ORANGA TAMARIKI
Ministry for Children

Social Impact and Research

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Reducing youth reoffending in South Auckland Social Bond pilot: Cost Benefit Analysis

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The Oranga Tamariki Social Impact and Research team works to build the evidence base that helps us better understand wellbeing and what works to improve outcomes for New Zealand's children, young people and their whānau.

Email: research@ot.govt.nz

Author: Eyal Apatov

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Background

This report summarises the findings from a Cost Benefit Analysis (CBA) for the *Reducing Youth Reoffending in South Auckland Social Bonds Pilot*, the only Social Impact Bond (or Social Bond) that has been successfully issued in New Zealand to date.

Social Bonds are a type of pay-for-success contracting approach, where the government contracts private investors to fund a social service (via a service provider), paying them back, plus a return, if pre-determined outcomes set in the contract are met.

In September 2017, Oranga Tamariki (on behalf of the Crown) entered a six-year agreement with Genesis Youth Trust (GYT) to deliver an intervention aimed at reducing the frequency and severity of reoffending by South Auckland young people (rangatahi henceforth). Over the piloting period, 607 rangatahi who were referred by Police, have enrolled to the pilot. Once enrolled, they took part in a 20-week intensive programme which was followed by ongoing mentoring and monitoring for a period of up to 18 additional months (i.e., as needed).

Following the Social Bond contractual approach, the pilot was funded by non-government investors and were paid back in each assessment period if the participant reoffending outcomes outperformed the cohort/risk-level specific reoffending targets in the contract. Previous analysis indicated that the pilot had a stronger (positive) impact on participant reoffending outcomes compared to alternative – business-as-usual – interventions. This report builds on this work, to examine whether these benefits are sufficiently justifying the cost allocated for funding the pilot.

Costs

The cost of the pilot used in the analysis include both those related to setting up the contract, and the cost for operating it. Set up cost include resources provided by GYT, Oranga Tamariki, and any other relevant party for setting up the pilot (e.g., negotiating costs, advise to parties, contract set up, legal fees, due diligence). These were unknown to the author, and were assumed to have costed 10% of the direct operating cost. *Operational* costs included the direct expenses to finance the pilot (e.g., wages to GYT staff, material, and property rental) as well as the resources allocated by Oranga Tamariki to administer the contract (including evaluations and auditing costs).

Note that as a general approach for the analysis, assumptions relating costs and benefits were made so to have the effect of overstating costs and understating benefits. This was done so to ensure that any positive findings are not driven by these assumptions. Examples for this include assuming that the counterfactual had no cost, or that the full budget for funding the pilot was spent within the first year.

Combined, the pilot's estimated costs totalled to just over $7.5m (in 2017q3 price levels).

Benefits

Building on the work of Apatov and Spier (2024), which estimated that on average, the pilot led to an estimate of approximately 2 (1.976) fewer offences per participant during the two years following enrolment.

This was the only source of benefit for this analysis, resulting in about 1,200 avoided offences aggregately (nearly 2 offences for each of the 607 participants). Next, by applying the average cost of offending from CBAx ($12,348.7 per offence, 2017q3 price levels), the pilot's flow of benefits was estimated to total to a social value of $14.8m.

Net benefits

Following discounting of the costs and benefits using a 2% annual rate, the baseline scenario indicates that the Net Present Value (NPV) of the pilot was $6,222,495, and the Benefit-to-Cost (BCR) ratio was 1.83. Put differently, the baseline scenario suggests a social return of $1.83 for every $1 investment in the pilot. Compared with the pilot's CBA from Bakker (2023), these results are more modest, potentially due to including a shorter period of time for this analysis, only including avoided offences as a benefit, and as a general rule, and applying more conservative assumptions.

Next, while introducing a greater annual discount rate (8%), or inflating the costs by their (net) deadweight loss reduced the NPV and BCR, these were still positive and large, still in-line with the baseline scenario's findings. Assuming that the costs of the pilot in this analysis are correct, the flow of benefits will need to be about half their estimated size for the pilot to be less favourable than its business-as-usual type alternatives.

