure" in the context of the asset-to-expenditure ratio.

5.1. Base CPP assets relative to expenditures

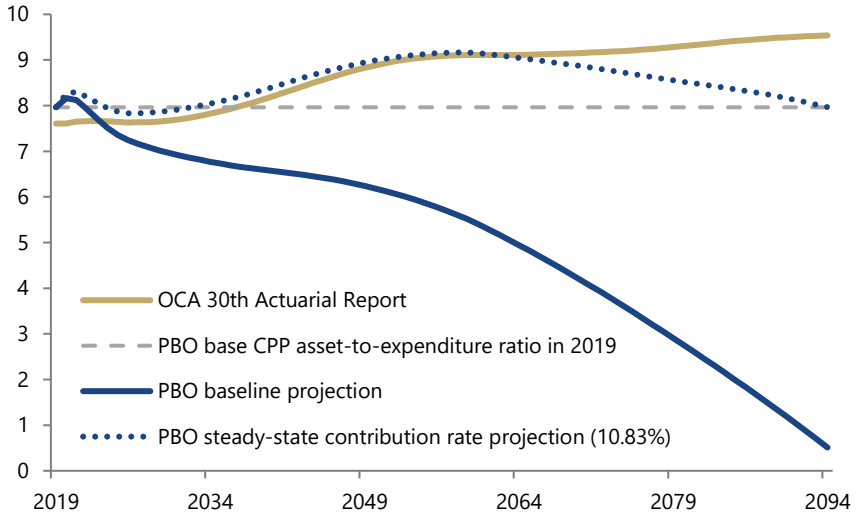
For the base CPP, PBO projects the asset-to-expenditure ratio to decline steadily over the long term, falling from 7.96 in 2019 to 0.51 in 2094 (Figure 5-1). This projected decline contrasts with the trend increase in the asset-to-expenditure projected in AR30, from 7.61 in 2019 to 9.54 in 2094.[19]

Similar in concept to the minimum contribution rate calculated by the OCA, we estimate a "steady-state" contribution rate for the base CPP, which is the

contribution rate (for 2020 and beyond) that returns the asset-to-expenditure ratio to its 2019 level at the end of the projection in 2094.

Based on PBO's projections from its November update, we estimate the steady-state contribution rate to be 10.83 per cent—almost a full percentage point higher than the legislated rate of 9.9 per cent—which indicates that the base plan is not sustainable using that definition.[20] This contrasts with the OCA's estimate of the minimum contribution rate of 9.72 per cent (for 2034 and thereafter) and its assessment that the legislated contribution rate is sufficient to finance the base plan over the long term.

Figure 5-1 Base CPP asset-to-expenditure ratio



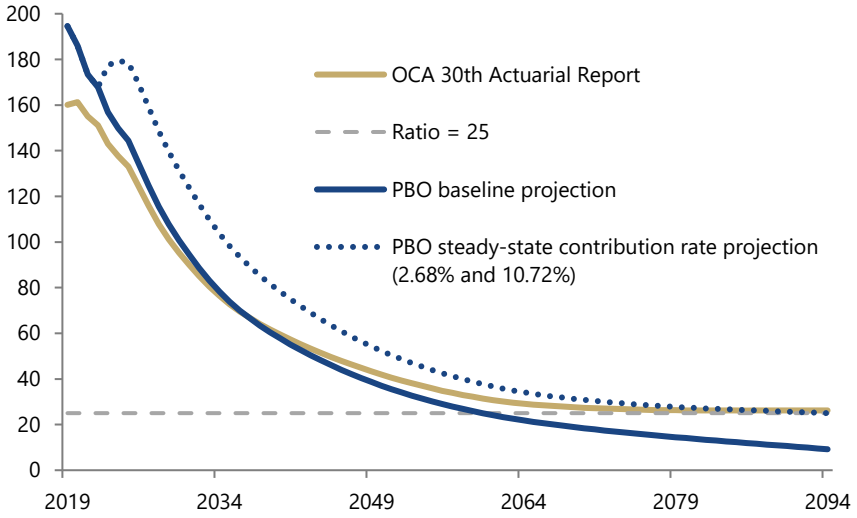
Sources: Statistics Canada, Office of the Chief Actuary and Parliamentary Budget Officer.

