Research and Development Tax Incentive (RDTI) Five-Year Evaluation

Final Report

Prepared by: Motu Economic and Public Policy Research & The University of Otago

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Authors: Dr. Tadhg Ryan-Charleton, Professor Conor O'Kane, Dr. David C. Maré, Dr. Dean Hyslop & Amelia Blamey, MCom.

15 May 2025

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Executive Summary

The Research and Development Tax Incentive (RDTI) was introduced on April 1, 2019, to encourage innovation by offering a 15% tax credit on eligible research and development (R&D) expenditure. It replaced the R&D Growth Grants scheme, which closed to new applicants in 2019 and was phased out in 2021. The RDTI has been subject to frequent modifications since its introduction, due, in part, to stakeholder feedback, Covid-19, and smoothing the transition process from R&D Growth Grants.

The legislation introducing the RDTI specifies that an objective and independent evaluation of the scheme be laid before the House of Representatives every five years. Motu Research have been engaged by MBIE to lead the first five-year evaluation. Motu are working with the University of Otago, who are contributing qualitative and subject-specific expertise to the evaluation.

We were asked to address five questions that focus on the impact of the RDTI (and of other types of government R&D support), as well as the RDTI's compliance costs, administrative processes, and legal requirements. We were also asked to consider a sixth question regarding how certain conclusions from our evaluation would be affected by changes to three specific policy settings.

We address these questions using a mixed methods approach, combining quantitative analysis of survey and administrative data with qualitative insights from interviews with key stakeholders. The quantitative approach relies primarily on statistical analysis of data from Statistics New Zealand's Longitudinal Business Database, with our descriptive analysis also drawing on other administrative data sources. The qualitative analysis uses data from 67 semi-structured interviews we conducted with 84 participants. This includes 41 interviews with firms, 10 with RDTI operational team members, 5 with policy experts, and 11 with professional tax advisors. All interview transcripts were analysed and coded individually for relevant insights. Substantive findings are based on qualitative themes aggregated across multiple stakeholders.

The six evaluation questions and our key conclusions are as follows.

A. What is the impact of the RDTI on R&D expenditure, innovation, and productivity in the economy as a whole?

In the first five years of the RDTI, 1,752 firms received support. This means that they received a tax credit or had a successful General Approval application in any of the five years. We estimate that $1,074m (nominal value) of tax credits will have been provided through the RDTI relating to the first five years. By 2023, firms receiving RDTI support accounted for 65% of total measured R&D expenditure (relative to the peak of 44% from Growth Grant supported firms).

The RDTI appears to have been more inclusive than the earlier R&D grants regime. Just over half of RDTI entrants had not previously been supported by Callaghan Innovation's grants and loans. Just under half of RDTI entrants had average R&D expenditure below the annual level associated with Growth Grant eligibility ($300k). Among firms that received multiple years of RDTI support, we see growth in support over time reflected in the average number of supported projects, RDTI-eligible R&D expenditure, and estimated total R&D expenditure.

We assess whether the observed increases in R&D among supported firms, as well as any changes in innovation and productivity, were attributable to the RDTI or would have occurred

anyway. To do so, our causal analysis employs a 'doubly-robust' estimation approach, controlling for how firm characteristics are related to who receives support, as well as to observed outcomes. We use propensity score weighting to account for bias in characteristics that may cause firms to select into government support. We then estimate the supported firms' counterfactual outcomes (in the absence of receiving RDTI support) using a weighted regression equation for a comparison of unsupported firms. The difference between the predicted outcomes with and without RDTI support is the estimated treatment effect associated with receiving RDTI support.

We find that firms supported by the RDTI spent more on R&D than they would have in the absence of RDTI support. The difference was stronger for smaller firms. Annual R&D expenditure was on average $274k higher per firm in real terms as a result of RDTI support (2020-2024). The total additional R&D expenditure generated by the RDTI was $1,833m (present value). The "bang for the buck" from the RDTI (additional expenditure per dollar of support provided) was approximately 1.4, which is similar to OECD benchmarks. The net impact of the RDTI across the five years was $221m, which reflects the additional R&D expenditure generated less total government costs.

There is some evidence that RDTI support raised innovation, but only two or more years after firms first receive RDTI support. The average increase after that point is 6.1 percentage points, although not all of the estimated effects are statistically significant. There is no evidence that RDTI support affected the productivity of supported firms, suggesting that private returns to R&D are not evident in the relatively short outcome window for which follow-up data are available. Our causal analysis suggests that output, capital inputs, intermediate inputs, and employment growth, were higher as a result of RDTI support.

Benefits that accrue to wider society from innovation are a core rationale for government support of business R&D. We draw on prior research which estimates the aggregate rate of return to GDP from business investment in R&D as a basis for projecting the overall economy-wide impact of the RDTI within a range of +/- 50%. The midpoint of the range is $6,774m. Relative to the $1,612m total investment made by the government, this suggests an overall economic impact of 4.2 times government investment.

Qualitative insights from businesses about the RDTI's impact are broadly consistent with quantitative findings. When comparing the RDTI with Growth Grants, many businesses reported that significant compliance costs associated with the RDTI were more than offset by the ability to access greater levels of R&D support. A majority reported that the RDTI had a positive impact on their R&D activities and business outcomes. Several firms with international operations explained that the RDTI is influential in attracting and retaining R&D work in New Zealand. Insights from across the spectrum of interviewees also provided a strong indication that businesses prefer policy stability, with the implication that instability leads to lower R&D expenditure and lower uptake.

B. What is the impact of government support for business R&D generally on R&D expenditure, innovation, and productivity in the economy as a whole?

After the creation of Callaghan Innovation in 2013, a wide range of earlier R&D support schemes operated by multiple granting agencies were streamlined into three Callaghan-administered grants—R&D Growth Grants, R&D Project Grants, and R&D Student Grants. In the context of this evaluation, "government support for business R&D generally" refers to these three schemes, as well as the RDTI, and the R&D Loan scheme introduced in response to Covid-19.

In the years before the RDTI was introduced, the three Callaghan-administered R&D grants were expanding. There were increases in the number of active and newly-approved grants each

year, with a significant number of grants going to previously unsupported firms. The RDTI's introduction meant that R&D Growth Grants were phased out. It also shaped subsequent decisions to close Project Grants and cap the appropriation for Student Grants.

To assess the causal impact of government support for business R&D generally we look separately at two different "treatments": receiving R&D Growth Grants and receiving any (of the five above) government support for business R&D. We find an annual increase in R&D expenditure of $429k per annum per firm as a result of Growth Grant support (2015-2019). The comparable annual increase in R&D expenditure from receiving any government support was $95k (2015-2024).

In total, Growth Grants generated $906m additional R&D expenditure over a five-pear period, and any government support generated $2,711m additional R&D expenditure over a ten-year period (both present value). The sum of estimated Growth Grant additionality ($906m) and RDTI additionality ($1,833m) slightly exceeds the total estimated additionality for all government support ($2,711m). This reflects the fact that each estimate has a margin of error. Taken together, it also suggests that Growth Grants and RDTI contribute by far the largest share of overall additionality from government support.

Neither Growth Grants, nor government R&D support generally, generated as much "bang for the buck" as the RDTI. The "bang for the buck" ratio was 0.83 from Growth Grants, and 0.83 for any government support for business R&D. The net impact of Growth Grants was -$471m across 2015-2019, suggesting that the scheme generated less additional R&D than government costs. Government support for business R&D generally (across the five schemes) generated $1,467m of R&D expenditure less than government costs. This result does not consider the value of R&D expenditure to non-R&D performers or to the economy as a whole.

Both Growth Grant support, and business R&D support generally, were associated with an increased rate of innovation of around 5 percentage points. There was no evidence that either treatment affected the productivity of supported firms. We find some indication that firms experienced increases in capital inputs and employment as a result of Growth Grant support.

The projected overall economic impact of Growth Grants (2015-2019) was $3,347m (midpoint of +/- 50% range). Relative to the $1,377m total investment made by the government, this suggests an economic impact of 2.43, which is significantly less than the equivalent ratio for the RDTI.

Across ten years of government investment in R&D support, the overall impact to the economy is projected to be $10,021m. Relative to the $4,178m total government investment, this suggests an economic impact of 2.4 times government investment.

The introduction of the RDTI compared favourably to a hypothetical scenario whereby Growth Grants continued for the same five-year period. In present value terms, the introduction of the RDTI was associated with $1,833m of total additional R&D, compared with a projected total of $1,478m from Growth Grant continuation. The bang for the buck ratio from the RDTI (1.4) was greater than the corresponding projection for Growth Grant continuation (0.95). Although innovation and productivity results appear similar for both schemes, it is inappropriate to compare these on a like-for-like basis given the short follow up period for the RDTI. A midrange projection of the impact on the economy as a whole relative to government spending was 2.8 for Growth Grant continuation (versus 4.2 for the RDTI).

C. Are compliance costs appropriate in the context of the policy intent?

Compliance costs experienced by firms seeking RDTI support include administrative, resource, and time costs required for obtaining pre-approval and completing supplementary returns, maintaining accurate records to substantiate claims, and responding to inquiries from administering agencies.

There are three primary drivers of compliance costs for firms, stemming from provisions put in place to mitigate against fraud. First, the documentation and record-keeping burden is ongoing and significant, involving identifying, assessing and recording eligible activities and expenditures. This was highlighted in interviews with firms across both the General Approval (GA) and Criteria and Methodologies (CAM) pathways. Beyond record-keeping, firms also reported significant costs from reviews and supplementary inquiries by the administering agencies.

Second, engaging professional advisory services is a significant compliance cost for many firms. Tax consultants play a central role in the pre-approval and supplementary return processes. Use of tax advisors increases in line with eligible R&D expenditure, from 25% among the low R&D expenditure firms interviewed to 100% among high R&D expenditure firms interviewed. The extent of support received from advisors depends on the complexity of the application or claim, the number of R&D activities involved, the firm's internal tax expertise, and its preference for external assistance.

Third, a significant cost for many firms was the effort required to efficiently capture and claim all eligible R&D activities, particularly smaller-scale projects. Across a variety of R&D expenditure categories, firms expressed concern that the administrative burden of documenting and proving technical uncertainty often outweighed the benefits of claiming, leading them to deliberately overlook eligible activities.

There are certain factors that help firms to limit or reduce compliance costs. Several firms were able to integrate or build on established R&D management and tracking processes when embedding RDTI compliance, rather than starting from scratch. There was also evidence that firms were able to learn from their previous experiences with the scheme and increase the support received over time. There is little evidence that firms are using Approved Research Providers (ARPs) as a vehicle to lower compliance costs.

The overall “appropriateness” of compliance costs depends on weighing the burden to firms against the policy intent, including the need to mitigate against non-compliance. The experiences of many businesses interviewed, and a vast majority of professional advisory firms, suggest that RDTI compliance costs are appropriate. Of the 39 firms interviewed who received RDTI support, just over half (51.2%) were broadly positive about the appropriateness of the compliance costs relative to the support received. Most of the other half (41.0%) perceived compliance costs as excessive relative to the incentive.

Nonetheless, low R&D expenditure firms faced disproportionately high compliance costs, making the scheme less attractive and, in some cases, financially unattractive. There was general consensus across our interviews that firms needed to be spending at least $300k-$500k on eligible R&D expenditure for the RDTI to be financially worthwhile. The drivers of compliance costs result in proportionately higher costs—and a proportionately lower incentive—for low spenders, which may explain their comparatively low uptake of RDTI support. Our assessment of scheme administration is also suggestive of avenues to improve the appropriateness of compliance costs.

D. Is the scheme being administered effectively, particularly in terms of the costs and the nature of interactions with stakeholders and participants?

The RDTI is administered through a tripartite agreement between the Ministry of Business, Innovation and Employment (MBIE), Inland Revenue (IR), and Callaghan Innovation (CI). MBIE (science, innovation and technology policy) and IR (tax policy) are joint policy leads for the RDTI. The RDTI is administered by IR and CI. IR is responsible for delivery of the scheme through the tax system. CI supports the scheme's delivery and operation through two teams, one focusing on customer engagement and another providing scientific and engineering expertise for RDTI technical assessments.

On balance, we find that the RDTI is being administered well and has continued to make improvements in important areas highlighted in previous reviews. Rates of approval have increased significantly, and average handling times have decreased as the scheme has matured.

The educational and on-boarding roles of CI's customer engagement team are adding significant value, particularly among smaller firms and lower R&D spenders. The CI assessment team have made further improvements in how criteria are applied when assessing the eligibility of R&D activities. Processing times have reduced. Many firms appreciated IR's efficiency, clarity relating to their Requests for Information, and pragmatic approach to immaterial issues.

Insights from the business and professional advisory sectors suggest that the customer experience has improved over time. There was almost unanimous agreement across all stakeholders that CI and IR had distinct roles, the roles were complementary and well aligned, and that overall, the RDTI team were working well collaboratively.

Our evaluation also points to administrative challenges. Most significantly, it appears that the pendulum has swung, with issues shifting from the initial overly restrictive application of eligibility tests during pre-approval (as highlighted in previous reviews of the scheme) to delays and unpredictability in the processing of Supplementary Returns (SRs). Despite decreases in SR handling times, the interviews highlighted frustration with delays and inconsistencies in SR processing. We suggest that this issue stems from fundamental operational and resourcing issues relating to how approved activities are interpreted as eligible expenditure at the SR stage.

E. Are taxpayers complying with the legal requirements of the regime, particularly those designed to ensure the funds are being used to support actual R&D?

Comprehensively answering Question E requires review and audit powers beyond those granted to us for the evaluation. We were not granted access to information about IR's approach to risk profiling, their methods of selecting claims for in-depth review, how many are selected, and the rate of disallowed expenditure and SR amendments during the scheme's first two years. In addition, IR have not recorded how many site visits and virtual audits of business R&D expenditure have taken place.

Based on available evidence, taxpayers appear to be complying with legal requirements. All interviewees were asked about the risk of non-compliance within the scheme. The majority of businesses said the risk was low and that they would need to be very determined and highly motivated to attempt to benefit fraudulently from the RDTI. Approximately 20% of firms said the level of due diligence was excessive and that fewer checks and balances could reduce compliance costs for business without increasing the fraud risk.

Inland Revenue take a vigorous approach to reviewing expenditure, with 43% of Supplementary Returns amended in 2022 and 18.5% in 2023. These rates of SRs revisions appear to reflect a greater level of expenditure scrutiny when compared with some overseas schemes. The

RDTI's legislative framework, which involves assessments at both pre-approval and Supplementary Return stages, seems well-equipped to mitigate against non-compliance.

Legal requirements to ensure funds are being used to support actual R&D also influence the appropriateness of compliance costs for firms. A stated policy goal when the RDTI was introduced was that a lower eligible R&D expenditure threshold (relative to Growth Grants) of $50k would make the RDTI accessible to firms that were previously unsupported. Although the current legislative framework appears robust for mitigating against fraud, it brings significant compliance costs that may be undermining this policy goal, at least among low R&D expenditure firms.

F. How do the following three policy settings affect the conclusions on questions A, C, D, and E?

Given the rate of recent change in New Zealand's approach to supporting business R&D, and the potentially positive impact of stability on business decision making, there appears to be a strong case for preserving a stable support mechanism in the medium term. To explore options to strengthen the scheme, we were asked to determine a suitable counterfactual scenario for each of three policy settings and consider how our conclusions might change as a result. For each setting, we present preliminary quantitative modelling and also consider the process-related implications of changing the policy settings.

The single rate for all businesses

Since the 2020 year, a uniform tax credit rate of 15% has been applied consistently across all eligible entities and expenditures. Given the proportionately higher compliance costs for low R&D expenditure firms, and the greater responsiveness of this subgroup to R&D support, we explore a counterfactual scenario involving a higher 20% tax credit rate for entities' first $300k of R&D expenditure. Our modelling suggests that this policy setting would have had a net negative impact (-$6.2m in present value terms), meaning that additional R&D generated would be less than the associated government costs. A majority of support would go to firms already spending more than $300k annually, for whom the marginal cost of additional R&D expenditure would not change.

This particular tiered approach would therefore require significant additional government investment, without significant additional incentive for business R&D activity in most cases. There may be other targeted ways to reduce RDTI compliance costs or increase support for low R&D expenditure firms; perhaps by streamlining the approval process or providing greater hands-on support at the outset of their RDTI journey.

The cap on overseas expenditure

Expenditure on R&D activities outside New Zealand can form up to 10% of an entity's total RDTI claim, provided the activities support a core R&D activity conducted in New Zealand. Based on Supplementary Returns records, 31% of firms' eligible overseas R&D expenditure is currently outside the existing cap. However, most overseas R&D expenditure comes from high R&D spenders, who are generally less responsive to R&D support. We explore the potential effects of increasing the overseas cap from 10% to 50% of an entity's total claim and suggest that this would have had a negative net impact (present value -$8.87m). Like the previous scenario, this means that government costs would have outweighed the additional R&D expenditure generated.

More broadly, it is unclear whether channelling additional support to overseas R&D expenditure results in benefits that are aligned with the policy intent. Although we acknowledge that certain firms are required to conduct some of their R&D programme overseas and would benefit from a less restrictive cap, changes to this setting may create a considerable administrative

and compliance burden. We also note the Minister's intention to prioritise support in areas that offer the greatest return to New Zealand.

The treatment of expenditure on software development

The RDTI, like many international R&D tax incentives, employs a rather restrictive approach to the eligibility of software R&D expenditure based on the OECD's Frascati manual. The wording and interpretation of the Frascati criterion relating to technological uncertainty is particularly problematic, as is the RDTI's requirement to define R&D activities and its exclusion of expenditure on internal administration software.

We explore a counterfactual setting involving an expanded definition of eligible R&D expenditure, which used Transitional Support Payments provided to ex-Growth Grant recipients as an imperfect measure of RDTI ineligible and Growth Grant eligible expenditure. The resulting projections were highly imprecise. Instead, we suggest that the significant frustration among businesses and administrators may be a more appropriate barometer of the actual impact that an improved software setting could achieve.

Recognising that the original design of the RDTI placed a lot of emphasis on ensuring that only activities involving genuine scientific or technological uncertainty qualified as R&D, we highlight opportunities to revisit the RDTI's approach to software R&D, how rules in this area are communicated to businesses and implemented by agencies, and the potential for other complementary policies to support software-related R&D.

Acknowledgements

We thank interviewees from across the business, government and professional advisory sectors. We are grateful to members of the RDTI Evaluation working group, as well as experts from across government, who generously imparted their expertise. Russell Thomson provided a detailed and constructive peer review on an earlier version. We also benefited from discussions with Arthur Grimes, Jonathan Haskel, Silvia Appelt, Fernando Galindo-Rueda, and Lorine Labrue. We acknowledge valuable research analysis provided by Hannah Kotula. The evaluation was commissioned and funded by MBIE.

Glossary table

ANZSIC	Industry classification: Australia and NZ Standard Industrial Classification (2006)
ARP	Approved Research Providers: organisations approved by Inland Revenue to provide R&D services under contract to other businesses
BERD	Business Expenditure on Research and Development
BFTB	"Bang For The Buck" ratio of additional R&D induced to support dollars provided
BOS	Statistics New Zealand's Business Operations Survey
Callaghan or CI	Callaghan Innovation – *Te Pakapū Auaha*: a government agency that supports innovation
CAM	Criteria and Methodologies Approval: a systems-based approval approach for determining eligible R&D activities and expenditure
CBA/ CBAx	Social cost benefit analysis (CBAx is a CBA tool developed by NZ Treasury)
External R&D	R&D funded or commissioned by a firm but conducted by a different entity
Externalities	(also called spillovers) positive or negative consequences of decisions that affect others but that are not taken into account by decision-making firms
GA	The General Approval pathway for RDTI pre-approval of eligible R&D activities
GDP	Gross Domestic Product
GIR	Gross incrementality ratio: a measure of input additionality (Appelt et al., 2023)
IA/ Input additionality	Additional R&D expenditure undertaken in response to R&D support
IAS 38	New Zealand Equivalent to International Accounting Standard relating to the accounting treatment of intangible assets
Internal R&D	R&D carried out in-house
IR or IRD	Inland Revenue – *Te Tari Taake*: New Zealand government tax agency
IR10 or I10	A "Financial Statements summary", provided by firms to IR
LBD	Statistics New Zealand's Longitudinal Business Database
MBIE	Ministry of Business Innovation and Employment – *Hīkina Whakatutuki*: the government agency that advises on business R&D and innovation policies
OECD	Organisation for Economic Co-operation and Development
R&D	Research and Development
RADS	Statistics New Zealand/ MBIE Research and Development Survey
RDExp	Research and development expenditure, as measured by the imputed measure documented in section B.1.5. (based on data from RAD, BOS and IR10 tax forms)
RDTI	New Zealand Research and Development Tax Incentive
R&DTI	Common abbreviation for the Australian R&D Tax Incentive
RDTI_RDExp	Total R&D expenditure, constructed from RDTI returns and approvals (See B.1.2)
RDTI_Elig	Total RDTI-eligible R&D expenditure, constructed from RDTI returns and approvals (See B.1.2)
RFI	Request for Information
RePEc	RePEc (Research Papers in Economics) provides rankings for economics journals, book series, working papers, and more
SP	Significant Performer: a high-R&D expenditure firm using the RDTI CAM pre-approval pathway
SR	The RDTI Supplementary Return submitted by firms to IR to claim RDTI tax credit
Supported firm	A firm receiving financial support for their R&D activity. In the case of the RDTI, this includes firms that have received pre-approval for supported activities
TRL	Technology readiness level: a scale for assessing the maturity of technologies
TSP	Transitional Support Payments – a temporary form of support intended to smoothen the RDTI transition for former Growth Grants recipients (see section 2.2.2).

1 Introduction and background

1.1 Statutory requirement

The Research and Development Tax Incentive (RDTI) was introduced on April 1, 2019, through an amendment (subpart LY) to the Income Tax Act 2007 and an amendment to the Tax Administration Act 1994. The RDTI encourages innovation by offering a 15% tax credit on eligible research and development (R&D) expenditure. At the time of introduction, the RDTI was the primary initiative to achieve the government's stated goal of increasing New Zealand's R&D expenditure to 2 per cent of gross domestic product (Callaghan Innovation, 2024; MBIE, 2023c).

The RDTI replaced the Growth Grant scheme, which was phased out on March 31, 2021. The RDTI was intended to be more inclusive than Growth Grants, broadening eligibility beyond the reported 316 firms receiving Growth Grant support in 2018 to potentially benefit up to 2,000 businesses (MBIE, 2018).

The RDTI is operated by the Ministry of Business, Innovation and Employment (MBIE), Inland Revenue (IR), and Callaghan Innovation (CI). MBIE are joint policy lead for the RDTI, with responsibility for science, innovation, and technology policy. IR is responsible for tax policy and for the delivery of the scheme through the tax system. CI supports the scheme's delivery and operation through two teams, one focusing on customer engagement and another providing scientific and engineering expertise for RDTI technical assessments.