Speculatively, since the aggregate impact of the different assumptions taken in this analysis are likely to result in understating the true social benefits of the pilot, it is possible that the true social benefit of the pilot is much larger. However, to confirm this claim, the pilot's impact evaluation (Apatov & Spier, 2024) and the CBA would need to be reproduced in the future, when outcomes can be observed over longer periods of time, and potentially also including aspects that were out of scope in this analysis (e.g., examining non-reoffending outcomes, exploring spillovers).

Introduction

Social Impact Bonds, or Social Bonds, are a type of pay-for-success contracting approach that is used to fund interventions aimed at addressing social issues. In this approach, the government contracts private investors to fund a social service (via a service provider), paying them back, plus a return, if pre-determined outcomes set in the contract are met.

This report summarises the findings from a Cost Benefit Analysis (CBA) for the *Reducing Youth Reoffending in South Auckland Social Bonds Pilot*, the only bond that has been successfully issued in New Zealand to date.

The SB Pilot

In September 2017, Oranga Tamariki (on behalf of the Crown) entered a six-year agreement with Genesis Youth Trust (GYT) to deliver an intervention aimed at reducing the frequency and severity of reoffending by South Auckland young people (rangatahi henceforth).

The intervention was termed the *Reducing Youth Reoffending in South Auckland Social Bond Pilot* (pilot henceforth) and followed a Social Impact Bond contracting approach. As such, NZD$6m for pilot set up costs and operations were financed by non-governmental investors (New Zealand Superannuation Fund, Mint Asset Management, and the Wilberforce Foundation).

The pilot included a five-year period for enrolments, and an additional year to deliver the intervention to the remaining participants after the enrolment cut-off date (31 August 2022). The contract allowed enrolment for up to 1,000 rangatahi who offended, recorded a Youth Offending Risk Screening Tool (YORST) score[1] of between 40 and 100, and resided within the pilot's geographic boundary (mostly South Auckland suburbs).[2] In practice, 607 rangatahi enrolled (Apatov & Spier, 2024).

Referrals to the pilot were made by NZ Police, and once enrolled, rangatahi took part in a 20-week intensive programme,[3] followed by ongoing mentoring and monitoring for a period of up to 18 additional months (i.e., as needed).

To determine payments to investors, participant reoffending outcomes were assessed against cohort/risk-level specific reoffending targets that were set in the contract. These were assessed at six-monthly intervals, with NZD$24m set aside by

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1 The YORST score is the estimated risk of reoffending (e.g., a YORST score of 60 means the tool estimated the likelihood of the rangatahi reoffending was 60%). For more information about the use of YORST score by New Zealand Police, see Mossman (2016).

2 For the purposes of the pilot, South Auckland was defined as the suburbs of Mangere, Otahuhu, Papatoetoe, Otara, Onehunga, Mt Wellington, Glen Innes, Panmure, Orakei, Manurewa, Clendon, Takanini, Papakura, and Pukekohe. In practice, it is not clear how the boundaries of these suburbs were defined by Police.

3 Responses were structured around multidisciplinary teams that included social workers, counsellors, and youth workers/mentors. Once enrolled, the team prioritised addressing the immediate needs of the participant (e.g., food security), followed by a response tailored to address their specific immediate and longer-term needs. For more information, see Allen & Clarke (2023).

government (administered by Oranga Tamariki). For more information about the pilot, see Apatov & Spier (2024).

Related findings

Oranga Tamariki evaluated the pilot three times. The first two evaluations were largely qualitative, with the first focusing on learnings from the pilot implementation and operations (Malatest International and Oranga Tamariki, 2021), and the second on outcomes as perceived by the participants, their whānau, and other key stakeholders (Allen & Clarke, 2023).

The third evaluation was quantitative and focused on estimating the *causal* effects of the pilot on participant reoffending outcomes (Apatov & Spier, 2024). For this, participants were matched to a group of non-participants with similar recorded characteristics (including offending histories), but who were not referred to the pilot, and were treated by 'business-as-usual' (BAU) interventions instead. The evaluation estimated that the pilot led to a statistically significant reduction in the frequency of reoffending (but not severity).[4]

The pilot was also evaluated by Synergia (2023), who utilised data from the Stats NZ Integrated Data Infrastructure (IDI)[5] to explore the pilot's impact over participant reoffending, as well as non-reoffending outcomes (e.g., education, health, employment). Similarly to Apatov & Spier (2024), this evaluation applied matching to establish a comparison group and concluded that the pilot reduced reoffending frequency (i.e., compared with their matched comparison group).[6]