Notes: The PBO and OCA asset-to-expenditure ratios shown include benefit payments but exclude operating expenses.
The OCA projection from the 30th Actuarial Report is based on the legislated contribution rate of 9.9 per cent.

5.2. Additional CPP assets relative to expenditures

For the additional CPP, PBO projects the asset-to-expenditure ratio to decline steadily over the long term, falling from 195 in 2019 to 9 in 2094 (Figure 5-2). This decline is sharper than projected in AR30 where the asset-to-expenditure ratio falls from 160 in 2019 to 26 in 2094.

Figure 5-2 Additional CPP asset-to-expenditure ratio



Sources: Statistics Canada, Office of the Chief Actuary and Parliamentary Budget Officer.

Notes: The PBO and OCA asset-to-expenditure ratios shown include benefit payments but exclude operating expenses.
The steady-state contribution rates shown refer to the first and second additional contribution rates respectively.
The OCA projection from the 30th Actuarial Report is based on the legislated contribution rates of 2.0 per cent and 8.0 per cent.

Similar to the criteria used by the OCA, we use the asset-to-expenditure ratio of 25 and the 1:4 ratio for the first and second additional contribution rates, respectively, to calculate our steady-state contribution rates for the additional plan.[21]

Based on PBO's projections from its November update, we estimate the first and second additional steady-state contribution rates to be 2.68 per cent and 10.72 per cent, respectively, which are well above the legislated rates of 2.0 per cent and 8.0 per cent. These estimates also indicate that the additional plan is not sustainable based on PBO's projections.

This contrasts with the OCA's estimate of the first additional minimum contribution rate of 1.98 per cent (for 2023 and thereafter) and 7.92 per cent for the second additional minimum contribution rate (for 2024 and thereafter) in AR30, as well as its assessment that the legislated contribution rates are sufficient to finance the additional plan over the long term.

6. Rates of return on CPP assets

In this section we detail PBO's approach for determining the rate of return assumptions on CPP assets. To complete our reconciliation of PBO and OCA sustainability assessments, we then examine the sensitivity of our asset-to-expenditure projections to the rate of return assumptions used by the OCA.

6.1. PBO's rate of return assumptions

PBO incorporates OCA assumptions related to rates of return but adjusts them to account for differences in the benchmark or reference asset in the CPP portfolio (that is, the yield on long-term Government of Canada bonds).

The ultimate rate of return for a given plan (R) can be expressed as a weighted sum of the rates of return of the asset classes held in the portfolio (R_i), where the weights (α_i) represent the shares of each asset class in the total portfolio ($\Sigma_i \alpha_i = 1$). Given the return on the ("risk-free") benchmark asset (R_B), the total return on the portfolio (before active management and investment expenses[22]) can then be expressed as the benchmark return plus the weighted sum of the "risk premia" for each asset class (RP_i).

$$R = \sum_i \alpha_i \times R_i = R_B + \sum_i \alpha_i \times (R_i - R_B) = R_B + \sum_i \alpha_i \times RP_i$$

PBO's ultimate assumed rate of return for each plan applies the weighted sum of risk premia to its yield on long-term Government of Canada bonds. In this way, PBO's rate of return assumption is based on the same risk premia and portfolio asset shares as the OCA in AR30. Consistent with AR30, PBO assumes that annual inflation will be 2.0 per cent over the long term.

In AR30, the total nominal rate of return (before active management and investment expenses) for the base plan is assumed to be 6.21 per cent and 5.71 per cent for the additional plan over the long term. Including the additional rate of return due to active management increases the total nominal rate of return (before investment expenses) for the base plan to 7.01 per cent and to 6.24 per cent for the additional plan.