The legislative amendment introducing the RDTI specified that an objective and independent evaluation of the RDTI be laid before the House of Representatives every five years. According to the amendment, the first five-year evaluation should occur after the 2024 tax year.[1]

Commissioned by MBIE, the first five-year evaluation addresses the mandatory evaluation criteria specified in section LY10 of the legislation. There are a total of six evaluation questions put forward by MBIE across three components.

The Impact Component

A. What is the impact of the RDTI on R&D expenditure, innovation, and productivity in the economy as a whole?

B. What is the impact of government support for business R&D generally on R&D expenditure, innovation, and productivity in the economy as a whole?

The Process Component

C. Are compliance costs appropriate in the context of the policy intent?

D. Is the scheme being administered effectively, particularly in terms of the costs and the nature of interactions with stakeholders and participants?

E. Are taxpayers complying with the legal requirements of the regime, particularly those designed to ensure the funds are being used to support actual R&D?

[1] Years are labelled according to their balance date throughout the report, unless stated. The 2024 tax year refers to the tax year ending on 31 March 2024.

The Additional Component

F. How do the following three policy settings affect the conclusions on questions A, C, D, and E?

- The single rate for all businesses
- The cap on overseas expenditure
- The treatment of expenditure on software development

1.2 Evaluation team

Motu Economic and Public Policy Research (henceforth "Motu") were engaged by MBIE to undertake the first five-year evaluation of the RDTI. Established in 2000 as an independent charitable trust, Motu is the top-ranked economic research group in New Zealand (based on RePEc rankings) and specialises in economic and public policy research. The evaluation team at Motu is led by Dr. David C. Maré, Dr. Dean Hyslop, and Dr. Tadhg Ryan-Charleton. Maré and Hyslop are experts in programme evaluation and the use of Statistics New Zealand's Integrated Data Infrastructure and Longitudinal Business Database. Their recent evaluations include the COVID-19 Wage Subsidy Support Outcome Evaluation, 2018 Families Package Winter Energy Payment (WEP) Policy, and a Review of the Statutory Minimum Wage in Aotearoa. Ryan-Charleton brings more than ten years of research experience focused on innovation activities and firm performance. The evaluation team also includes Amelia Blamey (Research Analyst), who holds a Master's in Economics with Distinction from Victoria University Wellington. Hannah Kotula (MSc. Ecology, University of Canterbury) contributed as a Research Analyst during the early stages of the evaluation.

Motu collaborated with the University of Otago to undertake the evaluation. A highly regarded research institution in the top 1% of universities worldwide, Otago contributed qualitative and subject-specific expertise. This work is led by Professor Conor O'Kane, who brings expertise on university-industry engagement, research commercialisation, and firm innovation capabilities.

1.3 Our methods and data

The evaluation employs a mixed-methods approach, combining quantitative analysis of datasets within the Longitudinal Business Database with insights from qualitative interviews with key stakeholders. Our aim is to provide an assessment of the direct impacts of the RDTI, as well as of broader policy and administrative implications.

The quantitative analysis relies primarily on statistical analysis of administrative and survey data available in Statistics New Zealand Longitudinal Business Database, supplemented with administrative information provided by Inland Revenue, MBIE, and Callaghan Innovation. The impacts of government R&D support are estimated using econometric methods that aim to isolate the causal impact of support on the outcomes of supported firms. We focus on three key outcomes – R&D expenditure, innovation, and productivity, with an additional summary of changes in output, employment, capital, and other inputs.

We assess whether the observed changes among supported firms were attributable to government R&D support or would have occurred anyway. Our causal analysis employs a 'doubly-robust' estimation approach, controlling for how firm characteristics are related to who receives treatment, as well as to observed outcomes. We use propensity score weighting to account for bias in characteristics that may cause firms to select into government support. We then estimate the supported firms' counterfactual outcomes (in the absence of receiving support) using a weighted regression equation for a comparison of unsupported firms. The difference between the predicted outcomes with and without R&D support is the treatment effect associated with receiving R&D support. The quantitative data and methods are outlined in Section 5, with additional detail included in Appendix B.

Table 1: Summary of interviewees

R&D Expenditure Band	Sample Count	Sample Percentage	Population Percentage
Rejected/not engaged	2	4.9%	-
$100k and below	8	19.5%	1.6%
$100k - $300k	7	17.1%	9.8%
$300k - $1m	6	14.6%	23.7%
$1m - $5m	9	22.0%	34.3%
$5m+	9	22.0%	24.8%
Total firms	41		
Operational	10		
Policy	5		
Professional advisory	11		
Total interviews	67		

This report also draws on in-depth qualitative data collected through 67 semi-structured interviews. Interviews were primarily conducted online via Zoom and Microsoft Teams. However, where possible, some interviews took place in person. All interviews were conducted between 18th October 2024 and 21st February 2025 and each lasted between 40-60 minutes. Interviews were recorded with participants' consent for accurate transcription and analysis. Targeted for interview were a diverse set of stakeholders, each with deep knowledge but distinct experience of the RDTI. In total, we interviewed 84 participants across 67 interviews (Table 1), including 60 representatives across 41 firm interviews, 10 interviews with members of the RDTI operational team, 5 interviews with policy experts, and 11 interviews with professional tax advisors.

Efforts were made to ensure that the firms interviewed reflected a diversity of experiences (in terms of size, expenditure, and industry). Almost half of the firm representatives interviewed were CEOs, directors or founders, providing strategic insight from the firm perspective on the scheme's impact and process. Additionally, 23 participants had senior tax or finance roles, while 20 held senior science and technology positions (e.g., R&D/Innovation manager).

Ten interviews were conducted with key members of the operational teams within CI and IR. In addition to interviews with the team leads, interviews were conducted with members of CI's customer engagement and assessment teams, as well as with IR compliance officers and technical specialists. Five interviews were conducted with policy experts who could speak to the background, evolution and intent of the policy. Finally, eleven interviews were conducted with professional advisory firms. These participants have in-depth knowledge on the scheme and could offer important insights on their engagements with firms, operational teams and the legislation.

All interview transcripts were analysed and coded individually for insights relevant to impact, compliance costs, administration, and legal compliance. The findings presented on compliance costs reflect themes identified from a cross-comparison of micro-case studies developed from each firm's experience and views on the appropriateness of scheme compliance costs. For administration and legal non-compliance, a second stage of analysis involved comparing and contrasting relevant insights across all stakeholder informants.

While multi-stakeholder qualitative data provide rich opportunities to identify important themes, it was also necessary to carefully consider to the motives and position of each informant within the scheme. In terms of the findings presented on scheme administration, we place attention on views we believe are important and insightful for those governing and operating the scheme. Insofar as is practical, and without wishing to quantify our qualitative analysis, we identify whether insights reflect the views of one, few or many informants, as well as the role of the informant(s) within the

scheme. Our more substantial findings, and in particular those from which we develop suggestions for improvement in scheme administration, are based on data and themes aggregated across multiple stakeholder informants.

Overall, the qualitative data provide a wide-ranging view on the scheme's workings. At the stakeholder level, the collection of insights from key constituents – firm, operational, policy, and advisory – offers a rigorous and important multi-stakeholder lens. Furthermore, at the individual level, our qualitative data capture insights from various capability domains – commercial, science, technical, financial, tax, and legal - that are fundamental to effectively participating in and administrating the scheme.

1.4 Report scope and structure

To address the six evaluation questions, our report is organised as follows. We begin by with a review of recent government policy relating to support for business expenditure on R&D (BERD). We discuss key opportunities and challenges associated with the transition from a grant-based approach to R&D support to the current arrangement where most R&D support is provided through the RDTI. The discussion covers the rationale for the transition, key developments, and challenges encountered. We then present a descriptive analysis of BERD in New Zealand, both pre- and post- RDTI. This includes commentary on the extent and sources of R&D activity over time, as well as changes in BERD patterns in the economy. We also unpack patterns of government R&D support under the RDTI versus other government support schemes, including R&D Growth Grants, Project Grants, Student Grants and the R&D Loan.

We proceed to explain our causal analysis of the impact of the RDTI, Growth Grants, and government support for business R&D generally. The analysis focuses on several key outcomes: R&D expenditure ("input additionality"), innovation and productivity ("output additionality"), and intermediate outcomes (output, employment, capital, and other inputs). This is followed by a discussion of qualitative insights relating to the impact of government R&D support

We consider the net impact of government R&D support, as well as a more parsimonious "bang for the buck" ratio which can be compared with international benchmarks. The causal impact analysis forms the basis for broader projections of the impact of government R&D support on the economy as a whole, drawing on academic and policy literature. When combined with our estimates of input additionality, this offers a range of anticipated impacts on New Zealand's GDP.

We next consider how the RDTI is implemented in practice. Drawing on qualitative and quantitative data, we unpack the appropriateness of compliance costs for business, the effectiveness of scheme administration, and compliance with legal requirements. We also reflect on how our conclusions might change with alterations to three policy settings specified by MBIE, as well as a hypothetical counterfactual scenario involving the continuation of Growth Grants for the same five-year period. The report concludes with a discussion of the limitations and research implications of our evaluation, and a summary of key findings.

2 Government support for business R&D: Policy overview

A core rationale for government support of R&D is that BERD generates external societal benefits (positive externalities) in addition to private gains for R&D performers. Externalities are driven by advancements in new and existing products and technologies, improved networks and organising methods, as well as the training of scientific and managerial personnel, which "spill over" to other firms. Often, firms in technologically and/or geographically related areas benefit most from externalities (Adams & Jaffe, 1996). Over time, externalities may contribute to economy-wide productivity gains, with macroeconomic evidence suggesting annual returns to GDP from BERD can be in excess of 100% (e.g., Australian Productivity Commission, 2007; Coe & Helpman, 1995).

Because resources are finite, and businesses are often unable to appropriate the full benefits of their R&D investments (Griliches, 1992, p. 32; Teece, 1986, p. 86; Winter, 2006), they may invest less in R&D than is socially optimal. Public policy instruments to support innovation—commonly R&D grants and tax incentives— aim to address this market failure by incentivising firms to spend more on R&D. Bloom et al (2019, p. 180) provide a review of policies to promote innovation and conclude that "[i]n the short run, research and development tax credits or direct public funding seem the most effective" in generating innovation spillovers.

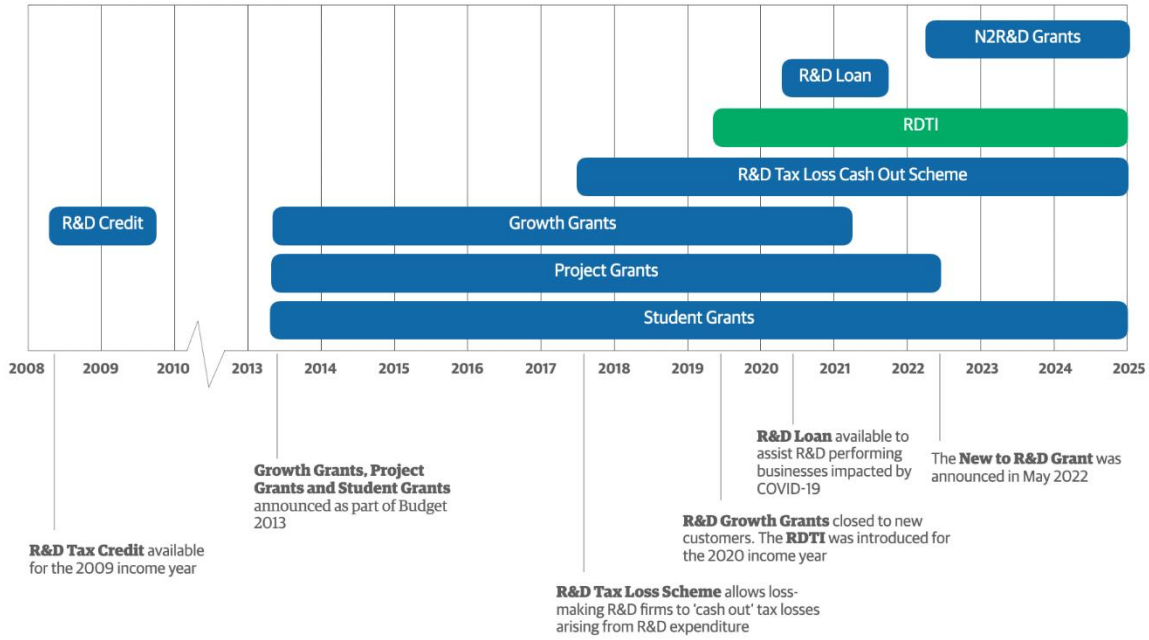
When R&D grants are used to support BERD, they are usually awarded on a discretionary basis. This allows governments to make decisions about priority areas for targeted support (e.g., towards research with greatest perceived potential for spillovers). Tax incentives generally provide broader non-discretionary support in the form of a further benefit above the standard tax treatment of R&D expenditure. In Australia, for example, eligible businesses can receive a further tax offset based on their annual turnover and level of eligible R&D expenditure. Across the combined OECD area in 2021, government support for R&D in the form of direct government funding or tax support amounted to 0.21 percent of GDP, with 58% of that (0.12 percent of GDP) in the form of tax incentives. For New Zealand in 2021, government support amounted to 0.11 percent of GDP, a third of which was in the form of tax incentives (0.035 percent of GDP) (OECD, 2024b).

When viewed at a country level, government R&D support likely contributes to economic growth through other mechanisms beyond spillovers. In particular, given evidence about innovator relocation in response to taxation (Akcigit et al., 2016; Moretti & Wilson, 2017), R&D tax incentives have likely become increasingly relevant as a national lever for attracting and retaining innovative firms. In 2023, 33 of 38 OECD countries offered tax incentives for R&D (up from 19 countries in 2000; Appelt et al., 2016), some of which were extremely generous. In countries with the highest support for R&D, at over 0.4 percent of GDP (UK, Iceland and France), tax incentives accounted for over two-thirds of the support. New Zealand's implied tax subsidy rate was similar to the OECD average (OECD, 2024b). France and Portugal offer R&D tax incentives with an implied subsidy that is at least twice the New Zealand rate.

2.1 Government support for business R&D prior to the RDTI

Government support for BERD in New Zealand has become progressively more streamlined over the past two decades. The creation of Callaghan Innovation (CI) in 2013 was an inflection point, simplifying a myriad of earlier schemes and granting agencies into three overarching CI-administered grants (Wakeman, 2017, pp. 3–4). These overarching grants—R&D Growth Grants, R&D Project Grants, and R&D Student Grants—were announced in Budget 2013, with a commitment of $566m

Figure 1: Government R&D support Timeline, 2008 onwards



in government support over four years (Beehive, 2014). Alongside the R&D Loan scheme introduced in response to Covid-19, the three grants are the "other government support for business R&D" that we examine alongside the RDTI. Figure 1 summarises relevant developments in the recent history of government support for BERD in New Zealand up to the end of the evaluation period, with additional detail provided in Appendix Table 1.

2.1.1 Growth Grants, Project Grants, and Student Grants

Before the RDTI, Growth Grants were the primary mechanism for channelling support to New Zealand's R&D performers. To be eligible for Growth Grants, firms needed to spend $300k per year (and at least 1.5% of revenue) on eligible R&D expenditure in New Zealand for the two prior years. Recipients received an initial three-year contract and were eligible for repeated two-year extensions if they maintained or increased their eligible R&D expenditure and intensity. Growth Grants funded 20% of a firm's R&D programme (equivalent to 14.4% after tax), capped at $5m per year. Firms could claim for funding quarterly in arrears. "Transitional Growth Grants" were provided in some cases where firms did not meet all Growth Grant requirements but were likely to become eligible in the future. The Growth Grant scheme closed to new customers in March 2019 and was phased out two years later.

Project Grants were designed to "develop recipients into stable and substantial R&D performers" (Callaghan Innovation, 2017, p. 4). Firms that did not meet the Growth Grant eligibility criteria could be eligible for Project Grants. A Project Grant funded up to 40% of the first $800k of eligible costs for a pre-specified R&D project and 20% of the remainder. Unlike Growth Grants, Project Grants were intended to support specific projects, rather than supporting R&D programmes on an ongoing basis. Project Grants could be directed towards projects that the Government deemed were likely to

provide considerable social returns.[2] The Project Grant scheme closed in August 2022 (New Zealand Gazette, 2022). The final start date for new Project Grants was 01 August 2022.

In the period under examination, there have been three types of Student Grants: Experience Grants (internships for tertiary-level students), Fellowship Grants (PhD or Master's students) and Career Grants (recent PhD and Master's graduates). Firm eligibility for Student Grants necessitates having an active R&D programme, meeting financial due diligence requirements, and employing the student on the payroll. Unlike Growth Grants and Project Grants, Student Grants have not been phased out.

2.1.2 The R&D Loan

The R&D Loan Scheme became available on 1 July 2020 as part of the New Zealand Government's Covid-19 Response. The core policy objective was to encourage R&D-performing businesses impacted by the pandemic to maintain R&D activity during the 2021 financial year (Callaghan Innovation, 2020). Capital provided was "…intended to supplement or replace private sources of funds that are temporarily reduced or unavailable because of the impact of COVID-19." (New Zealand Gazette, 2020, p. 1).

Firms were eligible for the R&D Loan if they had experienced a 30 percent or greater drop in private sources of funding that would have been used to fund eligible R&D activities as a result of Covid-19. Broadly, R&D activities that qualified for other government support (including Growth Grants or the RDTI) were deemed eligible for the R&D Loan. Up to $149m of loan capital was made available to firms at an interest rate of 3% per annum (no interest if repaid within the first year). This represented a significant concession on real-world interest rates for R&D firms, which were assumed to be 15% (Office of the Minister of Research, Science, and Innovation, 2020). Loan repayment obligations began in year 3 (voluntary repayments could be made earlier) and firms were required to repay the loan in full within ten years.

2.1.3 Patterns of support

Table 2 reports the counts of active and newly approved government supports for R&D from 2009-2024. Pre-CI grant schemes are referred to by their post-CI labels (see Wakeman, 2017, pp. 3-4; Figure 2.2). To help contextualise reported figures for the earlier schemes, Table 2 also includes CI's newest grants, the Ārohia Trailblazer Grant and New to R&D (New2RD), which are outside the scope of this evaluation.

In the years before the RDTI was introduced, the number of active and newly approved CI grants was increasing annually. There is no evidence in Table 2 that these schemes were stagnating or failing to support new R&D projects. In contrast, Table 2 highlights that the system for government BERD support was growing consistently and that the introduction of the RDTI coincided with terminating R&D grant schemes that supported a significant number of R&D performers.

Table 2 also shows how most firms with active Growth Grants remained in the scheme until it ended. In addition, CI were able to approve a large number of new grants for firms in the period around the RDTI introduction. Specifically, 2019 was by far the largest cohort of new Growth Grant approvals (n=117), while the two largest cohorts of Student Grant approvals were 2020 (n=771) and 2021 (n=858). A decrease in the number of Student Grants in 2023 and 2024 was due to a revised ceiling ($15m) introduced for Student Grants in 2023. Prior to 2023, CI had discretion for allocating funds between Student Grants and Project Grants from a combined appropriation.

[2] Project Grant applications were assessed by Callaghan Innovation based on their interpretation of criteria specified by the Minister.

Table 2: Active and newly approved R&D supports, 2009-2024

Year	Growth Grants		Project Grants		Student Grants		R&D Loans		Ārohia Grants		New2RD Grants		RDTI	
2009			*12*	(9)	*.s*									
2010			*54*	(45)	*.s*									
2011			*162*	(111)	*.s*	(.s)								
2012			*372*	(225)	*363*	(390)								
2013			*489*	(264)	*321*	(297)								
2014	*54*	(51)	*510*	(288)	*396*	(339)								
2015	*132*	(84)	*531*	(297)	*351*	(273)								
2016	*183*	(48)	*408*	(210)	*294*	(153)								
2017	*231*	(48)	*387*	(249)	*270*	(174)								
2018	*294*	(84)	*486*	(327)	*270*	(192)								
2019	*378*	(117)	*603*	(315)	*486*	(408)								
2020	*351*		*615*	(333)	*849*	(771)							*561*	(561)
2021	*339*		*699*	(396)	*975*	(858)	*438*	(459)					*684*	(243)
2022	*.s*		*771*	(399)	*906*	(714)	*438*						*1,110*	(465)
2023			*567*	(117)	*750*	(591)	*432*		*.s*	(.s)	*21*	(27)	*1,281*	(288)
2024			*258*	(.s)	*597*	(498)	*432*		*201*	(225)	*66*	(69)	*1,233*	(195)
Total		(432)		(3,585)		(5,658)		(459)		(225)		(96)		(1,752)

Notes: Active supports in italics, newly approved in brackets. Open grants where no funds have been drawn down are not considered active. Grants are defined as active until the earlier of the calculated end (i.e., last payment) date or contract end date recorded by Callaghan Innovation. Ārohia Grants include "Seed", "Evidence", "Trailblazer" and "Full" Grants (see p. 35 of Callaghan Innovation's Annual Report 2024). A firm is considered to have RDTI support if it has received a tax credit or been granted General Approval for a given year. Figures are aggregated to income years ending 31 March and rounded/ suppressed (".s") in accordance with Statistics New Zealand requirements.

Project Grants were an important part of BERD support in New Zealand prior to their closure on 30 June 2022. The regulatory impact assessment of the RDTI assumed that Project Grants would continue as a complementary source of support, and that only Growth Grants would be phased out (MBIE, 2018). Providing targeted support for R&D activities that did not fit the RDTI's strictly defined eligibility criteria was seen as an important ongoing function for Project Grants (or a similar scheme).

After Growth Grants closed, the eligible expenditure threshold for Project Grants was increased from $300k to $800k. In combination with other factors, including CI's improved customer engagement process, and a post-Covid rebound in demand for government R&D support, this significantly increased demand for Project Grants, including among firms eligible for the RDTI. According to MBIE, the expenditure on Project Grants increased to the point where the scheme became fiscally unsustainable, requiring transfers of funding from elsewhere in the portfolio.

In May 2022, the Government announced two new targeted grants intended to complement the RDTI—New to R&D grants (for a firm's first R&D project), and Ārohia Trailblazer grants (commercialisation funding for the "best of the best"). The New to R&D Grant, in particular, was

viewed by policymakers as a replacement for Project Grants, targeted in a way that was believed to neatly complement the RDTI. Table 2 includes Ārohia Trailblazer grants for reference because — despite not supporting R&D as defined by the Frascati manual — they overlap partially with the accounting-based definition previously used to determine Growth Grant eligibility.

2.1.4 Challenges associated with R&D grants

As the primary BERD support mechanism in New Zealand up to 2019, there were at least four perceived challenges with R&D grants.