Using the findings from Synergia (2023), Bakker (2023) conducted a CBA for the pilot that included elements from both a financial and an economic CBA. For example, including interest payments to investors as pilot costs, not including the deadweight costs of taxation in the analysis, but using a society-level measure when monetising benefits (Treasury CBAx). Bakker (2023) calculated a Benefit-to-Cost-Ratio (BCR) of 2:1 within six years post-enrolment, and 12:1 over the lifetime of participants.[7]

Unfortunately, comparing these findings to other similar bonds that were issued in other jurisdictions is challenging, since only seven bonds (out of 298 issued globally) seem to target youth recidivism,[8] and of those, only one was evaluated using

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4 This finding was robust to alternative specifications and matching algorithms tested, and when examining specific sub-groups.

5 The Integrated Data Infrastructure (IDI) includes individual and household data from various survey and administrative records. For more information, see: Integrated Data Infrastructure | Stats NZ

6 The evaluation also found that (relative to the matched control group) participants were less likely to consume prescriptions and mental health services and were more likely to enrol in tertiary education and record higher incomes.

7 Since these periods (e.g., six years) were longer than those measured in Synergia (2023), Bakker (2023) made several assumptions regarding the longer-term trajectory of participants. When examining the BCR over participants lifetime outcomes, it seems that those were largely driven by the assumption that a portion of participants are life-course-persistent offenders, and that the pilot resulted in reducing their share by 2.5 percentage points.

8 These were three in the U.S. (NYC Adolescent Behavioral Learning Experience Project for Incarcerated Youth, the Massachusetts Juvenile Justice PFS Initiative, and Illinois Dually-Involved Youth Pay for Success Initiative), and one in each of U.K. (The Skill Mill), Australia (YouthChoices Social Benefit Bond), Portugal

quantitative methods with a deliberate attempt to establish a counterfactual.[9] The lack of robust quantitative evidence regarding bonds is not unique to bonds aimed at addressing youth recidivism, and has been highlighted as a key limitation for this contractual approach in subsequent reviews (Gustafsson-Wright et al., 2015; Fraser et al., 2016; Ten et al., 2021, Fox and Morris, 2021; Dahbi et al., 2024).

Analysis

As discussed, the goal of this report is to assess whether the improvement in SB pilot participant outcomes justified the resourced allocated to fund it. While a Cost Benefit Analysis (CBA) has already been produced for this pilot (Bakker, 2023), we produce a second one, since there were a number of decisions that were taken by Bakker (2023), we would like to revisit or change. These include:

- Using the estimated impacts from a different impact evaluation that had a stronger focus on causal inference (Apatov & Spier, 2024)
- Focus on the economic impacts of the pilot (Bakker approach mixed elements from both and economic and financial CBA), and
- Focusing on observed outcomes when estimating impacts, without making assumption of future trajectories (which has the impact of inflating the value of benefits).

Other than that, the approach taken can be thought of as a 'typical' CBA approach. This includes defining the counterfactual, the flow of costs and of benefits, incorporating the pilot's (net) deadweight loss, and presenting both the baseline results, and alternatives following a sensitivity analysis.

Since not all information is known, assumptions regarding some features of the pilots, as well as its costs and benefits need to be assumed. As a general approach for this CBA, all assumptions are made so to have the effect of overstating costs and understating benefits. This is done so to ensure that any positive findings are not driven by assumptions, and therefore, findings regarding the impact of the pilot will tend to be conservative. Note that unless stated otherwise, the assumed value of each of these will be at the price levels at the start of the pilot, or in 2017q3 price levels.

Counterfactual

By design, the pilot was intended to be an alternative to BAU responses within the Police Alternative Action (AA) diversionary space.[10] Briefly, AA is a type of a Police response that is aimed at diverting rangatahi who offended away from the formal

(Transforma O teu potencial), and Japan (Ministry of Justice – Japan Social Bond Pilot). For the full list, see Impact Bond Dataset (ox.ac.uk),

9 This was the New York based bond (ABLE) bond, which was discontinued after the first year as the treatment group's recidivism rate was not statistically different to that of the matched control group.