The ultimate nominal yield on long-term Government of Canada bonds in AR30 is assumed to be 4.6 per cent (2.6 per cent adjusted for inflation).[23] In contrast, PBO assumes that these long-term bonds will ultimately yield 3.25 per cent nominally (1.25 per cent adjusted for inflation). PBO's lower assumed long-term rate largely reflects a lower short-term rate—we assume that the nominal yield on 3-month treasury bills will be 2.2 per cent over the long term, while the OCA assumed a 3.0 per cent yield.[24]

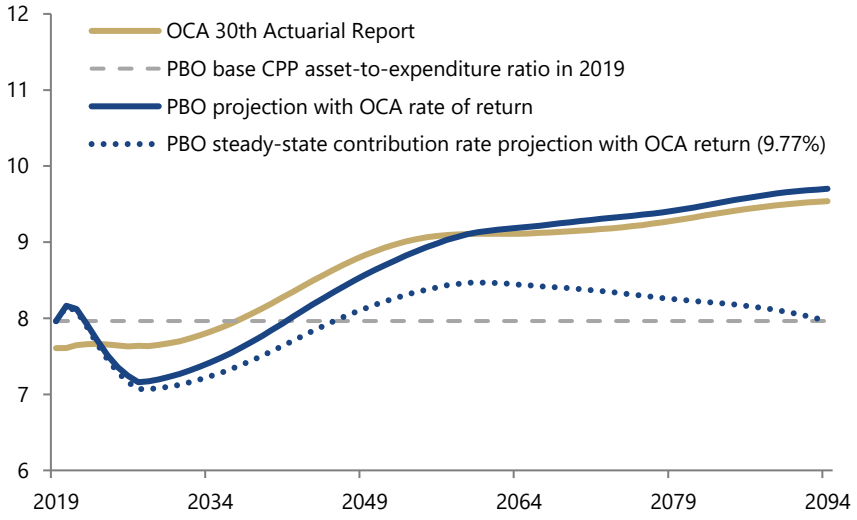
Thus, given PBO's approach to modelling the rate of return on CPP assets, this results in ultimate rates of return (before investment expenses) that are 135 basis points lower for both the base plan (5.66 versus 7.01 per cent) and the additional plan (4.89 versus 6.24 per cent) over the long term. Given the importance of investment income to financing the CPP and the impact of compounding this differential over several decades, such a difference significantly impacts PBO's projected path of assets under the base and additional CPP.

6.2. Sensitivity to rate of return assumption – base plan

To examine the sensitivity of our projected asset-to-expenditure ratios, we impose the AR30 total rate of return (before investment expenses) assumptions for the base and additional plans over the long term and re-calculate the steady-state contribution rates.[25]

Imposing the higher assumed rate of return from AR30 reverses the projected decline in PBO's asset-to-expenditure ratio for the base plan (Figure 6-1). By the end of the 75-year projection horizon, instead of declining to 0.5 (see Figure 5-1), the asset-to-expenditure ratio would reach 9.7 in 2094. Beyond the medium-term fluctuations (related to the COVID-19 pandemic and recovery), PBO's asset-to-expenditure ratio for the base plan broadly tracks the path projected by the OCA in AR30.

Figure 6-1 Base CPP asset-to-expenditure ratio



Sources: Office of the Chief Actuary and Parliamentary Budget Officer.

Notes: The PBO and OCA asset-to-expenditure ratios shown include benefit payments but exclude operating expenses.
The OCA rate of return assumption is imposed starting in 2028.

The OCA projection from the 30th Actuarial Report is based on the legislated contribution rate of 9.9 per cent.

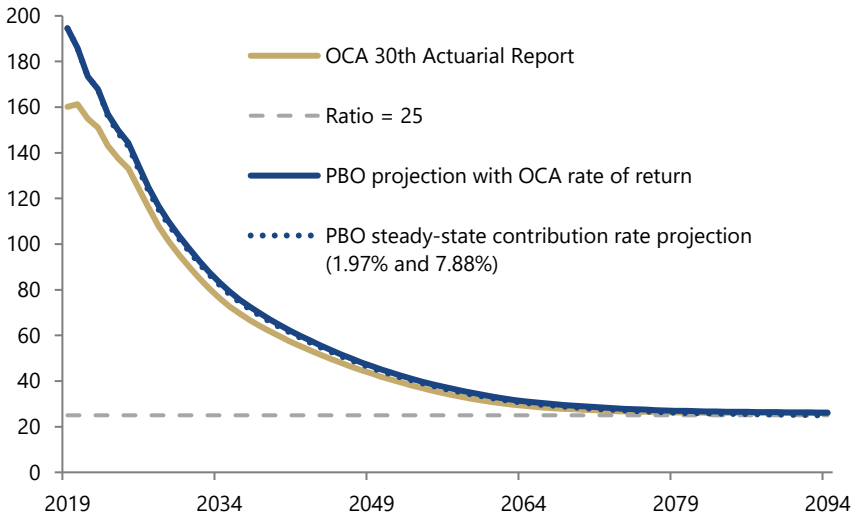
Under the AR30 rate of return assumption for the base plan, PBO's steady-state contribution rate would be 9.77 per cent, which is lower than the statutory contribution rate of 9.9 per cent. Despite different methodologies, PBO's estimated steady-state contribution rate is only slightly higher than the minimum contribution rate of 9.72 per cent (from 2034 onward) estimated by the OCA in AR30.