- Growth Grants channelled a large amount of government support to a relatively small number of firms. Critics argued that this approach was an attempt to "pick winners" (Mcilraith, 2023), favouring larger companies with established innovation trajectories (Reidy, 2017). There were some reports that smaller R&D performers who were ineligible for Growth Grants found it onerous to apply for and secure Project Grants (Reidy, 2017). The discretionary and targeted nature of Project Grants meant that Ministerial directions and CI's interpretation influenced who did and did not receive funding (MBIE, 2018, p. 8).
- R&D grants sometimes supported activities that did not fit clearly with commonly held views of what constitutes "research and development". Whereas the RDTI has adopted the Frascati Manual definition of R&D,[3] Growth Grants used an accounting-based definition of expenditure on intangible assets not capitalised under IAS 38 (see External Reporting Board, 2022). In practice, this sometimes blurred the line between R&D and product development. For example, Growth Grants supported one recipient to "build a digital bank". There were related questions about whether other activities supported by R&D grants were more appropriately categorised as routine business expenditure (e.g., customer relationship management software, project management tools; (Business Desk, 2015), rather than research and development.
- Recovering public funds was particularly challenging in cases where there were contractual breaches, changes in circumstances, or claims paid for ineligible expenditure.[4] CI encountered some high-profile difficulties when attempting to reclaim support already paid (e.g., Business Desk, 2015; Nippert, 2015).
- Under the R&D grant system, New Zealand was spending "well below" the socially efficient level of government support for BERD (OECD, 2017, p. 114). Most OECD countries were supporting BERD through a tax incentive, with evidence of considerable additional R&D expenditure when a tax incentive was used to broaden the base of R&D performing firms (Appelt et al., 2016; Benedictow et al., 2018).

[3] The Frascati Manual shapes international norms for reporting firm R&D expenditure and offers a definition of research and development activity that has largely been followed by the RDTI definition of eligible R&D expenditure (Jackson, 2023). The Frascati Manual defines R&D as any activity that is comprised of systematic work undertaken in order to increase the stock of knowledge or devise any new application of available knowledge. Activities must also fulfil the following criteria: novelty, creativity, uncertainty of outcome, a systematic approach, and transferability or reproducibility (OECD, 2015).

[4] Related concerns that R&D grant support was going to businesses that subsequently "failed" (Mcilraith, 2023) do not appear to be materially significant. Such concerns overlook the risk inherent in R&D investment and appear to refer to a small amount of grant support.

2.2 Introduction of the RDTI

2.2.1 Policy intent

The RDTI was proposed as the primary tool to achieve the then government's stated goal of increasing New Zealand's R&D expenditure to 2 percent of GDP. It recognised that difficulties securing external finance, as well as appropriating private returns from R&D investments, lead firms to underinvest in R&D. This 'market failure' arising from positive externalities from BERD was a key contributor to the RDTI's introduction:

> *"The knowledge created through R&D spreads across the economy in various ways, including product imitation, reverse engineering, and worker mobility. While this generates wider societal gains, the business that generated it does not receive those benefits. Government support for business R&D compensates businesses for those benefits that they are unable to capture in full, and thereby provides them with more appropriate incentives."*

(MBIE, 2018, p. 1)

Introduced on April 1, 2019, the RDTI was intended to enhance New Zealand's economic productivity by addressing low BERD levels relative to OECD counterparts (Wakeman & Conway, 2017). A tax incentive for R&D was believed to be preferable to the existing Growth Grant scheme, which had limited reach and benefited a reasonably narrow group of firms with established, high-intensity R&D programs (MBIE, 2018). The RDTI was an attempt to broaden support for BERD by offering a more equitable and efficient stimulus. Unlike Growth Grants, which involved significant compliance costs and restrictive eligibility requirements, the RDTI was intended to provide non-discretionary support that reduced compliance burdens (MBIE, 2018).

By lowering the cost of conducting R&D, the RDTI was designed to drive innovation among existing R&D-performing firms and encourage others to initiate such activities. In preparing the regulatory impact assessment, MBIE and IR pointed to international evidence highlighting the efficacy of tax incentives in generating both private and societal returns from BERD (Appelt et al., 2016; MBIE, 2016).

The RDTI is designed not only to increase R&D expenditure but also to ensure that benefits of R&D are captured within New Zealand. This distinction is crucial given the policy intent to leverage R&D investments for national economic growth, knowledge spillovers, and domestic innovation capability. Several design features of the RDTI reflect this intent, including a tight cap on overseas R&D expenditure and relative stringent rules about the ownership of benefits from supported R&D (Inland Revenue, 2023).

The RDTI included a concentrated effort to define (in)eligible R&D activity, resulting in more than 140 pages of Inland Revenue guidance (IR1240). Firms were required to adapt to differences between Growth Grant-eligible activities (accounting definition of R&D) and RDTI-eligible activities (Frascati definition of R&D). For example, under the Growth Grant scheme, expenditure that could be capitalised was ineligible, but expenditure relating to intangible assets was often eligible, even if it did not satisfy the Frascati definition of R&D. It was therefore easier for the R&D activities of software firms to meet eligibility criteria under the Growth Grant scheme than the RDTI scheme. However, depreciation of R&D capital expenditure, which was ineligible expenditure under Growth Grants, is claimable under the RDTI.

The change in definition of eligible R&D activities was a deliberate policy choice to direct support towards activities that could provide the government with the greatest return on investment (Office of the Minister of Research, Science, and Innovation, 2021). Equally, however, it was assumed that a discretionary grant mechanism, such as Project Grants, would be retained (MBIE, 2018). Those who were involved in the original policy design viewed a discretionary grant as a complementary source

of support for certain activities that were important to New Zealand but fell outside the scope of RDTI-eligible R&D.

2.2.2 Key policy settings of the RDTI

As well as a change in delivery of support from grants to tax credits, the support rate for eligible R&D expenditure changed from 14.4% after tax (20% before tax) under Growth Grants to 15% after tax under the RDTI. The support range was expanded, with the lower bound for eligible R&D expenditure reduced from $300k under Growth Grants to $50k in an income year under the RDTI, and the upper bound for eligible R&D expenditure increased from $25m under Growth Grants to $120m under the RDTI (or an entity's approved research and development cap).

Eligible firms can claim tax credits on expenditure for eligible R&D activities (core and supporting activities), provided they meet the minimum expenditure threshold. Eligible entities are generally private sector businesses although in some cases industry levy bodies may qualify.[5] The eligible entity is required to perform their core R&D activity in New Zealand (or through a contractor in New Zealand) and have ownership of R&D results, or be able to use the results at no extra cost. Expenditure on supporting R&D activities outside New Zealand can form up to 10% of an entity's total RDTI claim, provided it is integral to a core R&D activity conducted in New Zealand. Core R&D activities must be conducted using a systematic approach, have a material purpose of creating new knowledge/ new or improved processes, goods or services, and have a material purpose of resolving scientific or technological uncertainty. These requirements were shaped by stakeholder consultations in 2018. Eligible supporting activities must support core R&D activity as their only or main purpose and be integral to the core activity (Inland Revenue, 2023).

The RDTI tax credit can be offset against a firm's provisional tax bill, or, in some cases, carried forward or refunded. To help make the credit more accessible to businesses with no provisional tax to pay (who cannot take advantage of a tax credit by offsetting it against their provisional tax bill), a limited form of refundable tax credit was introduced in 2019 and was available for the 2020 income year. This meant that businesses without a sufficient tax liability could receive partial payment in cash in lieu of a tax credit (MBIE, 2023a). Access to refundable tax credits was broadened in 2020 and, in response to COVID-19, the changes were brought forward to apply to the first year of the scheme (MBIE, 2020). Except for R&D conducted by Approved Research Providers (ARPs), refundability is capped at the total amount of labour related taxes paid by a firm.

The RDTI's $50k lower bound on eligible R&D expenditure does not apply if R&D were conducted through an ARP. Approved Research Providers were incorporated into the RDTI, in part, to "…make the R&D tax credit accessible to businesses of all sizes." (Inland Revenue, 2023; p. 16). Using organisations that have been approved by Inland Revenue to provide R&D services means that eligible R&D expenditure is not subject to a refundability cap. Because ARP payments can be fully refundable, using ARPs would appear to offer advantages for firms that do not have the provisional tax bill to absorb their credit.

Applying for the RDTI credit usually involves three steps: enrolment, pre-approval, and filing a Supplementary Return. The pre-approval process was introduced for the 2021 income year to provide firms with up-front clarity about their eligible R&D activities, and reduce the work needed to complete the Supplementary Return.

The RDTI offers two pre-approval pathways, each of which can offer approval for up to three years. The first pathway is filing a General Approval (GA) application. Firms following this pathway are required to apply for an approval for each R&D project. A second pathway is available for

[5] We refer to supported entities as 'firms' or 'businesses', with additional restrictions imposed for our analytical sample.

businesses that expect to have eligible R&D expenditure of more than $2m in an income year. This pathway requires firms to apply for a Criteria and Methodologies (CAM) approval – a systems-based approval approach that looks at a firm's systems and processes for determining whether R&D activities and expenditure are eligible for the tax credit (also known as the 'Significant Performer' regime). This enables businesses undertaking a large number of R&D activities to use their own established systems and processes to assess the eligibility of their R&D activities and expenditure.

To support firms as they transitioned to the RDTI scheme, a two-year extension ending on 31 March 2021 was given to Growth Grant recipients (last date for claims was 30 September 2021). The extension was intended to provide sufficient time for government agencies to fully implement the RDTI scheme and for Growth Grant recipients to understand the new scheme. As of 30 June 2022, CI reported that 73% of eligible former Growth Grant customers had applied for RDTI support (Callaghan Innovation, 2022).

In April 2021, the Minister noted uncertainty among "… a number of Growth Grant recipients … [who] are having issues meeting the definition of eligible R&D activity under the RDTI … feedback so far indicates a bigger gap than initially anticipated." (Office of the Minister of Research, Science, and Innovation, 2021, p. 3). This led to the creation of a temporary support mechanism, Transitional Support Payments (TSPs), which was made available to former Growth Grant recipients. TSPs were intended to support firms' transitions to the RDTI by maintaining business certainty regarding government R&D support, while stimulating business engagement with the RDTI and minimising disruption to its implementation. Firms were required to apply for the RDTI before applying for a TSP, with the TSP intended to support activities that were Growth Grant-eligible but RDTI-ineligible. TSPs were offered in the 2022 year only, although they were also provided in specific cases for the 2021 and 2020 years to avoid disadvantaging Growth Grant recipients who transitioned early. The sum of actual TSP support provided has amounted to around a quarter of the original $95m appropriation, suggesting that the eligibility gap may be smaller than feared.

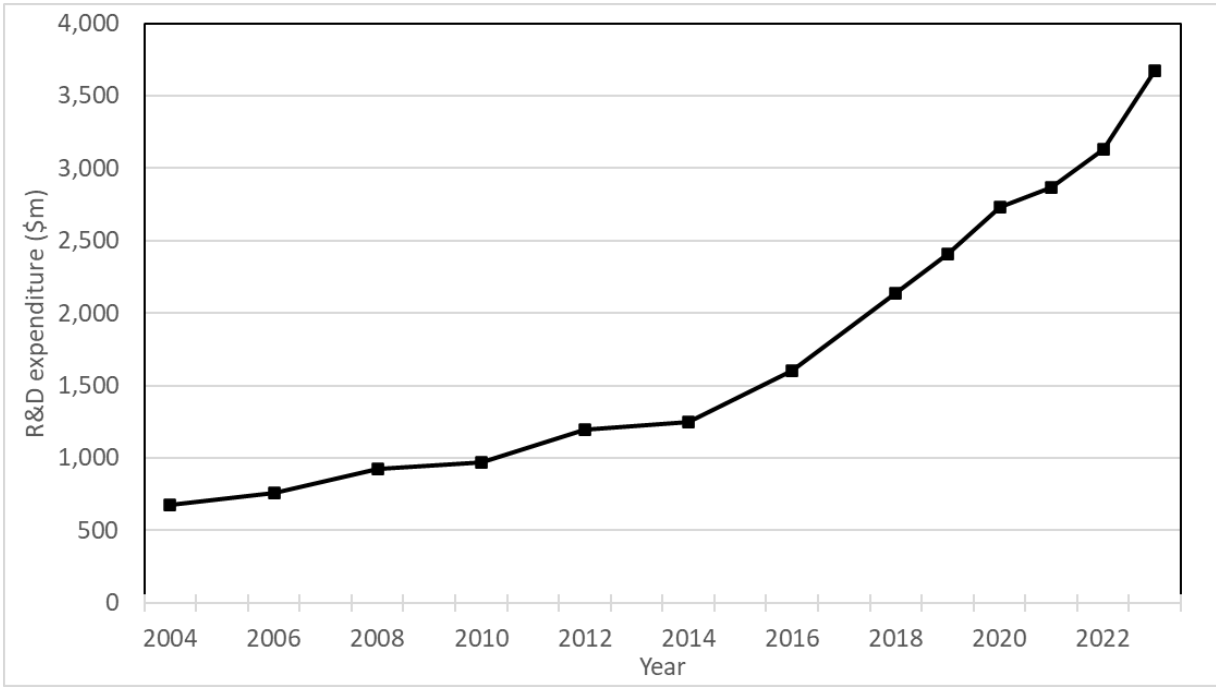
Since the RDTI introduction, there have been efforts to implement in-year payments. In-year payments would more closely mirror the timing of Growth Grant payments, which were paid quarterly in arrears. RDTI recipients currently receive a credit after they have filed their income tax return. In the 2023 briefing to the incoming Minister, MBIE noted there was on average a 16-month gap between eligible R&D expenditure and receiving a tax credit (MBIE, 2023a). The intention to implement in-year payments had been influenced by stakeholder feedback and motivated by a desire to help businesses manage cash flow.

In 2021, it was suggested that, in the long term, IR would deliver in-year payments through the tax system (with a plan to implement this for the 2025 tax year). This was changed to the 2026 tax year (i.e., to be implemented from 01 April 2025) with agreement from the previous government. In 2023, a temporary mechanism was introduced by MBIE to provide in-year payments administered through a third party. These payments were intended to be a loan against 80% of a firm's expected RDTI payments. The temporary mechanism was closed on 31 January 2024 because it was deemed to be providing low value for money due to administrative complexities, operational issues, and risks (MBIE, 2024). Shortly thereafter, the Minister of Science, Innovation and Technology wrote to the Minister of Revenue requesting that in-year payments be retained as a priority area for Inland Revenue and requesting no further delay in the implementation date.

3 NZ business expenditure on R&D

The development in government support for R&D has occurred alongside increases (from a low base) in business expenditure on R&D (BERD). Figure 2 shows the official statistics measure of BERD in New Zealand over the period 2004 to 2023. These official statistics capture internal R&D expenditure in the business sector reported by firms in the R&D Survey (RADS), measured in nominal (i.e., not inflation adjusted) dollar values. BERD was increasing steadily prior to the introduction of R&D Growth Grants in 2014, but has since grown more quickly. For example, BERD increased at an average 7.3% annual rate between 2004 and 2012, at 10.5% on average from 2012–2019, and 11.1% from

Figure 2: Business expenditure on internal R&D



Notes: From R&D Survey series on Infoshare, except 2004 and 2006 sourced from: https://www.ceicdata.com/en/new-zealand/business-enterprise-investment-on-research-and-development-oecd-member-annual/nz-business-enterprise-expenditure-on-rd-berd.

2019 to 2023.[6] R&D expenditure reached 1.47% of GDP in 2022, of which 0.87% came from the business sector. Business expenditure on R&D was 0.95% of GDP in 2023.

Table 3 reports a comparison of alternative R&D expenditure aggregates for the most recent (2023) year, highlighting a range of R&D expenditure measures used in our analysis. It covers measures from the RADS, the *RDExp* measure described in Appendix section B.1.5, and measures from RDTI administrative sources. The first row reports the official statistics measure of BERD activity, calculated as the total firm internal R&D expenditures (weighted by the RADS sampling weight): $3,672m performed by 2,286 R&D-active firms, at an average of $1.62m per firm. The first row of

[6] The first Growth Grants started in October 2013. For this reason, and because of the more limited coverage of R&D activity in odd years before 2018 when the R&D Survey is not conducted, it is appropriate to treat the March 2012 year as the end of the pre-Growth Grant period.

Table 3: Documenting alternative R&D expenditure measure aggregates (2023)

	Total R&D ($ m)	No. Firms	Average R&D ($m)
Official Statistics Aggregate (R&D Survey)	$3,672	2,286	$1.62
1. Weighted estimates:			
Internal R&D Survey estimate	$3,845	2,271	$1.69
Total R&D Survey estimate	$4,354	2,469	$1.76
2. Unweighted estimates:			
Internal R&D Survey estimate	$3,119	1,674	$1.86
Total R&D Survey estimate	$3,534	1,821	$1.94
3. Total R&D expenditure (*RDExp*) estimate (All firms)	$4,160	2,544	$1.64
4. RDTI enrolled/ supported firms			
Total R&D expenditure estimate (*RDExp*)	$2,978	1,005	$2.96
Supported firms:			
Total R&D expenditure estimate (*RDExp*)	$2,877	873	$3.30
Total RDTI R&D expenditure (*RDTI_RDExp*)	$2,395	1,239	$1.93
Eligible RDTI R&D expenditure (*RDTI_Elig*)	$2,361	1,239	$1.91
Supported firms in RADS, BOS, or IR10:			
Total R&D expenditure estimate (*RDExp*)	$2,877	873	$3.30
Total RDTI R&D expenditure (*RDTI_RDExp*)	$2,224	1,047	$2.12
Eligible RDTI R&D expenditure (*RDTI_Elig*)	$2,190	1,047	$2.09

Notes: The Official Statistics aggregate in the top row is in nominal (2023) $-values; R&D expenditure estimates in panels 1–4 are expressed in March 2024 $-values (i.e., real terms). The number of firms with internal R&D expenditure and total R&D expenditure in panel 1 are estimated as the sum of the R&D Survey (RADS) sampling weights associated with active firms. The "Total R&D expenditure" measure in panels 3 and 4 is based on (in order or priority), total R&D expenditure reported in RADS, rescaled R&D expenditure reported in BOS, and rescaled R&D expenditure reported in IR10: see Appendix section B.1.5 for details of the imputation algorithm used.

panel 1 contains the corresponding estimate based on our analytical sample that excludes firms with imputed R&D expenditures, which results in the loss of 15 (imputed) R&D-active firms. The aggregate R&D expenditure reported is not directly comparable to the official aggregate, as we use inflation adjusted expenditure to constant March 2024 $-values in our analysis. Nonetheless, the $3,845m is broadly consistent with the official nominal value. The total R&D Survey estimate in panel 1 records the corresponding weighted estimates of (non-imputed) total R&D expenditure by firms. Using this measure, the estimated number of R&D-active firms increases by 9% (to 2,469), and total R&D expenditure increases by about $500m (13%).

Our analysis expands the sample of R&D-active firms beyond that covered by the RADS to include firms reporting R&D expenditure in either the Business Operations Survey (BOS) or IR10 (Inland Revenue Financial Statements Summary). For this reason, the RADS sampling weights are not appropriate, and we report unweighted estimates in the subsequent panels in Table 3. Panel 2 replicates the estimated aggregate RADS internal and total R&D expenditures, which are respectively about 20% lower than their weighted benchmarks in panel 1, and based on samples of 1,674 and 1,821 R&D-active firms.

In panel 3, we report the aggregate total R&D expenditure obtained from the broader sample of R&D-active firms from the BOS and IR10 sources used to supplement the RADS. Described in Appendix B.1.5, this hybrid total *RDExp measure* is the core R&D expenditure variable in our analysis. Using this measure results in an increase (28%) in the number of R&D-active firms included (to 2,544), and a smaller (15%) increase in measured total R&D expenditure (to $4,160m).

Finally, panel 4 of Table 3 summarises alternative measures of R&D expenditure for firms in the RDTI. We first report the coverage of the total R&D expenditure measure. All RDTI firms (i.e., including enrolled but not supported firms) account for 72% ($2,978m) of the measured total R&D expenditure of $4,160m, and are 40% (1,005) of the 2,544 ever-R&D-active firms observed in 2023; while the corresponding proportions are slightly lower among RDTI firms ever observed to receive support, at 69% ($2,877m) and 34% (873) respectively.[7]

In summary, broadening both the source of R&D activity to include the BOS and IR10, and the measure of R&D from internal to total expenditures, substantially increases the sample for conducting comparable analysis between RDTI supported and non-supported firms. By contrast (not shown in Table 3), restricting the analysis to firms that appear in the R&D Survey would reduce the number of RDTI supported firms with R&D expenditure data by about half, with a significant associated reduction in the sum of supported R&D expenditure.

3.1 Trends

We next document the trends in R&D expenditure and R&D-active firms over the period based on the hybrid total R&D expenditure measure (*RDExp*). These trends are shown in Figure 3 for R&D expenditure in panel (a), and for R&D-active firms in panel (b).[8] The 2-year saw-tooth pattern until 2018 reflects the better R&D measurement coverage in even-numbered years where RADS and BOS were both administered. Broadly consistent with the trend in the official (nominal) series of R&D expenditure shown in Figure 2, estimated (inflation adjusted) total R&D expenditure in Figure 3 increased at average annual rates of 7.1% between 2004 and 2012, 9.1% over the CI Growth Grants period from 2012 to 2019,[9] and at 4.7% over the RDTI period from 2019 to 2023. In contrast, the number of R&D-active firms grew strongly after 2011, but slowed down and declined between 2014 and 2017, and again from 2019. The number of active firms grew at average annual rates of 10.7% between 2004 and 2012, 5.1% between 2012 and 2019, and *fell* 1.4% annually between 2019 and 2023.[10]

In each panel of Figure 3, we also graph the share of R&D expenditure in firms that receive government R&D support (panel (a)) and the share of R&D-active firms that receive support (panel (b)), as well as the corresponding shares of R&D expenditure and R&D-active firms associated with firms that received Growth Grant support over 2014–2022, or RDTI support over 2019–2023. These show fairly steady growth in the share of firms receiving support to over 40% by 2020, while the fraction of R&D expenditure conducted in supported firms grew more strongly to about 75% by 2021.

[7] Restricting the sample to firms that are observed in the RADS, BOS or IR10, RDTI-supported R&D accounts for 77% of the hybrid *RDExp* measure of R&D expenditure.