10 In the pilot's impact evaluation, Apatov & Spier (2024) found that 85% of participants recorded this Police outcome in the apprehension closest to enrolment.

youth justice system. Typically, AA targets newer offenders who committed offences of low to moderate seriousness.[11]

For simplicity, we assumed that in the absence of the pilot, *all* participants would have received a *typical* AA response from Police. More importantly for the analysis, since the costs of this *typical* AA response are not known,[12] we assume its cost was zero.

Costs

The costs of the pilot include the resources used at pilot *set-up*, and during its *operation*. In terms of *set-up* costs, these include resources provided by GYT, Oranga Tamariki, and any other relevant party for setting up the pilot (e.g., negotiating costs, advise to parties, contract set up, legal fees, due diligence). *Operational* costs include the direct expenses to finance the pilot (e.g., wages to GYT staff, material, and property rental) as well as the resources allocated by Oranga Tamariki to administer the contract (including evaluations and auditing costs). Note that since the counterfactual (BAU intervention) was assumed to have zero cost, all costs presented next can be thought of as incremental (i.e., above and beyond what BAU would have costed).

In terms of operational costs, previous evaluations indicated that investors paid G-Fund (the pilot's intermediary) $6m[13] to finance the pilot. Since the actual distribution of these fundings over the pilot's lifetime is confidential, it is assumed that the entire $6m was spent by the time the pilot began (i.e., year 0, or between September 2017 and August 2018). Again, this assumption is not realistic (e.g., more likely that spending was done over multiple years), and is made so to tilt any uncertainties towards overstating costs.

Oranga Tamariki assigned key personnel to manage the contract. In practice, this required less than a Full-Time-Equivalent (FTE) capacity, but since the true allocation of resources is not known, it is assumed to be equalling an annual cost of $120,000 throughout the piloting period (i.e., September 2017 to August 2023). In addition, Oranga Tamariki allocated resources for auditing and evaluating the pilot, presented in Table 1. Note that the true cost of two auditing done for the pilot is not known and is assumed to have costed $10,000 for the first audit (year 2), and $12,000 for the second (year 4). Similarly, since the impact evaluation (Apatov & Spier, 2024) was conducted internally, it is assumed to have costed the same as the external evaluations (i.e., $80,000).

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[11] For example, Apatov & Spier (2024) found that in most cases, participants' reoffending was not severe enough to require Oranga Tamariki intervention, resulting in only 30% having any prior Oranga Tamariki youth justice engagement. For more information about AA, see: https://www.police.govt.nz/sites/default/files/publications/alternative-actions-that-work.pdf

[12] AA is an umbrella term, and legislation gives Police autonomy to determine the best response. In some instances, this can be as simple as requesting that the rangatahi write an apology letter to the victim and to promise not to reoffend, while in others may include referral to specialist-led services.

[13] All dollar amounts shown in this report are in New Zealand Dollars (NZD).

Table 1 – Pilot's evaluation and auditing costs (nominal)

Year	Period	Activity	Cost
0	Sep 2017-Aug 2018	Evaluation strategy document	$10,000
2	Sep 2019-Aug 2020	Process evaluation	$80,000
2	Sep 2019-Aug 2020	External auditing	$10,000
3	Sep 2020-Aug 2021	Feasibility report	$20,000
4	Sep 2021-Aug 2022	External auditing	$12,000
6	Sep 2023-Aug 2024	Quantitative outcome evaluation	$80,000
6	Sep 2023-Aug 2024	Contracted advice for internal evaluation	$10,000

In terms of *set-up* costs, these are also unknown, and assumed to have costed 10% of the pilot's direct operational cost ($6m*10% = $600,000), and to be paid in full by the time the pilot started (year 0).

To summarise, Table 2 presents the annual and total costs of the pilot that will be used in this analysis. Column *Total* presents the nominal values, while column *2017q3* present these costs in 2017q3 price levels using Stats NZ Consumer Price Index (i.e., pilot start period). The table shows that pilot costs totalled just over $7.5m NZD, where nearly 90% of the total cost was spent in year 0. This unequal spend is driven by the assumption that the full $6m set aside to finance the pilot were all spent in year 0.[14]