Based on PBO's fiscal gap measure, the higher assumed rate of return would improve the gap from 0.11 per cent of GDP (based on the November FSR Update), to –0.05 per cent of GDP. Both the steady-state contribution rate and fiscal gap measures would suggest that the base CPP would be sustainable under the (higher) AR30 rate of return assumption.

6.3. Sensitivity to rate of return assumption – additional plan

Imposing the higher assumed rate of return from AR30 moderates the projected decline in PBO's asset-to-expenditure ratio for the additional plan (Figure 6-2). By the end of the 75-year projection horizon, instead of declining to 9.2 (see Figure 5-2), the asset-to-expenditure ratio would reach 26.1 in 2094. Beyond the medium term, PBO's asset-to-expenditure ratio for the additional plan broadly tracks the path projected by the OCA in AR30.

Figure 6-2 Additional CPP asset-to-expenditure ratio



Sources: Office of the Chief Actuary and Parliamentary Budget Officer.

Notes: The PBO and OCA asset-to-expenditure ratios shown include benefit payments but exclude operating expenses.
The steady-state contribution rates shown refer to the first and second additional contribution rates respectively.

The OCA rate of return assumption is imposed starting in 2028.
The OCA projection from the 30th Actuarial Report is based on the legislated contribution rates of 2.0 per cent and 8.0 per cent.

Under the AR30 rate of return assumption for the additional plan, PBO's steady-state contribution rates would be 1.97 per cent and 7.88 per cent, which are lower than the statutory contribution rates of 2.0 per cent and 8.0 per cent, respectively. Despite different methodologies, PBO's estimated steady-state contribution rates are only slightly lower than the minimum contribution rates of 1.98 per cent (for 2023 and thereafter) and 7.92 per cent (for 2024 and thereafter) estimated by the OCA in AR30.

Based on PBO's fiscal gap measure, the higher assumed rate of return would further improve the gap from –0.08 per cent of GDP (based on the November FSR Update) to –0.13 per cent of GDP. Both the steady-state contribution rate and fiscal gap measures would suggest that the additional CPP would be sustainable under the (higher) AR30 rate of return assumption.

7. Conclusion

When assessed in a framework comparable to that used by the Office of the Chief Actuary, PBO's November 2020 projections of the base and additional CPP indicate that the legislated contribution rates would not be sufficient to financially sustain the plans over the long term. This finding stands in contrast to the statutory evaluation prepared by the OCA in the 30th Actuarial Report on the CPP.

PBO's assessment of the sustainability of the base and additional CPP is due to an assumed yield on long-term Government of Canada bonds that is 135 basis points lower compared to AR30 (3.25 per cent versus 4.6 per cent, expressed in nominal terms).

Given PBO's approach to constructing rates of return on CPP assets (that is, applying OCA "risk premium" assumptions to PBO's benchmark return), this difference translates one-for-one into rates of return for the base and additional plans that are 135 basis points lower than assumed by the OCA.

If the same rate of return assumptions used by the OCA in the 30th Actuarial Report were applied, PBO would assess both the base and additional CPP to be sustainable.

That said, it is important to acknowledge the binary nature of sustainability assessments and the uncertainty surrounding long-term projections. Despite our significantly lower assumed rate of return, the adjustment required to achieve sustainability in PBO's framework is relatively small, amounting to 0.1 per cent of GDP annually for the base CPP. This result speaks to the solid funding structure underlying the CPP.

Going forward, PBO will re-assess its use of OCA risk premium assumptions. In addition, in future fiscal sustainability reports, PBO will present complimentary projections and analysis of the CPP for the base and additional plans separately, as well as estimates of the steady-state contribution rates based on each plan's asset-to-expenditure ratio.