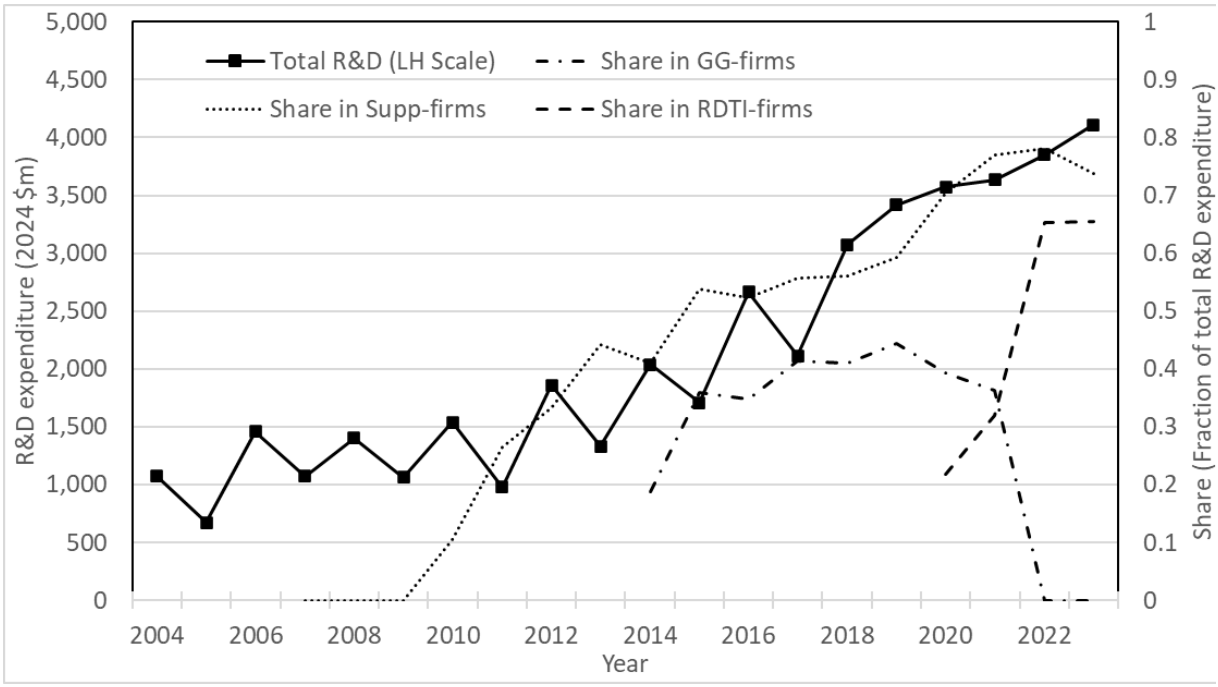
[8] Figure 3 focuses on firms that are R&D active in a given year, a slightly narrower sample than used in Table 3.

[9] Because of the lower coverage of R&D activity in odd-numbered years before 2019, we use 2012 rather than 2013 as the base-year prior to the start of Growth Grants.

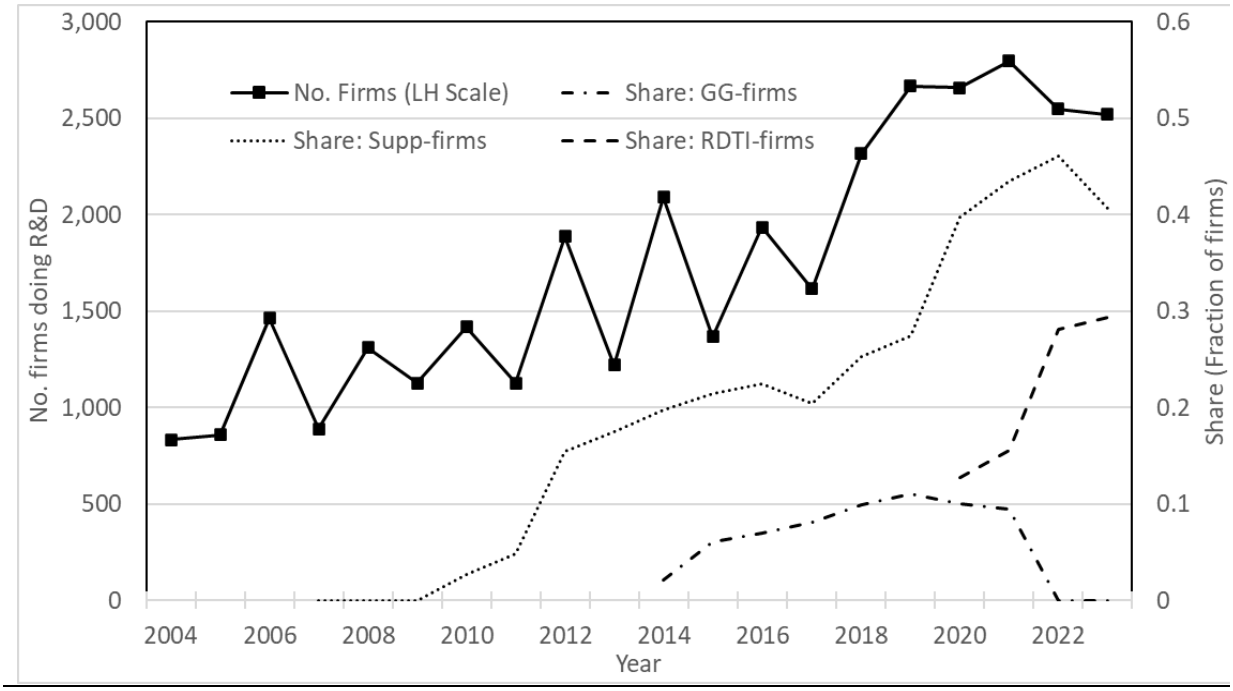
[10] The relatively low 2023 figure may be downward biased due to incomplete IR10 data.

Figure 3: Annual R&D activity, and fraction from supported firms, 2004 – 2023

(a) R&D expenditure



(b) R&D-active firms



Notes: The hybrid total R&D expenditure measure (RDExp) (described in Appendix B.1.5) utilises total R&D expenditure figures from R&D Survey, BOS and IR10 sources. The support shares in panel (a) are calculated as the share of R&D expenditure by firms receiving any support (Supp), Growth Grants (GG), or RDTI. "LH Scale" refers to the scale on left vertical axis (right side scale unless stated).

At its peak in 2019, firms receiving Growth Grants accounted for 40% of all supported firms (11% of R&D-active firms, compared with 27% supported overall). R&D expenditure by Growth Grant recipients accounted for about three-quarters of R&D expenditures in supported firms (44% of aggregate expenditure, compared with 59% of aggregate expenditure in supported firms). Similarly, by 2023 firms receiving RDTI support in that year accounted for about 70% of all supported firms,[11] 65% of aggregate R&D expenditure (Figure 3(a)), and 90% of supported R&D expenditures.[12]

3.2 R&D activity entry and exit

Beneath the overall trends, there are substantial flows of firms into and out of R&D activity. In this subsection we describe patterns of R&D activity continuation, entry and exit over the period 2004–2023. The saw tooth pattern in Figure 3 of estimated R&D-active firms and expenditure associated with poorer data coverage in the odd years prior to 2018 translates into offsetting patterns of the annual rates of entry and exit of R&D-active firms, especially in terms of R&D expenditure.[13] For this reason, we explore entry and exit using two-yearly patterns before 2018, calculated for the even years, and yearly patterns from 2018 to 2022. For R&D-active firms, the continuing (and exit) rates are calculated as the fraction of active firms in a year (t) that continue (cease) to be R&D-active two years later (t+2); while the entry rate is the fraction of active firms in a year that were not active two years earlier (t-2). For R&D expenditure the corresponding rates are calculated as the fractions of R&D expenditure associated with continuing, exiting and entering firms.

Figure 4 shows the continuation, entry and exit patterns for R&D expenditure in panel (a), and the number of R&D-active firms in panel (b). We include the total R&D expenditure and number of active firms in the respective panels. The fraction of continuing R&D-active firms appears relatively unstable over the early years, fluctuating between 42% and 55%, before stabilising somewhat between 52% and 59% after 2010;[14] while the fraction of R&D expenditure associated with continuing firms is somewhat higher: 63-76% in the early years, and over 80% from 2010 onwards. The entry and exit rates broadly mirror these patterns, with relatively higher entry than exit rates of R&D-active firms (except in the final two years), and associated R&D expenditures.[15] For example, since 2012 entering and exiting firms have accounted for approximately 20% of R&D expenditure.

3.3 The contribution of government R&D support

We next document changes in total R&D expenditure, over three sub-periods: 2004–2012, prior to the introduction of Growth Grants; 2012–2019, covering the Growth Grants period before the introduction of the RDTI; and 2019–2023, covering the RDTI period. We focus on the relative contributions to the changes associated with R&D-supported versus non-supported firms, interacted with the R&D-active continuing, entry and exit status of firms.[16]

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[11] Figure 3(b) reports 41% of firms receive R&D support, and 29% of firms receive RDTI support.

[12] Using information on Growth Grants and RDTI supported R&D expenditures, we estimated the share of R&D expenditure supported by each scheme. Shares of supported R&D expenditure are generally lower than the shares of R&D expenditure in supported firms, but follow similar trends. GG-supported R&D expenditure account for 70-90% of estimated R&D expenditure by GG-supported firms between 2015 and 2019; while RDTI supported R&D expenditure account for over 80% of R&D expenditure by RDTI-supported firms between 2020 and 2023.

[13] This highlights the analytical challenge of using data observations with inconsistent annual coverage over this period.

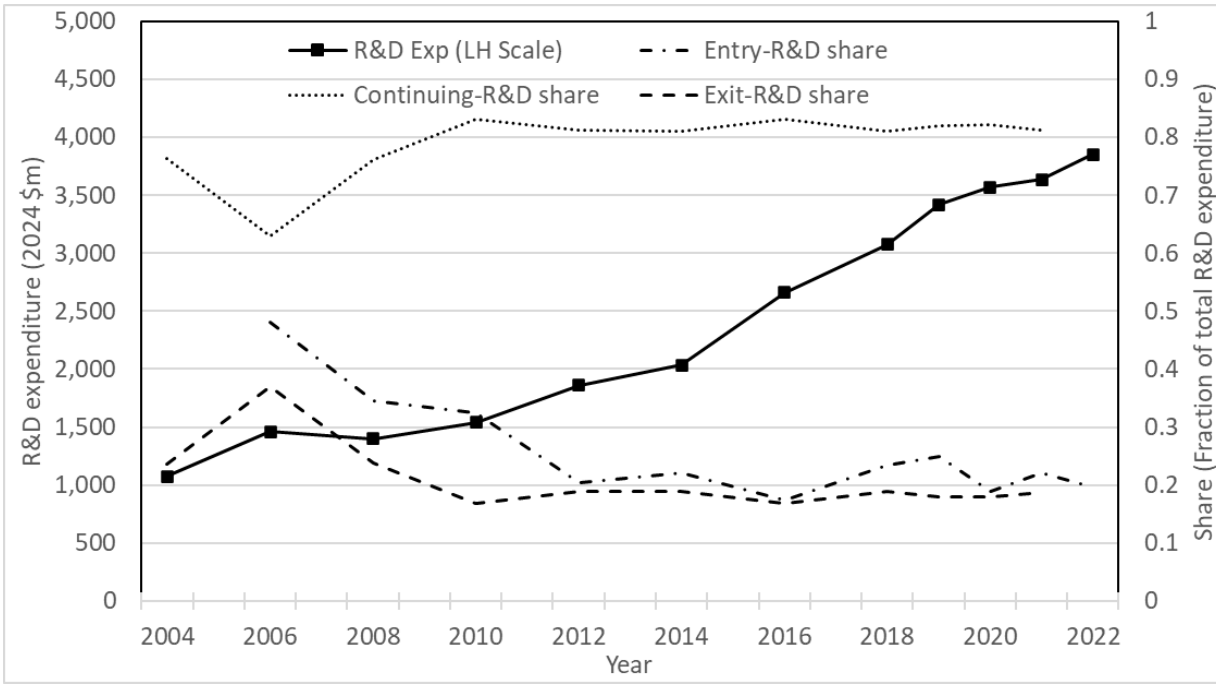
[14] The changing pattern may reflect changes in the RADS, which resulted in a series break. From 2012, the survey population was altered, to target R&D performers that had been identified as performing or funding R&D activities in New Zealand, drawing on a range of information sources (Statistics New Zealand, 2013).

[15] For comparison, the two-yearly entry and exit rates are approximately 5 ppts higher than annual rates over the period since 2018 when the RADS has been conducted annually.

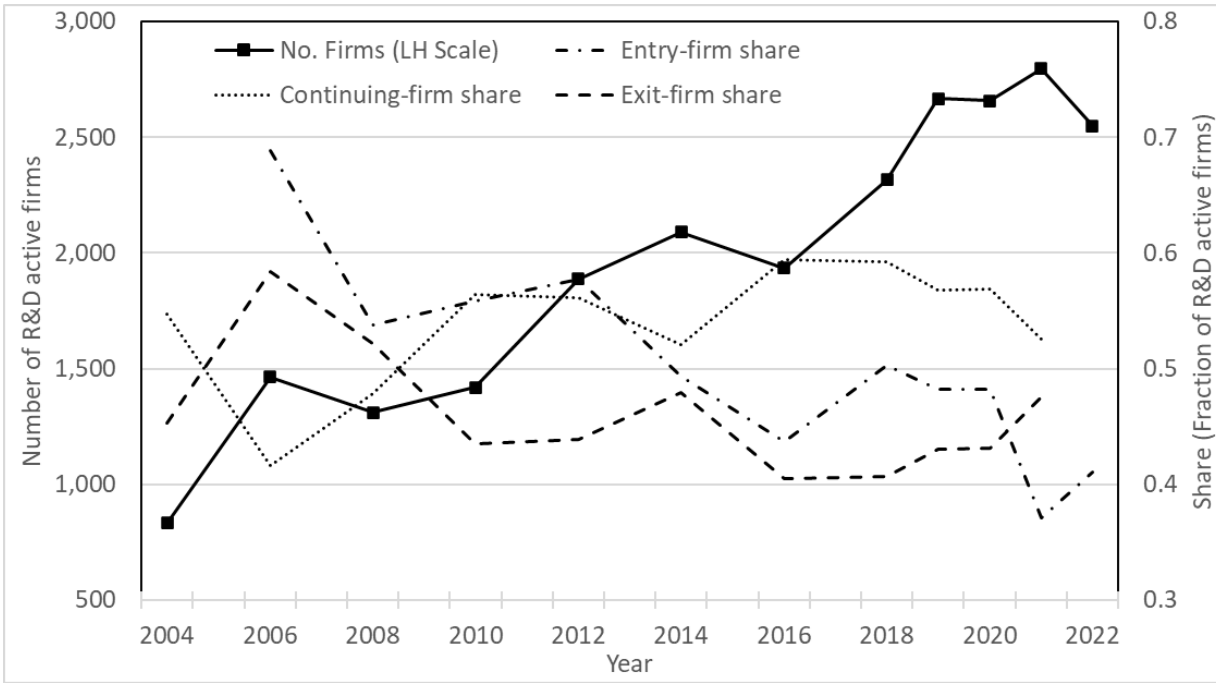
[16] We define the continuing, entry and exit status of firms on the basis of their R&D activity in the first and last year of each subperiod.

Figure 4: Annual R&D activity, and 2-year entry and exit, 2004–2022

(a) R&D expenditure



(b) R&D-active firms



Notes: The hybrid total R&D expenditure measure (RDExp) employed (described in Appendix B.1.5) utilises total R&D expenditure figures from R&D Survey, BOS and IR10 sources. Continuation, exit and entry is calculated for the even years from 2004–2018, and each year from 2018–2022. Continuing and exiting firms are calculated from the current-year to 2-years ahead; while two-year entering firms are calculated from 2-years prior to the current-year; and share of each is calculated relative to the number of firms in the current year. "LH Scale" refers to the scale on left vertical axis (right side scale unless stated).

Table 4 summarises the changes and contributions over these three periods. The top block of the table documents the total R&D expenditure in the first and last years of each subperiod, and the change over each period. The increases in annual R&D expenditure were particularly strong in the first two subperiods – $786m (73%) between 2004 and 2012, and $1,556 (84%) between 2012 and 2019 – and lower ($693, 20%) over the final shorter period.[17] Examining records of government R&D support beginning in 2007, $619m of R&D expenditure in 2012 came from firms that were receiving support. This accounted for 79% of the increase in R&D since 2004. Over the 2012–2019 period an additional $1,406m of R&D expenditure was undertaken by firms receiving support, accounting for 90% of the increase in total R&D over that period. Also, over the 2019–2023 period, there was a further $1,007m of R&D expenditure by firms receiving support, which accounted for 145% of the increase in total R&D in that period.

We further document the contributions to the changes in R&D expenditure by firms continuing, entering into and exiting from, R&D activities. First, there were increases in R&D expenditure of $111m, $667m and $482m by firms that were R&D-active in the first and last year of the respective subperiods. There were larger increases ($303m, $751m, and $612m) in R&D expenditure associated with continuing firms receiving support; and even larger increases among firms receiving Growth Grant (GG) support between 2012 and 2019 ($903m), and RDTI support in 2023 - relative to Growth Grant support in 2019 ($776m).

Second, given the high rates of R&D activity, entry and exit by firms, the increases in R&D expenditures by entering firms is particularly large and partially offset by reductions associated with exiting firms. Net changes associated with entry and exit, presented in the lower block of Table 4, may be more meaningful. The net effect of entering and exiting firms account for most ($675m or 86%) of the increase in R&D expenditure between 2004 and 2012, more than half ($889m or 57%) between 2012 and 2019, and a smaller proportion ($211m or 30%) between 2019 and 2023. R&D expenditure by supported firms contribute heavily to the latter two subperiod increases: $655m (74%) of the net entry increase between 2012 and 2019, and $395m (187%) of the net entry increase between 2019 and 2023.

The lower block of Table 4 also shows that Growth Grant supported firms contributed most of the supported-firm net increase between 2012 and 2019; while the positive contribution to net change in R&D expenditure from RDTI supported firms between 2019 and 2023 exceeded that of all supported firms. Between 2019 and 2023, this implies a small net decrease in R&D expenditure across entering and exiting government supported firms that were not RDTI supported.

To summarise, there have been large increases in R&D expenditure by firms over the sample period, which has resulted in a near four-fold increase in annual inflation-adjusted business R&D expenditure since 2004 (from $1,076m to $4,111m). Firms receiving government R&D support account for most of the observed increase. Two extreme explanations are, first, that the R&D support has caused the large increases in R&D activity by lowering the costs associated with conducting R&D; and second, that the support was coincident with increases in R&D activity that would have occurred even in the absence of support provided. By assessing the causal effects of various forms of support on R&D activity, our impact analysis in Section 5 unpacks the extent to which these explanations are correct.

[17] The 2023 total may be slightly understated due to incomplete IR10 data. However, official (RADS) measures of BERD also show relatively slow (11%) growth between 2019 and 2023.

Table 4: Decomposing changes in R&D expenditure, 2004–2023

Subperiod:	2004-2012	2012-2019	2019-2023
First year R&D	$1,076m	$1,862m	$3,418m
Supported firms	---	$619m	$2,026m
Last-year R&D	$1,862m	$3,418m	$4,111m
Supported firms	$619m	$2,026m	$3,033m
Change in R&D expenditure	$786m	$1,556m	$693m
(% change)	(73%)	(84%)	(20%)
Contributions from:			
• Change in Supported firms' R&D	$619m	$1,406m	$1,007m
(% change)	---	(227%)	(50%)
(% of R&D change)	(79%)	(90%)	(145%)
• Change in Continuing firms R&D (C)	$111m	$667m	$482m
(% of R&D change)	(14%)	(43%)	(70%)
Receiving R&D support	$303m	$751m	$612m
(% of C)	(273%)	(113%)	(127%)
Receiving GG (in 2019) or RDTI (in 2023)	---	$903m	$776m
(% of C)		(135%)	(161%)
• Change in Entering firms R&D (N)	$1,177m	$1,609m	$1,102m
(% of R&D change)	(150%)	(103%)	(159%)
Receiving R&D support	$316m	$839m	$667m
(% of N)	(27%)	(52%)	(61%)
Receiving GG (in 2019) or RDTI (in 2023)	---	$618m	$597m
(% of N)		(38%)	(54%)
• Change in Exiting firms R&D (X)	-$502m	-$720m	-$891m
(% of R&D change)	(-64%)	(-46%)	(-128%)
Receiving R&D support	---	-$184m	-$272m
(% of X)		(26%)	(31%)
Receiving GG (in 2019) or RDTI (in 2023)	---	---	-$198m
(% of X)			(22%)
• Net Entry and Exit (N+X)	$675m	$889m	$211m
(% of R&D change)	(86%)	(57%)	(30%)
Receiving R&D support	---	$655m	$395m
(% of N+X)		(74%)	(187%)
Receiving GG (in 2019) or RDTI (in 2023)	---	$618m	$399m
(% of N+X)		(69%)	(189%)

Notes: All R&D expenditures expressed in constant (March 2024) $m-values. Supported R&D refers to R&D expenditure in firms receiving government R&D support.

4 Patterns of government R&D support

Before presenting our impact analysis, we expand on Section 3 by outlining broad patterns in the provision of government support for BERD since the introduction of the RDTI. Where possible, we also discuss comparable figures relating to CI R&D grants.

Table 5: RDTI engagement among NZ R&D performers, 2020-2024

	No engagement	Enrolled	Successful General Approvals	Tax credit earned	Exited
Never received support from Callaghan grants and loans	2,397	1,266	741	561	288
Received Callaghan support before 2019 but not after	138	84	66	63	24
Received Callaghan support in or after 2019	1,392	1,080	867	690	207
R&D Exp. less than $100,000	1,602	612	420	291	153
R&D Exp. $100,000 to $299,999	456	456	375	294	144
R&D Exp. $300,000 to $999,999	306	522	465	372	114
R&D Exp. $1,000,000 or greater	165	444	399	357	108
No R&D Exp. figure available	1,398	399	9	.s	.s
Total	3,924	2,430	1,671	1,311	519

Notes: The sample is limited to firms with observed R&D activity during the RDTI window, meaning R&D-active in RADS/ BOS/ RDTI or Callaghan Grants and Loans. R&D Expenditure brackets are based on nominal annual average, using scaled values of RDTI R&D expenditure where the hybrid RDExp measure was unavailable. The penultimate row of the table captures firms for which no R&D expenditure data are available. Typically, the GA record provides a basis for imputing R&D expenditure when no SR exists, but there are 9 firms with GA records and missing estimated annual R&D spend. Figures are aggregated to income years ending 31 March and rounded/ suppressed (".s") in accordance with Statistics NZ requirements. Rounding means that totals in the top and bottom panel may not exactly match (total column calculated based on the RDExp brackets).

4.1 How many firms have engaged with the RDTI?

Table 5 lays out the extent of RDTI engagement among R&D performers in New Zealand who were R&D-active during the 2020-2024 RDTI window. It shows that 2,430 firms had enrolled in the RDTI, 1,671 firms had had successful General Approvals, 1,311 had received a tax credit, and 519 firms appeared to have exited the scheme.[18] Firm counts are disaggregated according to prior support from Callaghan Innovation, as well as the level of recent R&D expenditure.[19]

Table 5 highlights a high rate of follow-through from a successful General Approval to receiving a tax credit (78.5%). This is unsurprising given the up-front commitment required for a successful General Approval application. The follow-through rate is higher (82.2%) when we isolate the 2021 and 2022 years for which most Supplementary Returns have been processed.

[18] Firms are defined as having exited the RDTI if they have previously received RDTI support but have no record of 2024 support (neither a General Approval nor a Supplementary Return).

[19] Figures use administrative data available in Statistics New Zealand's Longitudinal Business Database. The most recent data available at the time of analysis were from September 2024. See Appendix section B.1 for further details.