Table 2 – Social Bond pilot costs

Year	Period	Operations	Evaluation & Auditing	Set up	Total	2017q3
0	Sep 2017-Aug 2018	$6,120,000	$10,000	$600,000	$6,730,000	$6,730,000
1	Sep 2018-Aug 2019	$120,000	-	-	$120,000	$120,000
2	Sep 2019-Aug 2020	$120,000	$90,000	-	$210,000	$207,046
3	Sep 2020-Aug 2021	$120,000	$20,000	-	$140,000	$139,068
4	Sep 2021-Aug 2022	$120,000	$12,000	-	$132,000	$130,903
5	Sep 2022-Aug 2023	$120,000	-	-	$120,000	$120,000
6	Sep 2023-Aug 2024	-	$90,000	-	$90,000	$71,382
Total		$6,600,000	$222,000	$600,000	$7,542,000	**$7,518,398**

Finally, payments to investors are not included as costs since they are transfers (as opposed to a resource allocated for operating the pilot). However, they will be used for calculating the pilot's (net) deadweight loss as part of the sensitivity analysis section.

Benefits

Pilot's benefits are sourced from the Oranga Tamariki impact evaluation (Apatov & Spier, 2024). The evaluation estimated participant reoffending outcomes ***relative*** to

[14] Note that when deflating costs, we assume that these were incurred in the first quarter of the year. This will reduce the impact of deflation on costs.

a control group that received BAU treatment, so all benefits are incremental by design.

The main finding of interest for this CBA is that, on average, the pilot led to an estimate of approximately 2 (1.976) fewer offences per participant during the two years following enrolment.[15] Therefore, to translate these into benefit flows, it is assumed that:

- The mean reduction (1.976 fewer offences per person) can be generalised to all participants, including those who had not reached the two-year milestone at the time the evaluation took place.[16]
- The reduction in mean offences occurred to *all* participants ***exactly*** two years after enrolment.
- No benefits occurred beyond the two years following enrolment (i.e., there were no longer-term benefits).
- The reduction in offending was the only benefit of the pilot (e.g., there were no improvements in health or educational outcomes).
- There were no spillover effects (e.g., to participants' peers or whānau).

That is, the assumptions above indicate that the only social benefits attributable to the pilot are from fewer offences committed by participants. In terms of the monetary value from fewer offences, we assume that the social benefit of each avoided cost is equal to that of the average offence (as in Roper & Thompson, 2006). In 2017q3 price levels, this is equal to $12,348.7 per offence.

Table 3 presents the flow of benefits from the pilot. *Enrolments* column shows the number of new enrolments to the pilot each year. Next, *Avoided offences* column multiplies the annual enrolments by the average reduction in reoffending (1.976) to produce the total number of offences avoided from the participants who enrolled in each year (and overall). Next, column *Benefits* monetises the number of avoided offences by the average cost of offence incident ($12.348.7 per offence). Finally, column *Realisation year* show the year the flow of benefits is realised. Since the analysis assumes that the reduction in reoffending occurs *exactly* two years after enrolment, the annual flow of benefits for each of the cohort will be realised *exactly* two years following enrolment.

The table shows that the greatest flow of benefits occurred for the first cohort of participants, reflecting their relatively large number. Overall, the table suggests that the pilot led to nearly 1,200 fewer offences being committed, with a social value of $14.8m (in 2017q3 prices).

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[15] The evaluation investigated other reoffending outcomes, but these were binary and therefore cannot be monetised using the Treasury CBAx tool. The evaluation also found an average reduction of 0.38 offences after one year, though it was not precisely estimated.

[16] This finding was for the 392 participants who enrolled sufficiently early to the pilot to have two years of outcome data at the time of the evaluation, and who met the study population's data quality criteria.

Table 3 – Estimated annual flow of benefits, 2017q3 price levels

Enrolment Year	Enrolments	Avoided offences	Benefits	Realisation year
0	134	265	$3,269,738	2019
1	151	298	$3,684,556	2020
2	112	221	$2,732,915	2021
3	118	233	$2,879,322	2022
4	92	182	$2,244,895	2023
Total	607	1,199	$14,811,426	-

Discount rate

The discount rate adjusts future costs and benefits, so they are represented in their present value. With a positive rate, this has the effect of decreasing the value of costs and benefits that materialises further into the future. The justification for discounting is justified by the fact that spending resources incurs an opportunity cost (e.g., resources today could be invested and produce more resources for use in the future), or from the assumption that people prefer to consume resources today more than in the future, and therefore future consumption is less 'valuable' (social rate of time preference). Following the advice of the New Zealand Treasury, we adopt an annual discount rate of 2%.[17]