Notes

1. The February 2020 Fiscal Sustainability Report is available at: https://www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/RP-1920-029-S/RP-1920-029-S_en.pdf.

2. In the November update we revised down our ultimate nominal rate of return assumptions (including additional returns from active management but excluding investment expenses) by 40 basis points from 6.06 to 5.66 per cent for the base CPP and from 5.29 to 4.89 per cent for the additional CPP.

   This revision resulted from 40-basis point reductions to our assumptions for the yield on long-term Government of Canada bonds (from 3.65 to 3.25 per cent), primarily due to a lower estimate of the neutral policy interest rate (revised down by 25 basis points, from 2.5 per cent to 2.25 per cent).

3. The November 2020 FSR Update is available at: https://www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/RP-2021-033-S/RP-2021-033-S_en.pdf.

4. The 30th Actuarial Report on the CPP was tabled before Parliament on 10 December 2019. Available at: https://www.osfi-bsif.gc.ca/Eng/Docs/CPP30.pdf.

5. This fiscal gap approach has been used internationally by independent fiscal institutions and audit authorities. See for example, the U.S. Congressional Budget Office (https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51580-ltbo-2.pdf), The U.K. Office for Budget Responsibility (http://cdn.obr.uk/FSR_Jan17.pdf), the U.S. General Accountability Office (https://www.gao.gov/assets/690/682131.pdf) and the U.S. Federal Accounting Standards Advisory Board (https://files.fasab.gov/pdffiles/2020_fasab_handbook.pdf). International organizations such as the OECD also produce fiscal gap calculations (see Fiscal Consolidation: Part 3. Long-Run Projections and Fiscal Gap Calculations, OECD Economics Department Working Papers, No. 934).

6. For the additional plan, the minimum contribution rate must also meet a sufficiency requirement whereby the present value of the assets must be at least equal to the present value of obligations.

7. In constructing projections for its Fiscal Sustainability Reports, PBO calibrates its projections of contributions and benefits to the most recent CPP Actuarial Report. In this way, only differences in demographic and economic assumptions will lead to differences in contributions and benefits projected over the long term. See Annex E in PBO's 2014 FSR (https://www.pbo-dpb.gc.ca/web/default/files/files/files/FSR_2014.pdf) for a description of the calibration methodology.

   With the exception of the rate of return, key demographic and economic assumptions used by PBO and the OCA are, broadly speaking, generally consistent.

8. See Section 4.4.1 of Office of the Superintendent of Financial Institutions, "Actuarial Report (30th) on the Canada Pension Plan". Available at: https://www.osfi-bsif.gc.ca/Eng/oca-bac/ar-ra/cpp-rpc/Pages/cpp30.aspx.

9. See 113.1 in the *Pension Act*. Available at: https://laws-lois.justice.gc.ca/eng/acts/c-8/FullText.html#h-170786.

10. See the System of National Accounts 2008 (at: https://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf); the Government Finance Statistics Manual (at: https://www.imf.org/external/Pubs/FT/GFS/Manual/2014/gfsfinal.pdf); and Statistics Canada's Best Practices for Defining the Canadian Public Sector (at: https://www150.statcan.gc.ca/n1/pub/13-604-m/13-604-m2020001-eng.pdf).

11. See Appendix B in PBO's February 2020 Fiscal Sustainability Report for a technical definition.

12. Although the base and additional plans are legally distinct entities, for simplification, our overall assessment of CPP sustainability combines the two plans. Thus, our treatment assumes that excess funds in one plan could be used to offset shortfalls in the other.

    Due to the present-value nature of the fiscal gap calculation (where the rate of return is used to discount future values), the 0.05 per cent of GDP estimate of the combined gap differs (slightly) from the sum of the gaps for the base and additional plans when estimated separately (0.11 and –0.08 per cent of GDP, respectively).

13. Given the higher rate of return on CPP assets compared to GDP growth, the base plan could realize operating deficits (that is, contributions less expenses) over the long term while maintaining a stable (or possibly rising) asset-to-GDP ratio. This occurs because the rate of return on plan assets would generate enough investment income to cover ongoing operating deficits.

14. See C.2.1 in Office of the Superintendent of Financial Institutions, "Actuarial Report (30th) on the Canada Pension Plan". Available at: https://www.osfi-bsif.gc.ca/Eng/oca-bac/ar-ra/cpp-rpc/Pages/cpp30.aspx.