Examining the disaggregated counts, the drop-out rate between Enrolment and General Approval is greater among firms with annual R&D expenditure of less than $300k (25.6%) and those with no prior Callaghan support (41.5%). It is possible to overstate the practical relevance of drop-outs, given that enrolment is a straightforward process. Nonetheless, relative to other subgroups, enrolling in the RDTI appears less likely to translate into receiving support for small R&D spenders, and firms that have not previously been CI customers.

Table 5 also demonstrates that RDTI exit rates appear higher among firms that have never received Callaghan support (51.3%), and those with average annual R&D expenditure of less than $300k (50.8%). Exit rates are calculated relative to the number of firms that were supported (i.e., received a tax credit or had a successful General Approval). Higher exit rates may point to challenges maintaining RDTI support (distinct from challenges entering the RDTI) that are experienced disproportionately by groups such as small R&D spenders.

A majority of the 2,397 firms in the "No engagement" column of Table 5 that had never received support through Callaghan are likely ineligible for the RDTI. However, a sizeable number of firms not engaged with the RDTI have received Callaghan R&D grants since the RDTI was launched (n=1,392). The number of firms with recent Callaghan-support who have not engaged with the RDTI is not much smaller than RDTI supported firms across the first five years (n=1,752). Many of these firms may be sporadic R&D performers, at the early stages of their R&D journey, and/ or supported by Callaghan in small ways for a defined time period (e.g., a Student Grant).

Table 6 provides an overview of reported take-up rates (as a proportion of all R&D-active firms) for the RDTI, Growth Grants, and other R&D grants provided by Callaghan Innovation. Take-up rates are broken into 11 industry groups, chosen to represent variation in R&D activity (See Appendix Table 12). The overall take-up rate for RDTI was 25%, meaning that a quarter of firms that were R&D-active between 2020 and 2023 had received RDTI support. This was more than twice the take-up rate for Growth Grants between 2015 and 2019 (11%). Almost half of all R&D-active firms (48%) received some firm of R&D support, with 31% receiving support through R&D grants other than Growth Grants administered through Callaghan Innovation (labelled 'Other CI').

The proportion of R&D-active firms that received support from RDTI varies markedly across industries. RDTI take-up was highest for 'Scientific Research Services' (37%), 'Information, Media and Telecommunications' (37%), and 'Computer System Design and related services' (36%) industries. In contrast, take-up for Growth Grants was relatively much higher for the 'Computer System Design and related services' (29%, compared with overall take-up of 11%) – the difference perhaps reflecting the reduced eligibility for software development under RDTI. Growth Grant take-up was also relatively high for Machine and Equipment Wholesaling industries (18%) and some manufacturing industries (17%, labelled as "Manufacturing group 2").

The lower panel of Table 6 summarises take-up rates weighted by R&D expenditure. Overall, 36% of R&D expenditure was in firms supported by RDTI, with over half of R&D (54%) in firms that received some form of support. The fact that the expenditure-weighted take-up of the RDTI (36%) was higher than the firm take-up rate (25%) implies that support went disproportionately to high-R&D expenditure firms. This concentration of support on high expenditure firms was more pronounced under Growth Grants, whereas "Other CI" support was concentrated disproportionately on firms with lower-than-average R&D expenditure – 31% of firms, accounting for only 19% of R&D expenditure.

Table 6: Take-up rates by industry (as a proportion of all R&D-active firms)

Group		Share of: firms	Take-up rates RDTI	Growth Grant	Other CI	Any main support
All Industries		100%	23%	10%	23%	38%
OSERV	Service industries nec	16%	21%	17%	25%	43%
C2	Manufacturing group 2	16%	14%	3%	14%	22%
M7000	Comp Sys Design & Rel Serv	14%	33%	27%	26%	56%
OTHER	Other non-service industries nec	11%	24%	10%	32%	47%
M69	Prof/Sci/Tech Serv (not M691/M70)	10%	20%	4%	21%	31%
C1	Manufacturing group 1	9%	15%	3%	20%	28%
F3	Wholesale Trade (except F34)	7%	18%	5%	19%	31%
C11	Food Product Manufacturing	6%	18%	3%	26%	33%
M6910	Scientific Research Services	4%	39%	10%	40%	57%
J5	Info Media & Telecomm (not J60)	4%	34%	8%	28%	44%
F34	Mach and Equip Wholesaling	3%	21%	15%	17%	36%
		Share of: R&D Exp	Weighted by R&D expenditure			
All Industries		100%	48%	41%	27%	68%
OSERV	Service industries nec	**20%**	**60%**	**66%**	**38%**	**86%**
C2	Manufacturing group 2	**9%**	**37%**	**14%**	**10%**	**37%**
M7000	Comp Sys Design & Rel Serv	**29%**	**46%**	**60%**	**24%**	**78%**
OTHER	Other non-service industries nec	**11%**	**52%**	**23%**	**35%**	**63%**
M69	Prof/Sci/Tech Serv (not M691/M70)	**4%**	**43%**	**13%**	**28%**	**49%**
C1	Manufacturing group 1	**5%**	**53%**	**37%**	**27%**	**68%**
F3	Wholesale Trade (except F34)	**4%**	**46%**	**54%**	**18%**	**74%**
C11	Food Product Manufacturing	**5%**	**26%**	**2%**	**45%**	**51%**
M6910	Scientific Research Services	**7%**	**39%**	**10%**	**21%**	**40%**
J5	Info Media & Telecomm (not J60)	**4%**	**57%**	n/a	**15%**	**65%**
F34	Mach and Equip Wholesaling	**2%**	**46%**	**65%**	**17%**	**77%**

Notes: RDTI (2020-2023); Growth Grant (2015-2019); Other Callaghan (2015-2024); Any main support (2015-2024). Other CI refers to any assistance provided through Callaghan Innovation other than Growth Grants (see Table 2). Any main support refers to the five government R&D supports within the scope of the evaluation: the RDTI, Growth Grants, Project Grants, Student Grants, and the R&D Loan. R&D-active firms are identified as those that report positive R&D expenditure in the Research and Development Survey, the Business Operations Survey, or that receive R&D support through RDTI or Callaghan Innovation.

4.2 First-time recipients of government R&D support – RDTI versus R&D grants

Table 7 lays out counts of firms according to the government supports they received during their first observed year of receiving government support. This table is limited to first support via the streamlined set of Callaghan grants as recorded in the Callaghan grants and loans table in the LBD, as well as RDTI records. [20] The annual count of first-time supported firms peaked in 2020 with the introduction of the RDTI and has declined considerably since. The count of supports received exceeds the total number of unique firms because a firm may have received support from multiple schemes in their first year of support. Figures from 2014 onwards are particularly interesting because this is

[20] Table 7 includes firms receiving Ārohia Trailblazer Grants in 2023-24. Administered by Callaghan Innovation, Ārohia is more appropriately described as an innovation grant – not a R&D grant.

Table 7: Number of firms receiving various government R&D and innovation supports during their first observed year of support, by year, 2009 onwards

Year	Unique firms	Project Grants	Growth Grants	RDTI	Stud. Grants	R&D Loans	New 2RD	Ārohia Grants
2009	9	9						
2010	39	39						
2011	102	102			.s			
2012	363	186			207			
2013	249	174			78			
2014	270	207	18		51			
2015	258	207	30		36			
2016	189	138	24		33			
2017	213	168	27		24			
2018	282	213	45		30			
2019	333	228	48		75			
2020	675	189		384	168			
2021	507	156		156	156	138		
2022	351	123		177	72	.s		
2023	264	36		183	54		9	.s
2024	267			126	48		30	93
Total	4,383	2,178	195	1,029	1,035	141	39	93

Notes: This is a sample of subsequently supported firms that had no observed government support pre-2009. Observed support refers to records from the Callaghan Innovation grants and loans dataset in the LBD, as well as the RDTI dataset. The "Project/ Growth" column is a count of the distinct firms that received either/both Project Grants or Growth Grants in their first observed year of support. A firm is deemed to have received RDTI support if there is evidence of either a tax credit received or a General Approval covering a given year. Figures are aggregated to income years ending 31 March and rounded/ suppressed (".s") in accordance with Statistics NZ requirements.

the first year of Growth Grants. (In prior years, some of these figures reflect that Project Grants are merely the earliest record in the dataset, rather than the firm's first instance of receiving government support.)

Table 7 shows that the average annual number of first-time supported recipients that received RDTI support is 206 (1,029 over 5 years). For comparison, the annual average of distinct first-time supported firms receiving Project Grants is 191 (Growth Grants: 35) in the five years preceding the RDTI's introduction. Reaching R&D performing firms that have not previously been supported is an important feature of an inclusive regime. On one hand, it is notable that the number of first-time RDTI-supported firms is declining. On the other hand, there are a finite number of R&D performers in New Zealand and the slightly lower RDTI figures may reflect that government support is getting closer to saturating the total addressable market.

4.3 How much support has been provided?

Focusing on Supplementary Returns only, Table 8 reports a count of tax credit claims approved based on firms' size of RDTI-eligible R&D expenditure. Around 1.5% of claims have come from firms with less than $50k of eligible R&D expenditure, with 88.6% (64.9%) of claims coming from entities spending more than $100k ($300k) of eligible R&D expenditure.[21]

[21] As well as those using ARPs, the 'below $50k' bracket could include entities in a partnership or look through company who are part of a combined claim that exceeds $50k.

Table 8: Supplementary Returns approved by eligible expenditure band, 2020-2024

	Year					
	2020	2021	2022	2023	2024	Total
Eligible expenditure band						
$1 to $50k	16	13	9	6	1	45
$50k to $99,999	84	67	77	54	2	284
$100k to $299,999	164	172	171	158	18	683
$300k to $999,999	176	191	304	278	39	988
$1M to $5M	95	113	226	247	34	715
$5M +	21	21	64	58	5	169
Total	**556**	**577**	**851**	**801**	**99**	**2,884**

Notes: Reproduced with permission using information provided by Inland Revenue in August 2024. Counts for later income years are understated due to the Supplementary Return submission/ processing lag. Eligible R&D expenditure bands refer to nominal values.

Expanding the focus beyond Supplementary Returns and taking account of General Approvals records covering recent years, we estimate that $1,074m (nominal value) of tax credits will have been provided through the RDTI relating to the first five years. This figure relies primarily on the Supplementary Returns data transferred from Inland Revenue to Statistics NZ and uploaded to the LBD. The latest data upload was September 2024. In cases where a General Approval is in place, but a Supplementary Return is not yet available (common in the 2024 income year), we use the estimated annual R&D expenditure included with the pre-approval record to calculate an estimated tax credit.

4.4 Entrants to the RDTI

To better understand the common pathways into RDTI support, Table 9 contains counts of firms receiving RDTI support for the first time in each income year and the total amount of RDTI tax credits received by these entrants. Firm counts and totals are disaggregated based on relevant groupings of prior government R&D support received as well as firms' recent histories of R&D expenditure. Overall, $306m in nominal terms (of $1,074m in total credits) have gone to firms in their first year of support. The evidence in Table 9 is suggestive of further patterns of firms' entry into the RDTI.

First, there is clear variation in the profile of RDTI entrants across years. Differences are particularly apparent between the two largest waves of entrants; those first supported by the RDTI in 2020 and 2022. Entrants in 2020 were spread across a diversity of R&D Expenditure brackets. Entrants with prior Callaghan Innovation support received larger tax credits, on average. Most 2020 entrants (61%) were not prior Callaghan Innovation customers, and a vast majority (95.7%) had never received a Growth Grant. Some Growth Grant recipients, particularly those who were spending above the ceiling of Growth Grant support may have switched to the RDTI at the outset, and this may have a large influence on the size of tax credits received by Callaghan customers in 2020. In contrast, the 2022 entry cohort was dominated by prior Callaghan customers (64.5% of entrants) and firms with $300k or more of average annual R&D expenditure (65.2% of entrants). Most Growth Grant recipients received their first RDTI support in 2022. Of the tax credits received by new entrants in 2022, 72.0% went to prior Growth Grant recipients.

Table 9: New entrants to the RDTI in their first year of support, 2020-2024

	2020	2021	2022	2023	2024	Total
Firm counts of new entrants	561	243	465	288	195	1752
New entrants with prior…						
Callaghan support	219	126	300	120	84	849
Growth Grant (GG)	24	30	189	18	.s	.s
Project Grant	153	72	171	72	51	519
Non-GG support	216	120	273	117	75	801
GG *and* non-GG Support	21	24	162	15	.s	.s
RDExp less than $100,000	141	81	84	81	66	453
RDExp $100,000 to $299,999	138	69	78	75	39	399
RDExp $300,000 to $999,999	162	48	126	78	66	480
RDExp $1,000,000 or greater	123	48	177	51	24	423
Tax credits to new entrants ($m)	$104.07	$20.41	$111.56	$51.74	$18.22	$306.01
New entrants with prior…						
Callaghan support	$65.32	$10.02	$94.78	$15.20	$8.65	$193.97
Growth Grant (GG)	$31.50	$5.62	$80.33	$3.09	.s	.s
Project Grant	$46.20	$4.22	$50.10	$8.01	$4.56	$113.09
Non-GG support	$63.00	$7.44	$89.38	$15.19	$6.85	$181.86
GG *and* non-GG Support	$29.55	$3.03	$74.94	$3.08	.s	.s
RDExp less than $100,000	$14.01	$4.84	$7.12	$18.31	$3.56	$47.84
RDExp $100,000 to $299,999	$6.46	$1.87	$3.62	$4.90	$1.44	$18.29
RDExp $300,000 to $999,999	$12.95	$2.90	$12.29	$7.86	$7.62	$43.62
RDExp $1,000,000 or greater	$70.65	$10.81	$88.53	$20.66	$5.60	$196.26

Notes: A firm is deemed to have received RDTI support if there is evidence of either a tax credit received or a General Approval covering a given year. Transitional Support Payments (TSPs) are not considered a distinct form of Callaghan support as they were available only to Growth Grant recipients. "RDExp" brackets refer to average annual R&D expenditure (see Appendix section B.1.5) in nominal terms, with remaining gaps filled from RDTI supplementary returns and General Approval estimated annual spend scaled to align with R&D Survey expenditures. Figures are aggregated to income years ending 31 March and rounded/ suppressed (".s") in accordance with Statistics NZ requirements.

Second, over the five years, the level of RDTI tax credits received by entrants with prior Project Grants is comparable to that received by those with prior Growth Grants. Project Grant recipients were strongly represented among early RDTI adopters. This strong early representation is notable given that closure of the Project Grant scheme was not announced in August 2022 and, in principle, Project Grants appear to offer a more generous level of support. Some firms may have concurrently received Project Grant and RDTI support for different R&D activities. Many Project Grant recipients who transitioned to the RDTI in 2022 may have done so following CI's tightening of Project Grant eligibility settings around this time, including a narrower focus on less established R&D performers and limiting the number of Project Grants a firm could apply for.

Third, the overall picture painted by Table 9 suggests a more inclusive approach to supporting BERD than the previous R&D Grants regime. Just over half of RDTI entrants (51.5%) had not previously been supported by Callaghan Innovation's grants and loans. Just under half of RDTI entrants (48.6%) had average R&D expenditure below the previous Growth Grant eligibility requirement.[22] While the majority of tax credits for new entrants went to those that were already

[22] This is based on a hybrid measure of RDExp described in Section B.1.5, and is not wholly equivalent to eligible Growth Grant expenditure.

Table 10: Growth of the 2020 RDTI entry cohort

Year	# firms	# with Projs	Avg # Projs	Avg. Elig. RDExp ($m)	w/ RDExp	Avg. RDExp ($m)
2020	561	561	2.37	$1.47	378	$2.07
2021	558	438	2.50	$1.84	381	$2.38
2022	558	432	2.88	$2.05	384	$2.53
2023	552	393	3.11	$2.06	345	$2.81
Growth			31%	40%		36%
Balanced subsample (over 4 years) of 2020 cohort firms						
2020	351	351	2.59	$1.86	237	$2.41
2021	351	351	2.67	$1.97	255	$2.78
2022	351	351	3.14	$2.21	258	$3.06
2023	351	351	3.25	$2.19	237	$3.53
Growth			26%	18%		46%

Notes: Real $ using an annual average of the Producer Price Index (inputs, March 2024 quarter: 1000).

significant R&D spenders and/ or prior Callaghan customers, a significant proportion of RDTI-supported firms were low R&D expenditure firms and/or new to government support.

4.5 Post-entry patterns among RDTI-supported firms

There appears to be growth in support over time among firms receiving multiple years of RDTI support. For each RDTI entry cohort, there is positive growth among supported firms with regard to (a) their average number of supported projects in a year, (b) their average RDTI-eligible R&D expenditure, and (c) their estimated total R&D expenditure (*RDExp*).

Table 10 illustrates these patterns for the first cohort of RDTI entrants, where 30-40% growth is apparent across the four years to 2023. Part of the growth is associated with repeated selection over time of larger expenditure, more active R&D firms within this cohort. Among the subsample of firms observed consistently in each of the four years (bottom panel of table), there is 26% growth in the average number of projects and 18% growth in the average eligible R&D expenditure (compared with 31% and 40% respectively in the full sample). Unsurprisingly, this suggests that the more R&D-active firms in the cohort are more likely to be supported in every year, and that their supported activity has increased.

For comparison, we also considered pre-support patterns for RDTI supported firms over 2015-19 (and/or 4 years prior to RDTI-entry year). We observe some positive average annual growth in the number of R&D-active firms over the 4 years pre-entry of 10% (2020 cohort), 11% (2022 cohort), and 18% (2023 cohort).[23] However, growth in RDExp was smaller and typically negative: -8% (2020 cohort), -5% (2023 cohort), -1% (2022 cohort).[24] Taken together, this appears to reflect growth in R&D activity over time for firms receiving repeated years of RDTI support.

[23] For the 2021 cohort, the four-year growth rates of R&D-active firms (32%) and RDExp (+3%) are probably best disregarded given the poor sample of R&D Activity (i.e., no R&D Survey) in the base year.

[24] This pattern is particularly interesting given overall positive R&D expenditure growth in the national statistics (e.g., Figure 2). One potential (speculative) explanation is that firms eligible for R&D support may have made more conservative R&D investments during the four-year pre-entry window, during which there was considerable uncertainty regarding medium-term government BERD support (see also Section 5.3.4).

5 Does support affect outcomes?

In this section, we report estimates of the effects of government R&D support on firms. The initial effect that we consider is the amount of R&D spending. This is referred to as "input additionality", reflecting the fact that R&D is an input into innovation and firm performance (Appelt et al., 2023). We also estimate the effect that support has on innovation, and on productivity (referred to as "output additionality"). Finally, we examine whether support affected firms' output or productive inputs (employment, capital and intermediate inputs).

Our estimates of input additionality and output additionality are based on a comparison of the outcomes of supported firms with the outcomes of otherwise similar non-supported firms. Similar firms are identified as those that have similar characteristics, as well as similar recent patterns of R&D expenditure, support, and growth. We use econometric methods ('doubly-robust propensity-weighting', outlined below) to obtain estimates of the effect of government R&D support on supported firms ("the effect of treatment on the treated"). We focus primarily on the effects of RDTI support, but we also report estimates of input and output additionality for firms that received Growth Grant support and any government R&D support, which also includes recipients of Project Grants, Student Grants, and the R&D Loan.

Estimating the effects of government R&D support is challenging for two main reasons. The first challenge is finding a credible counterfactual for how supported firms would have fared in the absence of support. We outline our approach to meeting this challenge in Section 5.1, providing further detail in Appendix section B.2. The second challenge is the lack of comprehensive data. We document the data sources that we use, and how we used them, in Appendix section B.1. Obtaining reliable estimates is also challenging due to the relatively short post-support period over which outcomes are observed. Furthermore, information on firm characteristics and recent changes is available for only a subset of supported and comparison firms, limiting the robustness of the findings.

Overall, we find evidence of relatively strong input additionality—we estimate that RDTI support raised R&D expenditure in supported firms by an average of $274k per firm per year.[25] In comparison, Growth Grant support raised R&D expenditure within supported firms by an average of $429k per year. Support going to firms in the form of any of the main government R&D support mechanisms (RDTI, Growth Grants, Project Grants, Student Grants and the R&D Loan) is estimated to have raised supported firms' R&D expenditure on average by around $95k per year. In section 5.2.4, we discuss the overall contribution of these effects in aggregate—taking into account how many firms received each stream of support and how many years are covered by each stream.

The estimated effects of support on innovation are statistically significant in only some years, and suggest a 5 to 6 percentage point increases for supported firms. We find no discernible impact on multifactor productivity in any year — the private returns to R&D are not evident in the relatively short outcome window for which follow-up data are available.

5.1 Methods

Our impact analysis focuses on the effects of R&D support on the firms that receive support (i.e., the 'treatment effects on the treated' firms), rather than the effects on the full population of potentially

[25] All dollar values in Section 5 are reported in real terms, unless stated, using an annual average of the Producer Price Index (inputs, March 2024 quarter: 1000).

supported firms.[26] This requires constructing counterfactual outcomes for firms receiving support, involving refined programme evaluation methods to disentangle the effects of R&D support from other factors that affect firms' expenditure, productivity and innovation outcomes.

Firms that choose to get government R&D support may differ from those that do not get support (see, e.g., Wakeman, (2017), table 2.3 and figure 2.4). Differences between supported ('treated') and unsupported firms in outcomes such as R&D expenditure could plausibly be related to their differing characteristics rather than the effects of government R&D support. For example, firms that are already R&D-active may find it easier to access government support and to increase the scale and success of their R&D programmes. It is important that our evaluation accounts for this non-random selectivity (take-up) of firms into receiving R&D support. Similarly, R&D expenditure growth following RDTI support cannot be interpreted as an effect of support without some comparison of growth patterns for unsupported firms.

Our approach uses non-experimental methods including matching and regression adjustment, using a restricted sample of comparison firms. Table 11 shows that RDTI-supported firms differ from other potentially R&D-active firms. The table documents the mean characteristics of treated (RDTI-supported) and potential comparison firms, for selected main characteristics, and separately for each RDTI entry cohort (and comparison firms from the same year). The set of potential comparison firms is a broader set of firms than are used when estimating the impacts of RDTI support. It includes all business-sector firms that are observed as R&D-active at some point prior to 2024 and are observed in a given year.

In each year, treated firms have a higher average level of R&D expenditure: $1.7m to $4.1m, compared with $0.6m to $0.8m among potential comparison firms. The proportion with any positive R&D expenditure is also higher for treated (46% to 69%) than for potential comparison firms (21% to 25%). Furthermore, R&D expenditure is missing for a higher proportion of potential comparison firms (50% to 53%) than for treated firms (24% to 46%). Treated firms report higher rates of innovation (59% to 82% of firms) than potential comparison firms (38% to 57%), and higher average levels of output ($31m to $103m compared with around $23m for potential comparison firms). The second panel of Table 11 shows the industry composition of the groups. Supported firms are much more likely than potential comparison firms to be in the Scientific Research Services (ANZSIC M691) and Computer System Design (M700) industries. The final panel summarises firm characteristics in the 3 years prior to the year of RDTI entry. Treated firms are more likely to have received some form of R&D support from Callaghan Innovation. A particularly high proportion (42%) of the 2022 RDTI entry cohort had received support in the form of Growth Grants in the previous 3 years, as noted in Section 4.4.