Table 4 presents the discounted costs and benefits in each year, and overall. On the costs side, the table shows the values before and after discounting (back to year 0), with minimal impact on the overall costs. This small change is due to 90% of costs being incurred in year 0 (due to the assumptions). On the benefits side of the table, column *2017q3* presents the annual flow of benefits from Table 3. Next, column Two-year discounts the annual flow of benefits back two periods (i.e., years). This discounting occurs since the analysis assumes that the benefits will occur *exactly* two years following enrolment. Finally, column *Discounted* further discounts these annual benefit flows back to year 0 (as done with the costs). After discounting, total benefits fell by about 7% to just over $13.7m.

Table 4 - Discounted costs and benefits

Costs			Benefits (estimated)			
Year	2017q3	Discounted	Realisation year	2017q3	Two-year	Discounted
0	$6,730,000	$6,730,000	2019	$3,269,738	$3,142,770	$3,142,770
1	$120,000	$117,647	2020	$3,684,556	$3,541,480	$3,472,039
2	$207,046	$199,006	2021	$2,732,915	$2,626,793	$2,524,791
3	$139,068	$131,047	2022	$2,879,322	$2,767,514	$2,607,890
4	$130,903	$120,934	2023	$2,244,895	$2,157,723	$1,993,402
5	$120,000	$108,688	-	-	-	-
6	$71,382	$63,385	-	-	-	-
Total	$7,423,223	$7,470,707	-	$14,811,426	$14,236,280	$13,740,894

[17] For sensitivity checking, Treasury requires the findings to be re-evaluated using a rate of 8%. For more information, see: Discount Rates | The Treasury New Zealand.

Deadweight loss

Until recently, the New Zealand Treasury recommended inflating the cost of any social initiative by 20% to capture the deadweight cost of taxation in order take account of the pilot's opportunity cost (e.g., the funding could have been used to cut taxes). However, the most recent advice (October 2024) is not to include a deadweight loss. Therefore, deadweight loss is not included in the baseline scenario. However, it will be introduced as part of the testing the robustness of the findings in the sensitivity test section.

Findings

Baseline results

Combining the information collated so far, Table 5 presents the findings under the baseline scenario. The total cost of the pilot includes both *set-up* and *operations* costs, totalling to a Present Value (PV) of just over $7.5m. Since this is less than the present value of the pilot's associated benefits ($13.74m), the baseline scenario suggest that the pilot had a net positive effect. The Net Present Value (NPV) of the pilot is estimated as $6.2m, and its Benefit to Cost Ratio (BCR) is 1.83. This indicates a social return of $1.83 for every $1 that was invested in the pilot (i.e., a return on investment of 83%).

Table 5 – Net present value and benefit cost ratios

Term	Present Value (PV)
Costs (set up and operations)	$7,518,398
Benefits (reduced offending)	$13,740,894
Net Present Value (NPV)	$6,222,495
Benefit-to-Cost Ratio (BCR)	1.83

Sensitivity tests

Table 6 presents the results when the discount rate is increased to 8%. Using this greater rate does not qualitatively change the costs of the pilot (largely) due to the assumption that its direct operational costs were all spent in year 0. On the other hand, the estimated benefits have fallen by about 20%, reflecting both the fact that benefits flow annually, and the assumed two-year delay between enrolment and benefits materialising.

Using this higher discount rate has the impact of reducing the NPV by 77% (to $812,892) and the BCR to 1.51 (i.e., a social return of $1.51 for every $1 invested). The first test suggests that while (holding all other things fixed), the discount rate used has a significant effect on the findings, the NPV is still positive even after applying this (greater) rate.[18]

[18] The pilot breaks even when the discount rate is set at a rate of just over 10%.

Table 6 – Net present value and benefit cost ratios, 8% annual discount rate

Term	Present value
Costs (set up and operations)	$7,351,886
Benefits (reduced offending)	$11,111,250
Net Present Value (NPV)	$3,759,363
Benefit-to-Cost Ratio (BCR)	1.51

Next, the impact of introducing a deadweight loss to the pilot is re-examined. As mentioned previously, the deadweight loss of taxation measures the loss in economic output that was caused by the government collecting a new (i.e., marginal) tax to fund a service or initiative (such as the pilot). While in practice, it is not likely that tax collection would have been lower in the absence of the pilot, it is a common practice to account for this conceptually. For this, the previous guide from the New Zealand Treasury was to inflate the cost of the initiative by 20% (Treasury, 2015).