15. If there have been changes to the CPP such that there are new benefits or current benefits are enhanced, the Chief Actuary must also calculate the permanent change in the contribution rate that will cover the extra costs of the increased or new benefits plus the temporary increase that is required to fully pay any resulting unfunded liability. If the full funding rate (referring to the permanent change) before rounding to the nearest 0.01 percentage points is below 0.02, the fully funding rate will be deemed to equal zero. See Section 115(1.1)(c)(ii) of the *Pension Act*: https://laws-lois.justice.gc.ca/eng/acts/c-8/page-40.html#h-170786 and the "Calculation of Contribution Rates Regulations", 2007. Available at: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2008-50/page-1.html#h-747733.

16. This relationship is defined in the *Additional Canada Pension Plan Sustainability Regulations*, SOR/2021-6, https://laws-lois.justice.gc.ca/eng/regulations/SOR-2021-6/FullText.html.

17. There are legislative requirements for the year increments required for specific components. For example, the estimated revenues, investment income and payments are to be presented annually for the first thirty years

immediately following the examination date (that is, 2019, which is up to 2050 in the latest OCA report).

18. Thus, total expenditures include payments (that is, transfers to households and non-residents) and operating expenses (that is, gross current expenditure on goods and services).

    For both the base and additional plans, PBO assumes that total operating expenses (which include CPPIB operating expenses) amount to 1.0 per cent of assets for each plan. This differs somewhat from AR30, which projects plan operating expenses separately and assumes investment expenses (CPPIB operating expenses) equal 1.0 per cent of assets for the base plan and 0.66 per cent for the additional plan.

19. The difference in the 2019 ratio is due to differing data sources but also the fact the ratio from the OCA was a projection at the time AR30 was published. PBO's ratio used historical data from the System of National Accounts, whereas the OCA relies on information from the Canada Pension Plan Investment Board (CPPIB).

20. To illustrate the impact of assessing assets relative to expenditures (instead of relative to GDP) on the threshold for sustainability, we can compare steady-state contribution rates estimated under each framework. Based on the asset-to-GDP ratio, PBO's projection would imply a steady-state contribution rate of 10.54 per cent for the base plan, which is approximately 30 basis points lower than the rate based on the asset-to-expenditure ratio.

21. Strictly speaking, in the OCA framework, the ratio of 25 applies to additional CPP expenditures that include operating expenses (excluding those of the CPPIB). Given their relative size, we did not make an adjustment in our steady-state contribution rate estimates to account for removing these expenses.

    In our steady-state calculations, we impose the first additional contribution rate in 2023 and the second additional contribution rate in 2024.

22. The additional rate of return from active management represents "the added value produced by the CPPIB investment management" (see the Review of AR30 available at: https://www.osfi-bsif.gc.ca/Eng/Docs/cpp30-rev.pdf). In AR30, the additional rate of return for the base plan is assumed to be 0.80 per cent and 0.53 per cent for the additional plan. Active investment expenses for each plan were assumed to equal their additional returns and therefore, "no net value is added or lost by the CPPIB's investment management" (Review of AR30). Passive investment expenses were assumed to equal 0.20 per cent.

23. AR30 indicates that "the 75-year time horizon of this report warrants a long-term approach that is expected to be generally consistent with the historical long-term averages of federal bond yields".

24. PBO's assumed 2.2 per cent nominal yield on 3-month treasury bills is consistent with the Bank of Canada's mid-point estimate (2.25 per cent) of the neutral nominal policy interest rate. This rate is defined as "the real rate consistent with output remaining sustainably at its potential and with inflation at target, on an ongoing basis, plus 2 percent for inflation. It is a medium- to long-term equilibrium concept" (January 2021 *Monetary Policy Report*). The Bank of Canada's latest estimates of the neutral rate and

assessment are available at: https://www.bankofcanada.ca/wp-content/uploads/2020/10/san2020-24.pdf.

25. Given that AR30 was prepared prior to the COVID-19 pandemic, we maintained our November FSR Update assumptions for the rate of return through the medium term ending in 2027. The AR30 rates of return (before investment expenses) for both plans were imposed starting in 2028.