The differences between treatment and potential comparison firms, and the variation between entry cohorts, demonstrates why a simple (unmatched/ unweighted) comparison of outcomes for treated and potential comparison firms is unlikely to be informative about the effect of RDTI support. The first step in our approach is to restrict the set of potential comparison firms. We require that both treated and comparison firms have positive reported R&D expenditure, as well as usable information on key variables such as recent R&D expenditure. Our estimation sample consequently includes only 771 distinct firms - about half of the 1,557 firms that received RDTI support between 2020 and 2023. The set of potential comparison firms is even more severely affected by these

[26] To the extent that there are positive R&D spillover effects to other (unsupported) firms, our estimated treatment effects will be understated. (This represents a violation of the Stable Unit Treatment Value Assumption, SUTVA, in causal inference.) However, as any spillover effects to other firms will take some time to occur and the analysis focuses on relatively short-term effects (especially for RDTI), we expect spillover effects to be small within the estimation period. Our estimates of the wider economic impact of government support for R&D (in section 6.3) capture longer term spillovers to productivity.

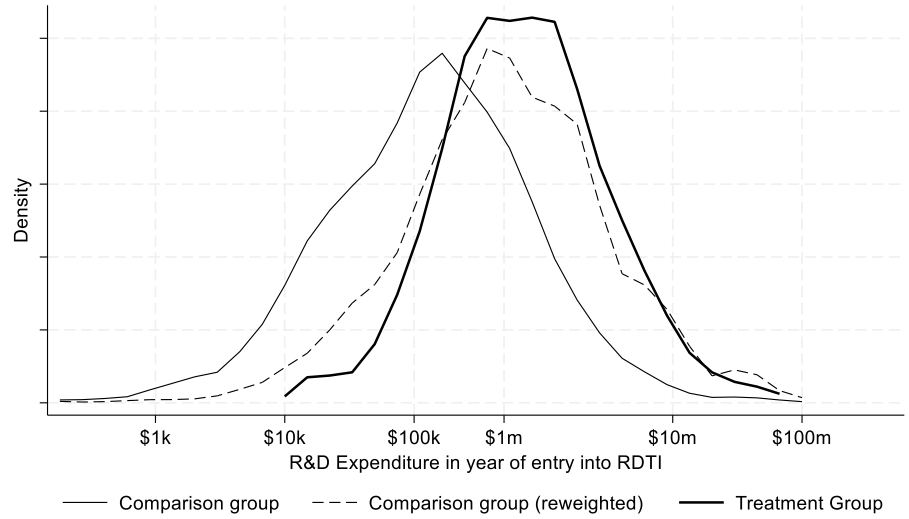
requirements. Only 5,814 of the 30,624 potential comparison firms reported in Table 11 are included in our estimation sample. These restrictions, and the impact they have on the number of included firms, are documented further in Appendix B (Appendix Table 7 and Appendix Table 8).

Table 11: Descriptive statistics for RDTI entry cohorts and potential comparison firms (by year of entry)

Variable	2020		2021		2022		2023	
	T	C	T	C	T	C	T	C
Entry year								
Number of observations	555	7833	237	7794	456	7662	285	7335
% with positive *RDExp*	61%	24%	66%	25%	69%	21%	46%	23%
Mean *RDexp* ($m)	$2.3	$0.7	$1.9	$0.6	$4.1	$0.7	$1.7	$0.8
RDExp from RADS	45%	34%	49%	34%	59%	35%	37%	34%
RDExp from BOS	7%	9%	6%	11%	6%	9%	9%	14%
RDExp from IR10	16%	5%	19%	5%	12%	4%	7%	2%
RDExp missing	32%	52%	25%	50%	24%	53%	46%	50%
RDTI total R&D exp	$1.5		$0.7		$1.9		$1.3	
RDTI total eligible R&D exp	$1.5		$0.7		$1.9		$1.3	
% with tax credits (supp returns)	99%		73%		80%		57%	
RDTI total credits	$0.2		$0.1		$0.3		$0.2	
Innovation (1yr new prod,serv)	74%	57%	82%	56%	79%	50%	59%	38%
Mean output $(m)	$103	$23	$65	$23	$31	$24	n/a	n/a
Industry (ANZSIC06)								
Manufacturing (C1*, not C11))	8%	8%	6%	8%	6%	8%	6%	8%
Food Product Mfrg (C11)	5%	4%	4%	4%	3%	4%	5%	4%
Manufacturing (C2*)	11%	12%	9%	12%	16%	12%	13%	12%
Wholesale Trade (F3*, not F34)	6%	7%	5%	7%	4%	7%	4%	7%
Mach&Equip Wholesale (F34)	3%	3%	4%	3%	2%	3%	2%	3%
Info Media & Telecom (not J60)	6%	4%	9%	4%	7%	4%	7%	4%
ProfTech&Sci Serv (Not M691/M70)	13%	12%	16%	12%	11%	12%	9%	12%
Scientific Research Serv (M691)	6%	2%	9%	2%	5%	2%	9%	2%
Computer Syst Design (M7000)	19%	9%	19%	9%	28%	9%	22%	9%
Other Service industries	15%	25%	13%	25%	14%	25%	14%	25%
Other industries	8%	15%	6%	14%	4%	14%	7%	15%
Recent (previous 3 years)								
R&D-active	56%	40%	51%	42%	68%	43%	51%	42%
Mean *RDexp*	$2.5	$0.5	$1.9	$0.5	$3.6	$0.5	$1.0	$0.5
% with productivity data	75%	74%	66%	75%	81%	75%	73%	77%
Geometric mean employment	13.8	10.9	8.4	11.0	13.0	10.9	8.0	10.8
Capital-labour ratio	9.9	9.9	9.7	9.9	9.6	9.8	9.6	9.8
Labour productivity (ln(Y/L))	11.9	12.2	11.6	12.2	11.8	12.2	11.4	12.2
2yr Innovation (prod, serv, proc)	70%	36%	54%	36%	76%	36%	58%	37%
Growth Grant support	5%	2%	14%	2%	42%	2%	5%	1%
Any Callaghan support	24%	10%	28%	12%	49%	14%	30%	14%

Note: Counts have been randomly rounded to base 3. ”T” denotes treated firms and “C” refers to potential comparison firms. The potential comparison firms are all firms that were ever R&D-active prior to 2024 and were observed in the specified year.

Figure 5: Raw and reweighted density of R&D expenditure



Notes: The figure shows kernel density measures with bandwidth of 0.25 and 51 evaluation points. Some values have been suppressed due to small numbers. The horizontal scale is a log scale.

The second step is to reweight the set of selected comparison firms so that their average characteristics match those of the RDTI-supported firms at the point that the treated firms first receive support. Our method of reweighting ("propensity score weighting") is explained in Appendix B. Table 12 summarises the range of variables on which the two sets of firms are matched. The Appendix also documents the 'balancing' of key characteristics across the treatment and control firms, showing that the procedure ensures that weighted characteristics of the two sets of firms have similar means and variances.

Although this approach ensures that the treatment and (weighted) comparison firms have similar characteristics prior to support, their outcomes can subsequently differ owing to the effects of support. Figure 5 provides a preliminary indication of the pattern of outcome differences that underpin our findings, and which will be analysed more carefully in the next section. The figure shows the distribution of R&D expenditures for RDTI-supported firms in their first year of support, compared with the distribution for comparison firms. The comparison-firm distribution is shown both weighted and unweighted. The left-most distribution is for the (unweighted) comparison group, showing that they generally have lower R&D expenditure than the treatment group. After reweighting, the distributions are more similar, but with a relatively high density of comparison at low levels of expenditure, and a relatively high proportion of supported firms to the right of the peak density. Overall, the average of the supported firm distribution is around 0.3 higher than the average of the weighted comparison firm distribution, implying that supported firms have R&D expenditure that is about 30% higher than expected based on the performance of comparable firms that did not receive support.

In addition to using a restricted sample and reweighting the data to ensure that the treatment and comparison firms are alike, we also use linear regression – an approach described as "doubly robust" (Hirano & Imbens, 2001). This additional regression adjustment controls for the possibility that the relationship between characteristics and outcomes differs between supported and unsupported firms. We estimate the relationship between outcomes of interest (R&D expenditure, innovation, productivity) and the same set of covariates as are listed in Table 12. (Appendix B provides further detail.)

Table 12: Variables included in selection and outcome equations

In year when outcome is measured	
• Industry	Grouping of ANZSIC06 industries into 11 groups (grouped to ensure sufficient observations in each industry) See Appendix Table 12.
• Entry cohort	Indicator variable for each entry cohort
• Source of *RDExp*	Where outcome is *RDExp*, indicator variables for the source of the outcome measure (RADS, BOS, IR10)
• Concurrent support	Where treatment is Growth Grant support, indicators for whether the firm was currently receiving non-Growth Grant support; and whether receiving RDTI support
Recent (in 3 years prior to selection equation year)	
• R&DExp	• Level: average of positive *RDExp* (quadratic in logs) • Growth rate: annual change • Missing value indicator for missing Growth rate • (observations are dropped if level of recent *RDExp* is missing) • Separate indicator if *RDExp* is non-missing but *RDExp*=0
• Innovation	• Indicator: introduced new products or services in the prior 2 years (from BOS Innovation module(s) in 3 years prior to entry) • Missing value indicator included
• R&D support	• Received other forms of support: RDTI support; Growth Grant support; Callaghan support other than Growth Grant (varies depending on treatment being examined)

• Production variables
  • L,K,M
  • *mfp*
	L=labour; K=capital; M=intermediate consumption (all in logs)
	mfp=multi-factor productivity
	• level: average of positive values
	• Growth rate: annual change in variable
	• Missing value indicator included

• Firm age	Indicator for whether firm is less than 6 years old.

5.2 Findings

This section discusses the estimated impacts of government R&D support on R&D expenditure, innovation and productivity, which are summarised in Table 13. The estimated coefficients and standard errors on which these estimates are based are included as Appendix Table 9.

5.2.1 Input additionality: Did supported firms increase R&D expenditure?

Figure 6 summarises estimates of the impact of R&D support on firms' R&D expenditure. The top panel shows the estimated impacts of RDTI support. The upper solid line shows the estimated treatment effect on R&D expenditure. In the year of entry into RDTI support, the estimated treatment effect is 0.55, implying that, on average, supported firms spent more on R&D in the year that they first received RDTI support than they would have in the absence of RDTI support.[27] The

[27] A full set of coefficient estimates and associated standard errors is included Appendix Table 9.

Table 13: Summary of estimated impacts per firm-year

	RDTI	Growth Grant	Any main
R&D Expenditure	$0.274m pa higher	$0.429m pa higher	$0.095m pa higher
BOS Innovation (years 2-4)	6.1 ppt higher	5.2 ppt higher	5.7 ppt higher
Multifactor productivity	n.s.	n.s.	n.s.

Notes: n.s. means no significant impact. R&D expenditure impacts are average dollars (real) of additional expenditure per firm per year.

treatment effect of 0.55 equates to a difference of around 70%.[28] The percentage difference was considerably larger for small firms, similar to the pattern found by Sterlacchi & Venturini (2019).[29] The difference in overall R&D expenditure is more strongly influenced by the (lower) differences estimated for larger firms. Overall, the implied increase in total R&D expenditure in the year of first RDTI support is around 22%.

The estimated size of treatment effects increases slightly in the years following entry into RDTI support, although the variation is not statistically significant. The average treatment effect is around 0.65, corresponding to an average difference of around 90%. Again, this difference is much stronger for smaller firms, so the implied increase in total R&D expenditure is lower, at about 25% per year.

To convert these estimates into an estimate of the total amount of additional R&D expenditure resulting from RDTI support, we need to make two adjustments. The first adjustment accounts for the fact that not all RDTI-supported firms are included in our estimation sample. The second adjustment corrects for remaining bias arising from the failure of our estimation approach to eliminate pre-support outcome differences between supported and unsupported firms. Such differences suggest that there are unmeasured characteristics that play a role in determining outcomes.

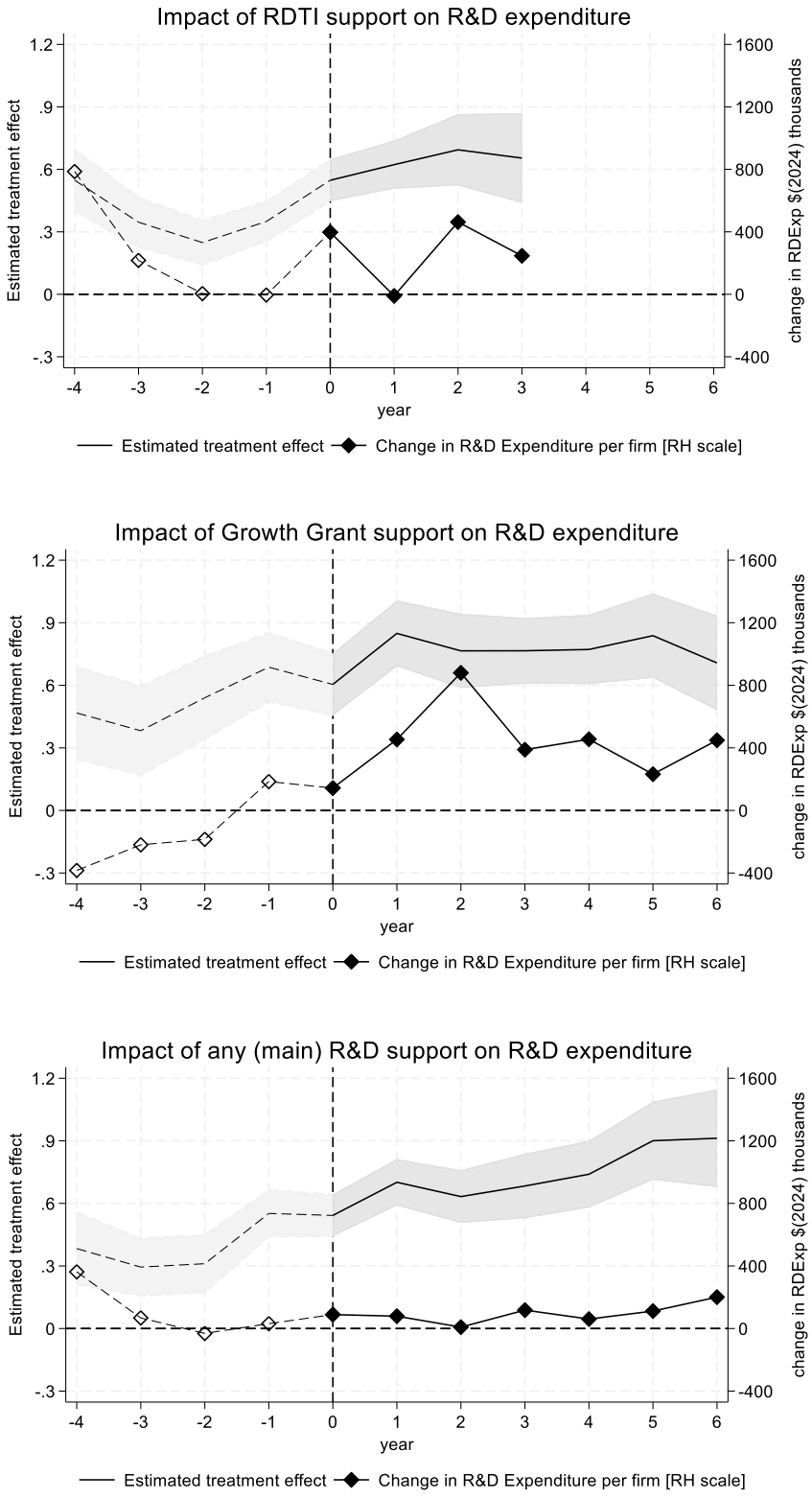
As noted above, a total of 771 supported firms contribute to the entry-year estimate shown in Figure 6 (See Appendix Table 8). This is only 50% of the 1557 firms that received RDTI support in the estimation period (as shown in Appendix Table 7. The omitted firms are mostly firms with low levels of R&D expenditure. The included firms account for 94% of the total RDTI-eligible R&D expenditure (RDTI_RDExp) done by supported firms in the entry year. We therefore rate up estimates of how much extra expenditure was due to RDTI support (by a factor of 1/0.94). This adjustment is larger for years other than the entry year, when the number of firms in the estimation sample is smaller.

The second adjustment is to remove remaining bias in the treatment effect estimates. We estimate 'placebo' treatment effects for periods before firms started receiving support, as outlined in Appendix section B.2. As the effects should be zero, we interpret any estimated treatment effect in these prior years as evidence of selection bias resulting from characteristics that we have been unable to control for. We first estimate the change in aggregate R&D expenditure resulting from RDTI support in each year that firms are supported, and then adjust the estimate by the average placebo effect estimated over the two years prior to support.

[28] The treatment effect is measured as a log change. A treatment effect of 0.55 equates to a percentage change of 73% ($=e^{0.55}-1$)

[29] Variation in the size of treatment effects across firms is discussed further in section 5.2.4.

Figure 6: Impacts of R&D support on R&D Expenditure



Note: Estimated treatment effects correspond to coefficients in Appendix Table 9. Shaded regions show 95% confidence intervals. See section 5.2.1 for an explanation of R&D Expenditure effects.

Table 14: Additional R&D expenditure resulting from RDTI support (undiscounted real value)

	Entry cohort					
	2020	2021	2022	2023	2024	Total
Number of firms	561	243	465	288	195	
Year						
2020	$153.7m					$153.7m
2021	$153.7m	$66.6m				$220.3m
2022	$153.7m	$66.6m	$127.4m			$347.7m
2023	$153.7m	$66.6m	$127.4m	$78.9m		$426.6m
2024	$153.7m	$66.6m	$127.4m	$78.9m	$53.4m	$480.0m
Total						$1628.4m

Note: Counts have been randomly rounded to base 3.

The estimated average change in annual R&D expenditure for each supported firm, adjusted for coverage and for bias, is plotted on the right-hand axis in the first panel of Figure 6. Annual real R&D expenditure per supported firm is raised as a result of RDTI support, by an average of $274k in the years in which they receive support, relative to what they would have spent in the absence of RDTI support. The estimated effect is negligible in the first year after entry, possibly due to variation in the timing of R&D expenditure, or the fact that average R&D increases were more concentrated among smaller firms in that year. For years other than year one, the average increase is around $370k.

The second panel of Figure 6 shows analogous results for the impacts on R&D expenditure of Growth Grant support. Growth Grant impacts are estimated for the period from 2014 to 2019 – prior to the introduction of RDTI. Estimated treatment effects are around 0.7 for years following first receipt of Growth Grant support, implying a doubling of R&D expenditure[30]. However, there is substantial remaining bias in these estimates, as shown by the high estimated (placebo) treatment effects in the years prior to starting to receive Growth Grant support. Calculating the impact of Growth Grant support in the same way as was done for RDTI support, adjusting for coverage and for bias, we estimate an average increase in real R&D expenditure per supported firm of $429k per annum.

The R&D expenditure impact of any main form of government support for R&D is summarised in the lower panel of Figure 6. This estimation is based on the period 2014 to 2023. The estimated average treatment effects are generally similar to both RDTI support and Growth Grant support separately – ranging from 0.5 to 0.9. Controlling for coverage and bias, the average annual increase in R&D expenditure per supported firm is around $95k per annum (with some suggestion of higher effects 5 to 6 years after initial support). This average is considerably lower than for either RDTI supported firms or Growth Grant supported firms, because the group of firms over which the average is calculated includes many low-expenditure firms that were receiving relatively low amounts of support. Their inclusion lowers the average annual impact per firm.

Calculating the aggregate value of induced R&D expenditure entails multiplying the per-firm-year effects by the number of firms that have received support.[31] We estimate a treatment effect in the year of first treatment and in each subsequent year, so the number of firm-years grows over time. This sustained effect on R&D expenditure is consistent with the results shown in Figure 6, in which the treatment effects remain high in the years after treatment. Table 14 illustrates our approach to

[30] $e^{0.7}-1 = 101\%$

[31] We rely on estimates of average effects rather than calculating separate effects by year and cohort, given that the estimated average is more reliably estimated than the separate coverage-adjusted and bias-adjusted estimates.

Table 15: Aggregate value of additional R&D ($m per annum)

	Annual				Overall			
	Total (real)	PV d=2%	PV d=8%	PV d=15%	Total (real)	PV d=2%	PV d=8%	PV d=15%
RDTI (2020-24)	326	335	367	407	1,628	1,677	1,833	2,034
Growth Grants (2015-19)	110	125	181	275	548	623	906	1375
Any main supp (2015-24)	209	223	271	346	2,092	2,228	2,711	3,457

Note: d=discount rate used to convert stream of additionality to present 2024 values (PV).

aggregating the effects, focusing on support received by RDTI entry cohorts. Each row refers to a calendar year and each column a separate cohort of firms starting RDTI support. The number of firms in each entry cohort is shown in the first row. We apply a constant average effect per firm year of $274k (described above). [32] The right-hand column sums the amount of additional R&D resulting from RDTI support each year. Over the five-year evaluation period, the total effect is $1,628m, or $326m per year.

Calculating the present discounted value of R&D also requires us to take into account the timing of support. The top row of Table 15 shows the present value (as at 2024) of annual and overall additionality from RDTI support when applying discount rates of 2%, 8% and 15%.[33] Table 15 also presents the comparable real and discounted additionality for Growth Grant support for the 5-year period 2015-19, and for firms receiving any support over the decade 2015-2024. These are the values of additionality that will be used in section 6.2 in calculations of the net impact of government support for R&D.

The estimated additionality for any main support ($2,092m) is smaller than the estimated combined additionality from RDTI and Growth Grants (($2,176m = $1,628m + $548m per annum). Because any main support includes RDTI and Growth Grants as well as other forms of government support for R&D, we would expect the effect of any main support to be larger. The apparent inconsistency arises from the fact that each is based on statistical estimates – each of which has some uncertainty around it. As shown by the shaded bands in Figure 6, the central estimates for the treatment effects of around 0.6 to 0.7 across the three treatments are estimated with moderately large confidence intervals. This suggests that the actual treatment effect could be 0.1 to 0.2 higher or lower in each case (with 95% confidence). This implies that the range of likely values for the additionality from any main support ($1,600m – $2,600m) does overlap with the sum of additionality from RDTI ($1,200m – $2,000m) and from Growth Grants ($400m – $700m). Furthermore, the estimates of average annual additionality for the different treatments are estimated over different time periods and for different sets of firms, so consistency of estimates is not guaranteed. Taken together the estimates suggest that RDTI and Growth Grants account for by far the largest share of overall additionality. As will be shown in section 6.1, the amount of annual direct support provided RDTI and Growth Grants is also substantially higher than for other main forms of support. In the analysis that follows, we use the central estimate of additionality for each treatment, as shown in Table 15 as our preferred estimate.