However using that same rationale, the pilot should also result in less taxes needed and collected, and therefore a deadweight 'gain'. That is, using the same logic for justifying the deadweight loss, since the pilot is expected to reduce the total number of future offences (i.e., due to lower participant reoffending), it should result in lower demand on the Justice system (e.g., Police investigations) and less taxes needed. Therefore, instead of simply inflating costs by 20%, a *net* deadweight loss is calculated, taking the difference between the pilot's deadweight loss and gain.

Table 7 presents the pilot's deadweight loss and 'gain' in each year. With respect to loss, column *Total* captures the payments made by Oranga Tamariki to G-Fund (and which was then passed to investors) in each period. This is based on actual records of payments from Oranga Tamariki finances. Next, these are deflating these to 2017q3 price levels to account for inflation. Note that the nominal payments to investors total to the same figure (NZD$16.2m) reported in Bakker (2023).[19] Also, note that in year 5, payments are negative. This reflect previous overpayments by Oranga Tamariki that are where later repaid.[20] Finally, the deadweight loss is calculated as 20% of these payments, totalling $3.5m.

In terms of estimated benefits, the table shows the deflated and discounted annual flow of benefits associated with reduced reoffending. Next, column *Public savings* is equal to 23% of the benefits from reduced offending, estimated as the proportion of these savings that is captured by the public sector (Roper & Thompson, 2006). Finally, column *Gain* is the deadweight 'gain' from these savings, equal to 20% of these public savings.

Next, Table 8 discounts the deadweight loss back to year 0 (gains were already discounted), and presenting the final figures in each period, and overall (column *Net*). The table shows that in most years, losses outweighed gains, resulting in an

[19] By nominal term, we refer to the observed value rather than, for example, an inflation adjusted value.
[20] In year 5, Oranga Tamariki requested G-Fund (the intermediary between GYT, Oranga Tamariki, and investors) to return all remaining surplus.

overall loss of nearly $2.9m. Finally, Table 9 presents the cost and benefits of the pilot when the (net) deadweight loss is included. In this scenario, the costs increase to just over $13.7m, resulting in an NPV Of $3.32m, and a BCR ratio of 1.32. Therefore, as when applying a greater discount rate, the impact of incorporating a (net) deadweight loss on the findings is significant, but not large enough for the costs to outweigh the benefits.

Table 7 – Deadweight loss and gain

	Costs			Benefits (estimated)		
Year	Total	2017q3	Loss	Total	Public savings	Gain
0	$273,000	$273,000	$54,600	$3,142,770	$722,837	$144,567
1	$3,430,106	$3,366,106	$686,021	$3,472,039	$798,569	$159,714
2	$6,495,831	$6,282,600	$1,299,166	$2,524,791	$580,702	$116,140
3	$8,623,008	$8,221,261	$1,724,602	$2,607,890	$599,815	$119,963
4	$4,934,732	$4,483,618	$986,946	$1,993,402	$458,483	$91,697
5	-$7,556,676	-$6,060,382	-$1,212,076	-	-	-
6	-		-	-	-	-
Total	$16,200,000	$16,566,203	$3,539,259	$13,740,894	$3,160,406	$632,081

Table 8 – Net deadweight loss

Year	Loss	Discounted loss	Gain	Net
0	$54,600	$54,600	$144,567	$89,967
1	$686,021	$672,570	$159,714	-$526,307
2	$1,299,166	$1,248,718	$116,140	-$1,183,026
3	$1,724,602	$1,625,131	$119,963	-$1,604,639
4	$986,946	$911,786	$91,697	-$895,250
5	-$1,212,076	-$1,097,815	-	$1,212,076
6	-	-	-	-
Total	$3,539,259	$3,414,989	$632,081	-$2,907,178

Table 9 - Net present value and benefit cost ratios with (net) deadweight loss

Term	Present value
Costs (set up and operations)	$7,518,398
Deadweight loss	$2,907,178
Cost + Deadweight loss	$10,425,576
Benefits (reduced offending)	$13,740,894
Net	$3,315,317
BCR	1.32

Next, a typical step in a CBA sensitivity section is proceed with relaxing different CBA assumption and examining the extent to which they impact the findings. However, since nearly all assumptions made in this analysis are conservative, it is perhaps not as interesting of an exercise, since the impact will always be to result in a greater NPV and BCR.

Instead, a different approach is taken, where the impacts of relaxing different assumptions are *indirectly* measured - by re-calculating the BCR when the costs and benefits are up to 50% below and above their baseline value.

In Table 10, each cell presents the BCR for a specific combination of increased or decreased costs and benefits. Each of the table's rows present a change in costs, while each column shows a change in benefits. For example, the cell in the second row and first column that the BCR of the pilot will fall to 1.52 if costs were 40% lower from their baseline value and benefits were 50% lower. Unsurprisingly, all diagonal cells (bolded in black) equal the baseline BCR (since both are scaled by the same proportional change). Finally, cells in red represent instances when the costs are greater than the benefits (i.e., BCR<1).

Overall, the table shows that under most scenarios, the benefits exceed the costs. For example, even if assuming the true costs of the pilot are 50% greater than those in the baseline scenario, (when i.e., holding benefits unchanged), the BCR of the pilot is still greater than one (1.22). With costs held fixed, the table suggests that the benefits must be about half as what they were estimated in the baseline scenario for the pilot to be less favourable than its BAU alternative. This required reduction is large, especially when considering the many assumptions taken that had the tendency of understating benefits and overstating costs.

Table 10 – BCR at different levels of costs and benefits (-/+50% from baseline)

Costs/Benefits	-50%	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%	50%
-50%	**1.83**	2.19	2.56	2.92	3.29	3.66	4.02	4.39	4.75	5.12	5.48
-40%	1.52	**1.83**	2.13	2.44	2.74	3.05	3.35	3.66	3.96	4.26	4.57
-30%	1.31	1.57	**1.83**	2.09	2.35	2.61	2.87	3.13	3.39	3.66	3.92
-20%	1.14	1.37	1.60	**1.83**	2.06	2.28	2.51	2.74	2.97	3.20	3.43
-10%	1.02	1.22	1.42	1.62	**1.83**	2.03	2.23	2.44	2.64	2.84	3.05
0%	0.91	1.10	1.28	1.46	1.64	**1.83**	2.01	2.19	2.38	2.56	2.74
10%	0.83	1.00	1.16	1.33	1.50	1.66	**1.83**	1.99	2.16	2.33	2.49
20%	0.76	0.91	1.07	1.22	1.37	1.52	1.68	**1.83**	1.98	2.13	2.28
30%	0.70	0.84	0.98	1.12	1.27	1.41	1.55	1.69	**1.83**	1.97	2.11
40%	0.65	0.78	0.91	1.04	1.17	1.31	1.44	1.57	1.70	**1.83**	1.96
50%	0.61	0.73	0.85	0.97	1.10	1.22	1.34	1.46	1.58	1.71	**1.83**

Conclusion

This report assessed a Cost Benefit Analysis for the Reducing Youth Reoffending in South Auckland Social Bond pilot.

The baseline findings suggest that even when applying many conservative assumptions, the pilot resulted in greater social value than the business-as-usual option (counterfactual). The baseline results suggest that a social return of $1.83 for every $1 invested in the pilot within two years of enrolment. While this ratio is lower than found in Bakker (2023), it may be explained by the difference in period included in the analysis and the number of benefits each CBA attributed to the pilot.

Speculatively, the aggregate impact of the different assumptions taken under the baseline scenario are likely to result in understating the true social benefits of the pilot. For example, it is more likely that the financing of the pilot occurred over its lifetime (rather than in year 0), that the pilot led to improvements for rangatahi other than just reducing their reoffending, that these improvements may have extended beyond the two-year mark, and that some benefits positively affected the whānau and peers of participants (positive spillover). Therefore, it is possible that the true social benefit of the pilot is much larger.

To examine this claim, the pilot's impact evaluation (Apatov & Spier, 2024) and the CBA could usefully be reproduced in the future, ideally including aspects that were out of scope for this analysis (e.g., using a longer follow-up period, examining outcomes other than just reoffending, examining spillovers etc).

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