[32] The resulting estimates will be underestimates if the effects grow over time, as suggested by the bottom panel of Figure 6. They will be overestimates if firms cease operation in the years after being supported. Applying average effects to all years while or after a firm receives support provides a plausible aggregate estimate.

[33] The choice of an appropriate discount rate is discussed in Section 6.1.1.

5.2.2 Output additionality 1: Did supported firms innovate more?

The estimated impact of government support for R&D on innovation outcomes is summarised in Figure 7. The focal measure of innovation is the response to the annual BOS question asking whether firms have introduced new or significantly improved products, services, or processes (or marketing methods prior to 2023) in the previous 12 months. The measure does not distinguish between innovations that are new to the firm (i.e., adoption) and the sort of innovations that might be more closely related to the firm's research and development activities (innovations that are new to the world). As discussed in Appendix section B.1, our choice of innovation measure is constrained by data availability. Although the measure we use captures a broader range of innovations than are likely to be related to RDTI support, differences between treatment and comparison firms in reported rates of innovation will still reflect any impacts of support on innovation.

The graphs show the estimated treatment effects, as percentage point differences in innovation rates between supported and unsupported firms (coefficients and standard errors are shown in Appendix Table 9). Following the same approach as in the previous input additionality analysis, we adjust for bias in the estimates by subtracting the average estimated treatment effect in the two years prior to first receiving RDTI. Because the innovation outcome variable is measured as a proportion of firms, our estimate does not vary with the number of firms, so an adjustment for coverage is not needed.

The bias-corrected estimate of the impact of RDTI support suggests that RDTI support raises innovation from 2 years after support is started. The average increase 2 or 3 years after support starts is 6.1 percentage points, though the estimated treatment effects are imprecisely estimated (only two of the four coefficients are statistically significant, and even then, only at a 5% level of significance). The bias adjusted estimates are not significantly different from zero at a 5% level of significance.

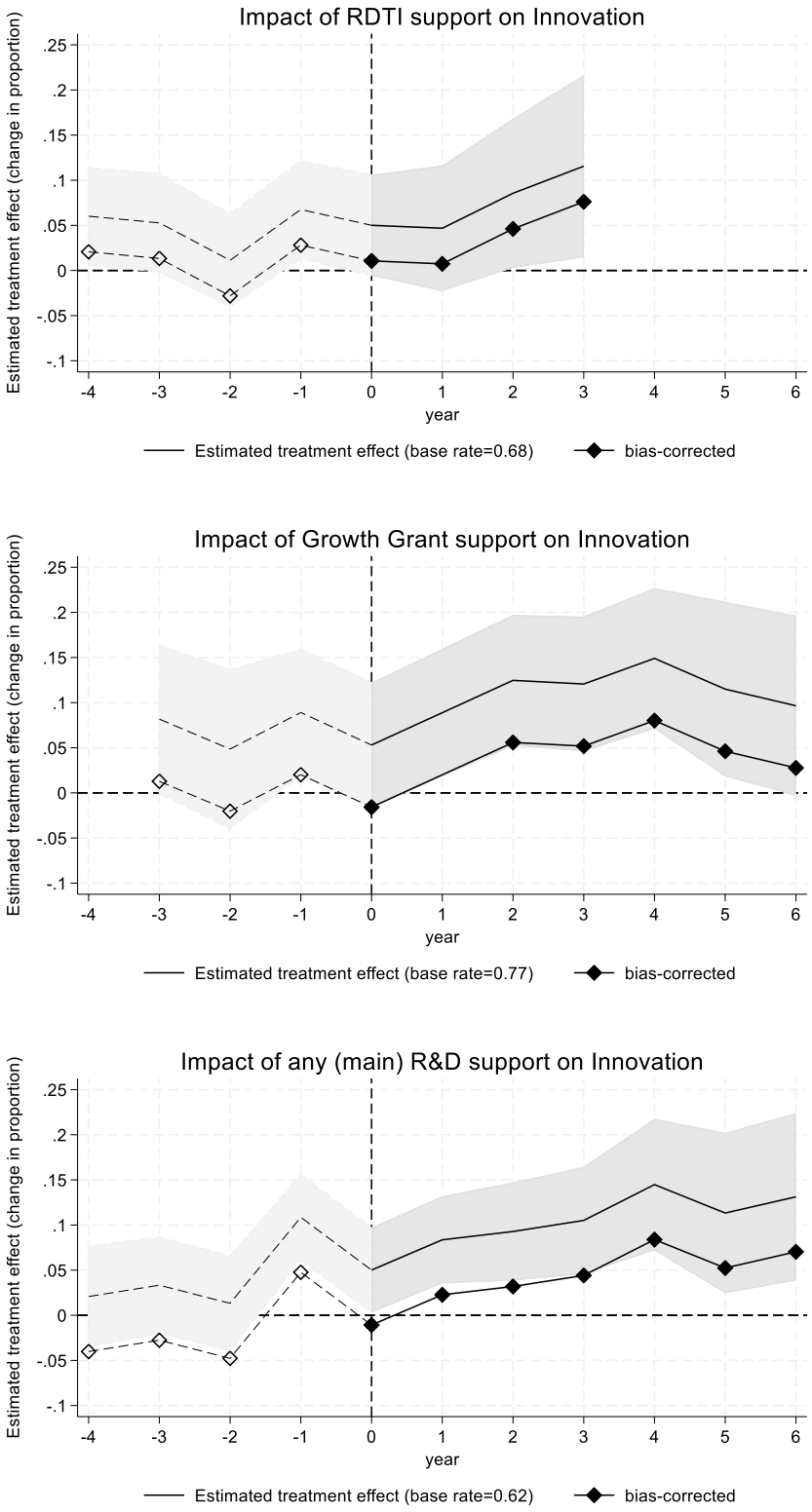
A slightly lower magnitude of impact is estimated for Growth Grant support, with an average bias-adjusted treatment effect of 5.2 percentage points. As with the impact of RDTI support, the bias-adjusted Growth Grant impact is imprecisely estimated.

For the impact of any main R&D support, the estimated treatment effect is significantly positive from the third year after starting to receive support. However, the pre-treatment bias is also significantly positive. Adjusting for this bias lowers the estimate of treatment effects, resulting in very small effects only some of which are statistically significant at a 5% level. The point estimates suggest an increased rate of innovation from the second year amounting to an average of 5.7 percentage points higher.

5.2.3 Output Additionality 2: Did supported firms become more productive?

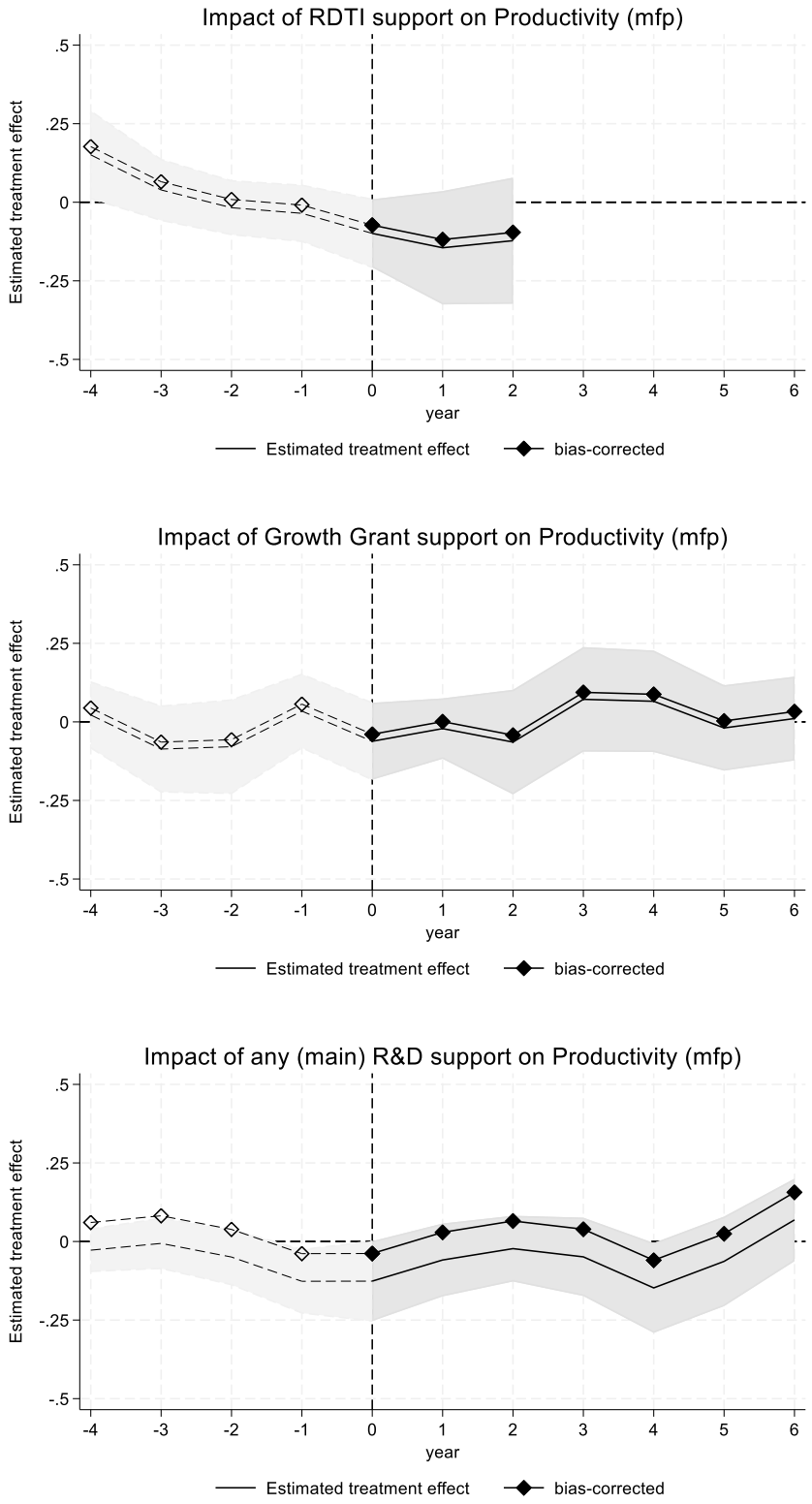
To assess the impact of R&D support on productivity, we use a measure of multi-factor productivity (*mfp*), which summarises whether firms produce relatively high output, controlling for the amount of inputs they use. Factor productivity measures such as labour productivity (e.g., output per worker) or capital productivity do not adequately control for the presence of complementary inputs, and are thus inferior measures of productive impacts. Labour productivity is often used where other input measures are unavailable. Such measures are available for our study, so we rely on *mfp*. We also complement our *mfp* findings with a summary of separate RDTI impacts on output, employment, capital and other inputs, in section 5.2.5.

Figure 7: Impacts of R&D support on Innovation



Note: Estimated treatment effects correspond to coefficients in Appendix Table 9. Shaded regions show 95% confidence intervals.

Figure 8: Impacts of R&D support on multi-factor productivity (*mfp*)



Note: mfp is multifactor productivity, as described in Appendix B.1.7. Estimated treatment effects correspond to coefficients in Appendix Table 9. Shaded regions show 95% confidence intervals

The expected impact of support on productivity is ambiguous. In the short term, an increase in R&D expenditure is likely to be associated with increased inputs, without an immediate impact on output. This would result on lower measured productivity. Any positive effects on the productivity of supported firms may take several years to emerge, and consequently may not be detected during the relatively short follow-up periods we observe. In the longer term (possibly with a considerable lag), R&D expenditure may lead to innovations that raise productivity in firms other than the firms that are supported. Our estimates of productivity effects are based on differences in productivity growth between supported and unsupported firms. If unsupported firms indirectly benefit from R&D support, our estimates will understate the impact of support on productivity. An alternative approach is needed to estimate the likely impact of government support for R&D on the economy overall, which we present in Section 6.

There is no significant evidence of a positive effect of government R&D support on the productivity of supported firms. The graphical summaries shown in Figure 8 and the associated coefficients in Appendix Table 9 are not statistically different from zero at a 5% level of significance, apart from a single significant negative estimate. Given the likely time lags between increases in R&D expenditure and increased multifactor productivity, it is not surprising that we do not find effects during the relatively short follow-up period. In section 5.2.5, we show suggestive evidence that government support for R&D does lead to increased output *and* productive inputs within supported firms, despite our finding of no productivity effect, which captures the extent which output increases exceed input increases.

5.2.4 Variation of R&D expenditure impacts across firms with different levels of expenditure

Table 16 documents the variation in the impact of RDTI on R&D expenditure for firms with different levels of initial expenditure. The top panel shows the proportional change in R&D expenditure that we attribute to RDTI support. Overall, we estimate that total R&D expenditure for supported firms was 22% higher in the first year of support than it would have been without RDTI support. The average percentage increase for firms with extremely low R&D expenditure (less than $100k), however, is 194% relative to what they spent prior to receiving RDTI support. In contrast, the increases for high R&D-expenditure firms are slightly lower than average (20%).

The lower panel of Table 16 shows the contributions that each size-group makes to the overall 22% increase in the year of entry. Even though the low-expenditure firms have high percentage increases, the dollar value of those increases is relatively small – contributing only 1 of the 22 percent overall increase. High expenditure firms account for most of the increase in overall R&D expenditure (18 of the 22 percent).

Table 16 also shows how the estimated impacts vary 1, 2 and 3 years after firms first receive RDTI support. Lower-expenditure firms make an increasing contribution to overall R&D growth 2 to 3 years after starting support but even three years post-entry, low-expenditure firms contribute only 3% to aggregate R&D expenditure growth. For high-expenditure firms, expenditure in the year after entry is no different from that of unsupported firms (contribution of 0). It is possible that supported high-expenditure firms may be bringing forward R&D expenditure when they start receiving support, so that the resulting additionality is reflected in the entry year contribution. They do, however, also contribute 27 of the overall 38% increase in the second year after entry and 27 of the overall 53% increase in the third year.

5.2.5 Impacts on output and productive inputs

Although the primary focus of this evaluation is on input (R&D expenditure) additionality, and on the impacts on innovation and productivity, in this section we summarise the estimated effects of government support for R&D on firms' output (measured as revenue) and their use of labour, capital and intermediate inputs.

Table 16: Variation in RDTI impact estimates- by R&D expenditure band

	R&D expenditure band (potential outcome)				
	Less than $100k	($100k,$300k]	($300k,$1m]	More than $1m	Total
	(a) Average percentage increase in *RDExp*				
entry year	207	44	17	15	
year 1 post-entry	198	116	37	-6	
year 2 post-entry	205	137	29	26	
year 3 post-entry	351	205	46	9	
	(b) Contribution to aggregate percentage increase in *RDExp*				
entry year	1	1	1	14	17
year 1 post-entry	1	2	2	-6	-1
year 2 post-entry	2	6	3	22	33
year 3 post-entry	3	12	7	7	29

Notes: Expenditure bands are based on potential outcomes (estimates based on expenditure levels of comparison firms, matched on pre-support characteristics). Changes and contributions have been bias-adjusted (subtracting the mean change or contribution in the two years prior to entry).

We follow the same approach to estimating these impacts as in the previous sections. In this section, we focus on the estimated (bias-adjusted) percentage changes in output and inputs attributable to government support for R&D. The estimates are summarised in Table 17. A key feature of the table is that many of the estimates are based on treatment effect coefficients that are imprecisely estimated, so the patterns summarised should be treated as indicative. Nevertheless, the patterns are suggestive of substantial changes in firm behaviour as a result of support.

The first column of Table 17 shows the bias that has been removed in the calculation of impacts. The first row shows the impact of RDTI on firm output. In the two years prior to first being supported, supported firms had output growth that was slightly higher (4%) than that of comparable unsupported firms. In the first three years of support, the output of supported firms was more than 60% higher than in comparable firms, with almost all of this difference occurring in the year of first support. Supported firms also increased their capital inputs, which were 103% higher than in comparable firms 2 years after first support. There were smaller relative increases in intermediate inputs (30% to 40%). Prior to support, supported firms had slower employment growth than comparable unsupported firms (-11%). By three years after the start of support, their employment levels were 24% higher than in comparable firms, adjusting for the pre-support difference.

The estimated impacts of Growth Grant support are more volatile, but are suggestive of increases in both capital and employment inputs, with weaker impacts on intermediate inputs and on output beyond a year or two of starting support.

Table 17: Effects of support on output and production inputs

	Bias	Entry year	After 1 year	After 2 years	After 3 years	After 4 years	After 5 years	After 6 years
RDTI Support								
Output	4%	62%	62%	69%				
FTE employment	-11%	-2%*	-2%*	16%	24%*			
Capital	-2%	74%	137%	103%				
Intermed. Inputs	1%	42%	36%	30%				
GG Support								
Output	12%	-1%	28%*	-5%	0%	-1%	31%	1%
FTE employment	3%	15%*	24%*	25%*	26%*	13%*	22%	9%
Capital	5%	8%*	21%*	25%*	7%	15%	15%	0%
Intermed. Inputs	20%	-1%	27%*	14%*	-6%	5%	30%	-1%
Any main Support								
Output	13%	4%	-1%	43%*	-1%	3%	40%	25%*
FTE employment	-5%	1%	1%	32%	42%	91%	61%	50%
Capital	-18%	59%	62%*	51%*	70%*	65%*	51%*	105%*
Intermed. Inputs	-7%	99%	74%*	69%*	48%*	3%*	16%	58%*

*Note: * indicates that the estimate is based on a treatment effect coefficient that is significantly different from zero (p<0.05). Percentage changes have been bias-adjusted following the approach described in Appendix section B.2.*

When considering the overall impact of any of the main forms of government support for R&D, there is evidence of a fairly strong positive effect on levels of capital and intermediate inputs. The positive effect on employment levels appears to emerge only 2 to 3 years after first support. The effects on output are less consistent, although the level of output for supported firms is comparatively high in some years.

5.3 Qualitative insights about impact

Expanding upon aspects of the causal analysis, our semi-structured interviews with RDTI recipients offer some additional qualitative insights regarding the impact of government R&D support. These insights coalesce around four themes, which we expand below. Illustrative quotations supporting each of these themes are provided in Appendix C.1.

5.3.1 Comparison of RDTI and Growth Grants

Insights from interviewed firms indicated reasonably strong support for both Growth Grants and the RDTI. It is difficult to distinguish which is preferred. On balance, support for the RDTI over the Growth Grants seems to be strongest among the larger R&D spenders as they can better resource and absorb the compliance costs and consequently, access more of the incentive through their identification of eligible expenditure.

Many businesses explained how the heavier compliance costs associated with the RDTI in comparison to the Growth Grants were more than offset by the ability to access greater levels of R&D support through the RDTI. According to these respondents, there was greater potential to get rewarded for the R&D work being done. Other benefits of the RDTI mentioned by these interviewees included equal and broader access to the scheme, the higher cap, the ability to contract R&D for offshore partners in some cases, and also the ability to capitalise R&D in a way that does not exclude it from the credit.

Conversely, other businesses suggested that R&D Growth Grants provided a higher level of engagement and a more substantial (in terms of dollar received) form of R&D support. Some of these respondents preferred Callaghan's high trust model and simpler compliance processes over the RDTI's emphasis on broader accessibility combined with greater scrutiny. A common theme among those who perceived Growth Grants as more impactful for their business was that RDTI compliance was more complex and required more attention from key people, even though the dollars of support received were largely similar to what had been received through Growth Grants.

5.3.2 Impact of the RDTI on R&D activity

A majority of firms reported that the RDTI had a positive impact on their R&D activities and business outcomes. Start-up and smaller firms commented that the scheme provided an invaluable cashflow and time buffer for their early-stage R&D. The incentive allowed other firms to scale up investment on their R&D projects and to undertake a greater proportion of exploratory activities than they would otherwise do. Some larger firms indicated that greater familiarity with the scheme in recent years meant they were effectively growing their RDTI claims though different business units beyond their core R&D function and achieving good outcomes. A significant number of firms explained how the RDTI did not influence what they did, but it did enable them to scale up and spend more on their chosen R&D projects. A selection of other firms were more neutral or critical regarding the impact of the RDTI on their R&D spend and activities. These firms broadly described the incentive as a cash windfall for R&D projects they would be doing anyway. Some of these firms claimed the rate of support is too low and the outcome too uncertain to incentivise higher R&D spends or risk taking.

It was explained how the funding gained through the RDTI provided a buffer for one firm to maintain their R&D activity, particularly when in a cash-burn position. Another start-up explained how the incentive provided them with the cash to survive until such a time as their product development could attract additional outside investment. One mid-sized firm explained how the RDTI allowed them to progress ideas and projects at lower Technology Readiness Levels (TRLs) in the lead-in to the commercial tendering process. Other firms explained how the incentive allowed them to undertake exploratory and blue-sky projects at a level that they otherwise would not. Such R&D activity was said to be effective in attracting and recruiting new engineering talent and tertiary students, which helped to further strengthen the R&D function.

One significant fast-growing firm explained how the incentive provided them with additional runway on a large project that has since become a big success. The RDTI support provided the firm with extra confidence and time, ensuring that they did not rush things or cut corners in a way that could compromise the early R&D work they had undertaken. Another smaller firm explained how the incentive provided them with vital cashflow support at critical early stages for a highly uncertain project. The project has since led to the development of a "point of difference" flagship product which has produced many new overseas connections and new spin-off R&D opportunities. At the very opposite end of the R&D expenditure scale, one high R&D expenditure firm explained how greater familiarity and understanding of the scheme in recent years has enabled them to effectively grow their RDTI claims though different business units beyond their core R&D centre (whose eligible expenditure had somewhat plateaued). This includes within their engineering and manufacturing groups where they have explored sustainability, carbon reduction and other such opportunities to make their operations more efficient.

Several firms were more reserved on the impact of the RDTI, suggesting it was a 'nice to have' and that R&D projects and expenditure would have proceeded regardless. These firms appear to apply for the incentive because the support is available for R&D work core to their business and therefore it makes sense to apply. They view the RDTI more like "normal accounting stuff", and given the size of the incentive and the fact that they cannot rely on or be certain of a successful outcome on their claim, these firms indicate the scheme does not materially influence their R&D activity. One

firm explained that their R&D spend and activity was primarily dictated by their revenue and product line objectives related to customer needs and procurement processes, and much less so by the RDTI. Similar to this view, another firm described the RDTI as a support mechanism for projects that had a sound commercial logic, meaning it did not incentivise higher spends or risk taking, rather it offered support for projects for which a market need was well understood, and the firm had determined there was a reasonably high likelihood of commercial success. Some other firms sounded more critical and cautious tones. For instance, some firms held the view the RDTI was the wrong scheme and that the rate was too low to incentivise greater levels of R&D spend. They indicated that easier compliance and eligibility criteria could lead to higher claims, but even then, the RDTI would do little to shape R&D projects or to incentivise R&D behavioural change within their firm.

5.3.3 Attracting and retaining R&D activity in New Zealand

Several firms with international operations explained that the RDTI is influential in attracting and retaining R&D work in New Zealand. One firm made the point that the RDTI was just one, albeit an important, component of a broader proposition to locate R&D activities in New Zealand. There appears to be general agreement among these respondents that without the RDTI, less of their firms' R&D work and personnel would likely occur in New Zealand.

One firm explained how they regularly educate their corporate leadership on the value of the RDTI and how they try to influence decisions on the location of R&D new hires. They see this as important as such recruitment decisions help to strengthen R&D capabilities and teams within New Zealand, which can make the region even more attractive and influential in future decisions. Another firm explained how the RDTI influenced a corporate decision to relocate R&D spend and activities to New Zealand when the company was rationalising some of their international R&D activities.

One firm emphasised that the decision to locate and attract R&D activities in New Zealand was very much multi-factorial. It was commented that the existence of the RDTI meant that the firm did more R&D in New Zealand than they would otherwise do. However, in reality it was just one, albeit an important, component in the overall proposition to locate R&D work in the country. Another large established firm sounded a word of caution that, while the incentive was currently competitive internationally and proving effective in maintaining R&D activity within New Zealand, by comparison to schemes and eligibility criteria in other jurisdictions, the 15% rate was a "low bar" and a "minimum requirement" and it could be increased in future if the goal is to attract more R&D to New Zealand.

5.3.4 Businesses prefer certainty. Changes are costly and can undermine the policy intent.

Insights from across the spectrum of interviewees provided a strong indication that businesses prefer policy stability, with the implication that instability could lead to lower R&D expenditure and lower uptake. Frequent changes are costly, demand new learning and can lead to more conservative decision making. Confidence in stability means firms are better able to plan and make decisions that capitalise on their learning/onboarding of the scheme and the policy intent.

A clear signal from government that the RDTI is not going to disappear may improve business confidence in the scheme. After more than five years of operation, firms now have a better understanding of the RDTI and many have bedded it in within their internal processes. However, interviewees explained that the scheme can only truly work as intended when businesses have confidence it will not disappear. Otherwise, it is difficult to fully and effectively account for the incentive in decision making and the planning of R&D activities. New policies create uncertainty and naturally demand new learning/ unlearning and onboarding. Firm respondents indicated that such conditions are costly, create inefficiencies and can ultimately lead to more conservative investments.

One firm respondent explained that stability trumps the policy mechanism, meaning the Growth Grant may have proved beneficial if it was bedded in longer. However, given that the change has

been made, it would be wise to stay the course and provide stability rather than change again. Another firm respondent commented that, when it comes to (re)locating R&D activities internationally, stability in R&D policy is valued by executives whereas frequent changes in policy can be unsettling and therefore unhelpful.

6 Modelling the wider impact of government R&D support

The importance of stable R&D support for business is, in part, due to the long payoff period for innovation investments (Jaffe & Le, 2015). This long payoff period, as well as the short follow-up period for the evaluation, makes it difficult to speak concretely about the overall impact of the RDTI on firm innovation or productivity, and about the overall impact on the economy. As a result, we suspect that the impact estimates from our causal analysis may only scratch the surface of the RDTI's full impact on innovation and productivity over time. This shortcoming could be particularly acute in sectors where the full gains from R&D take most time to be realised. For example, basic research contributes disproportionately to diffuse innovations with broad commercial and social applications (e.g., computing, genetics, machine learning) yet benefits can take up to thirty years to be realised (Jones & Summers, 2022; Wynn et al., 2022). Our estimates of the impact on supported firms will also fail to capture the potentially beneficial effects that R&D expenditure and innovation may have on firms other than R&D producers themselves. Incorporating these 'externalities' requires complementary analyses, which we discuss below in Section 6.3.

Our first objective in Section 6 is to consider the net impact of the RDTI and other government R&D support. Net impact refers to the impact on firms' R&D expenditure after accounting for the costs of providing and administering support, as well as government opportunity costs.

Assessing the RDTI's net impact across the first five years involves a trade-off between precision and comprehensiveness. On one hand, one could adopt a strict focus on the (truncated) evidence available. Such an approach would give a good representation of the scheme's costs, but almost certainly underestimate impacts in significant ways. For example, although we have a largely comprehensive perspective of the costs of support during the window of interest, we cannot observe benefits that have yet to be realised.

On the other hand, one could engage in a broader attempt to project likely benefits based on reported patterns from international schemes and academic literature. This might reflect the RDTI's full impact from the first five years in a more comprehensive way, but any conclusions would reach beyond what can be directly observed.

We organise our analysis in a way that achieves elements of both, while maintaining a line between what we observe and what we project. We begin by reporting more precise estimates based on observed impacts and costs. We then use evidence from other contexts to provide broader estimates of the expected impact on the economy as a whole. This involves breaking our net impact analysis into three parts.

First, we lay out the costs to government of providing support for BERD, drawing on Step 3 of the Treasury Guidelines to Cost-Benefit Analysis (NZ Treasury, 2015). This includes the costs to government of RDTI support (section 5.1), as well as the costs of other support - Growth Grants, Project Grants, Student Grants, and the R&D Loan (Section 5.2). We recognise that the direct support itself is a transfer payment that could be excluded on both sides without altering our conclusions (i.e., support from government equals benefit to firms). However, we prefer to document these figures in our calculations, as it provides additional information and may make it easier for readers to follow the subsequent projections.

Second, we weigh these costs alongside the results of our impact analysis to determine the net impact of government R&D support on BERD. The RDTI was introduced as the primary mechanism

to stimulate business investment in R&D (MBIE, 2018), and we assess the extent of cost incurred relative to additional BERD. We also report a parsimonious "bang for the buck" ratio that captures the amount of additional R&D expenditure stimulated by a dollar of support, and which can be compared with benchmarks reported internationally (e.g., Benedictow et al., 2018). Taking the sum of additional investment in BERD induced by government R&D support, less associated costs to the government, we additionally report a measure of net impact that accounts for all directly attributable costs to government.

Third, to provide projections of the broader impact of government R&D support on the economy as a whole, we draw on prior work which estimates the economy-wide impacts of R&D investment (Coe & Helpman, 1995). When combined with estimates of additional BERD ("input additionality") from our analysis, this offers a range of anticipated impacts on New Zealand's GDP. As in Section 5, all dollar values are reported in real terms, unless stated, using an annual average of the Producer Price Index (inputs, March 2024 quarter)

6.1 Costs to government of business R&D support

6.1.1 Costs of RDTI support

Our calculation of the government costs of RDTI support include all government costs "directly attributable" to the RDTI (NZ Treasury, 2015, p. 13). Table 18 lays out these costs, which come to $1,612m in present value terms across the first five years. This includes the cost of the tax credit provided to firms, the costs to Callaghan Innovation and Inland Revenue of operating the scheme, and capital expenditure directly attributable to the RDTI. A 20% deadweight cost of taxation (NZ Treasury, 2015) is applied to reflect that the scheme is funded from general taxation.[34] Non-direct (administration and capital) costs make up 2.6% of total costs (2.7% of direct support). Costs which would have been incurred regardless of the RDTI (e.g., policy advice, overheads) are excluded.

The Treasury suggest two public sector discount rates: the social rate of time preference (SRTP) for initiatives with mainly non-commercial costs and benefits, and the social opportunity cost of capital (SOC) for initiatives with mainly commercial cost and benefits (Treasury Circular, 2024/15). Our evaluation defaults to the SOC (8%) rate. Although the costs of government R&D support are primarily non-commercial, benefits/impacts are largely commercial (i.e., business and economic development impacts). We include sensitivity analysis using the SRTP (2%) rate. Return on investments in innovation are subject to significant risk, so we also report an additional sensitivity results using a higher discount rate of 15% based on an assumed market interest rate for loans to R&D firms.

Figures for the direct support (i.e., tax credits) provided to businesses are sourced from data transferred from Inland Revenue to Statistics NZ and uploaded to the LBD. They rely on firms' Supplementary Returns where available, and an estimated tax credit based on firms' General Approval forms when a Supplementary Return is not available. Administration costs are recorded in the year they are incurred. We have aligned public sector financial years (ending 30 June) with the most closely overlapping income year (ending 31 March), where required.

Payments incurred in smoothing the policy transition to the RDTI are not viewed as RDTI attributable costs. This includes Transitional Support Payments to former Growth Grant recipients

[34] In line with MBIE's request, we have followed Step 3 of Treasury's Cost Benefit Analysis (2015, pp. 15–16) and included a 20% deadweight taxation cost. This reflects that the cost of funding the RDTI from taxation is associated with a welfare loss that would not otherwise occur. However, we note the Treasury's CBAx tool no longer includes a deadweight cost of taxation by default, and instead implies that one taxation funded project displaces another. If no deadweight taxation cost of taxation were included in our analysis, the cost to government of the RDTI (other R&D support) would be $1,343m ($2,139m).

Table 18: Costs to government of RDTI support

Year	Nominal $ m	Real $ m	Inc. 20% Deadwt Tax Cost $ m	Pres. Val. (8% Disc.) $ m	Sensit. 1: (15% Disc.) $ m	Sensit. 2: (2% Disc.) $ m	Sensit. 3: Ex. Deadwt Cost $ m
Direct RDTI Support Provided to Business							
2020	104.07	124.63	149.55	203.46	261.57	161.88	169.55
2021	123.02	144.88	173.86	219.02	264.42	184.50	182.51
2022	269.50	292.21	350.65	409.00	463.74	364.82	340.83
2023	338.43	347.80	417.35	450.74	479.96	425.70	375.62
2024	238.55	239.06	286.88	286.88	286.88	286.88	239.06
Total	1,073.57	1,148.58	1,378.30	1,569.10	1,756.56	1,423.78	1,307.58
Callaghan Innovation's Administration Costs							
2020	1.65	1.98	2.37	3.23	4.15	2.57	2.69
2021	2.12	2.50	3.00	3.77	4.56	3.18	3.15
2022	3.13	3.39	4.07	4.75	5.39	4.24	3.96
2023	4.89	5.02	6.02	6.51	6.93	6.14	5.42
2024	5.05	5.06	6.08	6.08	6.08	6.08	5.06
Total	16.84	17.95	21.54	24.33	27.09	22.20	20.28
Inland Revenue's Administration Costs							
2020	0.56	0.67	0.80	1.09	1.41	0.87	0.91
2021	1.32	1.55	1.87	2.35	2.84	1.98	1.96
2022	2.12	2.30	2.76	3.22	3.65	2.87	2.68
2023	2.86	2.94	3.53	3.81	4.06	3.60	3.17
2024	3.35	3.36	4.03	4.03	4.03	4.03	3.36
Total	10.21	10.82	12.98	14.50	15.98	13.35	12.08
Capital Expenditure (RDTI Capability development for IR policy platform)							
2020	1.97	2.36	2.83	3.85	4.95	3.06	3.21
Total	1.97	2.36	2.83	3.85	4.95	3.06	3.21
Total Indirect	29.02	31.13	37.36	42.68	48.02	38.62	35.57
Total Cost to Govt.	1,102.59	1,179.71	1,415.65	1,611.78	1,804.58	1,462.40	1,343.15

Notes: Nominals are converted to real values using the Producer Price Index (inputs) averaged across the full year (March 2024 Quarter=1000). Present values are discounted to the end of the 2024 financial year (30 June). RDTI support figures for 2020-2024 are sourced from the Longitudinal Business Database. Administration costs and capital expenditure were confirmed in writing with Callaghan Innovation and Inland Revenue. Administration costs to end of public sector financial year 23/24 do not cover processing of all returns relating to the 23/24 income year. We assume that this is largely offset by the administration costs from financial 23/24 (and earlier) which relate to processing General Approval applications for income year 2025 and beyond.

for RDTI-ineligible expenditure. We also exclude the costs of providing an in-year payment mechanism to RDTI recipients. The impacts of in-year payments occur after our estimation window ends (in 2023), meaning there is no impact to "net". The costs to government of these payments are documented in Appendix Table 11.

The costs to the government do not include the compliance costs faced by firms. Compliance costs for firms can be thought of as negative impacts of government support. Some compliance costs may be captured within measured R&D expenditure (e.g., contributions of internal research staff to

pre-approval applications) whereas others may not (e.g., external tax advice). Section 7.1 documents the range of factors driving compliance costs and outlines the challenges in quantifying these costs. It is plausible that a significant proportion of the RDTI's net impact dissipates via compliance costs.

6.1.2 Costs of other R&D support

As noted, other R&D support includes R&D Growth Grants, Project Grants, Student Grants, and the R&D Loan for the ten-year period ending 2024. Table 19 reports government costs for these schemes, which include direct support provided and administration costs. No directly attributable capital expenditure was identified. Administration costs make up 7.7% of total costs (compared with 2.6% for RDTI support).

To assess the costs of R&D grants on a comparable basis to the tax incentive, it is necessary to consider the fiscal cost to government of R&D grants (i.e., after tax). For instance, the comparable fiscal cost to government figure for Growth Grants is 14.4%, so we deflate the reported costs of the scheme (which reflect the full 20% grant) accordingly. [35] Project Grants and Student Grants are part of a combined appropriation for most years, so we assume an average pre-tax rate of support across both schemes is 30% and deflate accordingly.[36] This adjustment allows us to compare bang for the buck (BFTB) ratios across schemes in the next section, so that it reflects "the change in R&D spending per dollar of tax revenue forgone by the government due to the tax incentives [R&D grants]". (Parsons & Phillips, 2007).

In the case of the R&D Loan, the government costs are the concessions on the market interest rate provided to firms. The extent of concessionary interest is the difference between the assumed market interest rate for R&D firms (15% per year) less the actual interest charged (0% if the loan was repaid within a year, 3% per year otherwise) (MBIE, 2020).[37] Actual capital provided through the R&D Loan scheme was $148.97M (Callaghan Innovation 2024). Rather than rely on MBIE's ex ante modelling of repayments, we use the LBD to measure the proportion of the loan portfolio that has been fully repaid. This means that concessionary interest is assigned only to the open part of the loan portfolio, with an assumed even pace of repayments on these loans once required repayments began in Year 3.

All four R&D support schemes in Table 19 were administered by Callaghan Innovation, including selecting, negotiating, managing and monitoring contracts. CI do not disaggregate their operating costs on the basis of type of support. In the absence of disaggregated cost information for the administration of R&D Loans, which was funded within Callaghan's "Building Business Innovation" appropriation, we use information provided by Callaghan about the component of the appropriation that was appropriated specifically for administering R&D Loans.

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[35] In the absence of government R&D support, the tax revenue foregone due to R&D expenditure deductibility is 28%, assuming that firms have a sufficient provisional tax bill to offset expenditure. The RDTI increases the tax revenue foregone by a further 15% tax credit. The support of a Growth Grant introduces a cost to the government in the form of a 20% grant, however, no expenditure deduction is allowed for the portion of R&D expenditure funded by the Growth Grant. As such, the net fiscal cost of Growth Grant support is 14.4%, which decomposes into the 20% grant less the 5.6% (i.e., 28%*20%) smaller tax deduction.

[36] Student Grants fund up to 100% of a student's direct labour costs and, in some cases, tertiary education costs. The majority of the shared appropriation is awarded via Project Grants, which accounted for roughly three quarters of funds appropriated from 2015-2020. The level of Project Grant support has varied at the discretion of CI across the evaluation window, peaking at 50% (up to a defined threshold, prior to 2016). The most common rate of Project Grant support is 20-40%.

[37] The market interest rate is assumed to include a provision for anticipated credit losses. Our calculations depart from the R&D Short-term Loan Scheme "Initial Fair Value Write-down" appropriation (see MBIE, 2020) to avoid double-counting these losses. The market interest rate also reflects the anticipated return from capital within the year incurred, so we do not apply a discount rate to the concessionary expense on interest until the following year.

Table 19: Costs to government of other R&D support

Year	Nominal $ m	Real $ m	Inc. 20% Deadwt Tax Cost $ m	Present Value (8% Disc.) $ m	Sensit. 1: (15% Disc.) $ m	Sensit. 2: (2% Disc.) $ m	Sensit. 3: Ex. Deadwt Tax Cost $ m
Direct Support Provided to Business- Growth Grants							
2015	67.52	90.41	108.49	216.88	381.67	129.66	180.73
2016	86.16	115.90	139.08	257.43	425.45	162.96	214.52
2017	96.88	126.71	152.05	260.59	404.47	174.66	217.16
2018	124.03	155.69	186.83	296.47	432.15	210.40	247.06
2019	131.72	159.34	191.21	280.95	384.59	211.11	234.12
2020	167.90	201.06	241.27	328.24	421.98	261.16	273.54
2021	91.80	108.12	129.74	163.44	197.32	137.68	136.20
2022	n/a	0.00	0.00	0.00	0.00	0.00	0.00
2023	n/a	0.00	0.00	0.00	0.00	0.00	0.00
Total	766.00	957.23	1,148.68	1,804.01	2,647.63	1,287.63	1,503.34
Direct Support Provided to Business- Project and Student Grants							
2015	22.11	29.61	35.54	71.04	125.01	42.47	59.20
2016	16.42	22.09	26.50	49.06	81.08	31.05	40.88
2017	16.82	22.00	26.40	45.25	70.22	30.33	37.70
2018	17.73	22.25	26.71	42.38	61.77	30.07	35.32
2019	25.72	31.11	37.33	54.86	75.09	41.22	45.71
2020	33.40	39.99	47.99	65.29	83.94	51.95	54.41
2021	29.71	34.99	41.99	52.89	63.86	44.56	44.08
2022	37.44	40.59	48.71	56.82	64.42	50.68	47.35
2023	21.63	22.22	26.67	28.80	30.67	27.20	24.00
2024	11.05	11.07	13.29	13.29	13.29	13.29	11.07
Total	232.02	275.94	331.13	479.67	669.36	362.82	399.73
Direct Support Provided to Business - R&D Loans							
2021	10.86	12.79	15.35	17.91	20.31	15.97	14.92
2022	19.23	20.85	25.02	27.02	28.77	25.52	22.52
2023	16.93	17.40	20.88	20.88	20.88	20.88	17.40
2024	16.81	16.85	20.22	20.22	20.22	20.22	16.85
Total	63.84	67.90	81.48	86.03	90.18	82.60	71.69
Administration of R&D Loans							
2020	0.05	0.06	0.07	0.10	0.13	0.08	0.08
2021	1.55	1.83	2.19	2.76	3.33	2.32	2.30
2022	1.14	1.24	1.48	1.73	1.96	1.54	1.44
2023	0.50	0.51	0.62	0.67	0.71	0.63	0.55
2024	0.45	0.45	0.54	0.54	0.54	0.54	0.45
Total	3.69	4.09	4.90	5.79	6.67	5.12	4.83

(continued)

Table 19 (continued): Costs to Government of Other R&D Support

Year	Nominal $ m	Real $ m	Inc. 20% Deadwt Tax Cost $ m	Present Value (8% Disc.) $ m	Sensitiv 1: (15% Disc.) $ m	Sensitiv 2: (2% Disc.) $ m	Sensitiv 3: Ex. Deadwt Tax Cost $ m
Administration of Growth Grants, Project Grants and Student Grants							
2015	11.21	15.01	18.01	36.00	63.36	21.52	30.00
2016	12.86	17.30	20.76	38.43	63.52	24.33	32.03
2017	12.25	16.02	19.23	32.95	51.15	22.09	27.46
2018	10.23	12.84	15.41	24.45	35.64	17.35	20.38
2019	7.75	9.38	11.25	16.53	22.63	12.42	13.78
2020	7.75	9.28	11.14	15.15	19.48	12.05	12.63
2021	7.75	9.13	10.95	13.80	16.66	11.62	11.50
2022	7.75	8.40	10.08	11.76	13.34	10.49	9.80
2023	1.06	1.09	1.31	1.42	1.51	1.34	1.18
2024	0.54	0.55	0.65	0.65	0.65	0.65	0.55
Total	79.16	99.00	118.80	191.16	287.93	133.88	159.30
Total Direct Support	1,061.86	1,301.07	1,561.29	2,369.71	3,407.17	1,733.05	1,974.76
Total Operating/ Capital Exp	82.85	103.09	123.71	196.95	294.60	138.99	164.12
Total Cost to Government of Other Government Support	1,144.71	1,404.16	1,684.99	2,566.66	3,701.77	1,872.04	2,138.89

Notes: All values are in $m. Nominals are converted to real values using the Producer Price Index (inputs) averaged across the full year (March 2024 Quarter=1000). Present values are discounted to the end of the 2024 financial year (30 June). Direct support costs are sourced from MBIE's Annual Financial Statements, except for R&D Loans where we use the Longitudinal Business Database as a more precise record of open loans. Funds appropriated to administer R&D Loans are sourced from Callaghan Innovation. Costs incurred in administering R&D Grants are based on funds appropriated from the Business Research and Development Contract Management appropriation (sourced from MBIE's Annual Financial Statements).

Callaghan Innovation's costs for administering Growth Grants, Student Grants, and Project Grants were funded centrally through another multi-category appropriation, "Business Research and Development Contract Management" (now "Business Innovation Support Programme Management"). Callaghan confirmed that only R&D grant administration costs go against the "Business Research and Development Contract Management" appropriation, and that this appropriation funded all three grant types during the period 2015-2022. For the years 2015-22, we use the actual total Business Research and Development Contract Management appropriation (sourced from MBIE's Annual Financial Statements) as a proxy for costs directly attributable to Growth Grants, Student Grants, and Project Grants.

Using 2019 as the final year that all three grants were fully active (prior to the introduction of the RDTI and phasing out of Growth Grants), we also calculated the administration cost per dollar of

grant support across the three grant schemes.[38] This average (nominal) administration cost —$4.92 per $100 of post-tax direct support — allowed us to estimate the administration of Student and Project Grants in 2023 and 2024.[39] This average administration cost was also used to isolate the administration costs of Growth Grants, both for understanding the scheme's net impact and for constructing a counterfactual involving the continuation of Growth Grants during 2020-2024 (see Section 7.4.4).

6.2 Net impact of government R&D support

Estimates of net impact are generated by taking the sum of additional investment in BERD attributable to government support (reported in Section 5.2.1), less associated costs to government. These are reported in Table 20 for the RDTI (2020-2024), all government support (2015-2024), and Growth Grants (2015-2019). The observed net impacts would likely be greater if the evaluation had been conducted after a longer follow-up period. At present, although we have a comprehensive perspective of the costs of support provided, we cannot observe benefits yet to be realised.

We also calculate a parsimonious bang for the buck (BFTB) measure for each regime, capturing the ratio of additional R&D induced to dollars of support provided. (This is also sometimes referred to as an incrementality ratio). BFTB is calculated before a deadweight cost of taxation is applied.

We find that the BFTB is approximately 1.4 for the RDTI. This is in line with a cross-country aggregated BFTB ratio for R&D tax incentives across 20 OECD countries of around 1.4 (Appelt et al., 2019, 2023) and less than the equivalent figure of 2.04 from the most recent evaluation of the SkatteFUNN scheme in Norway (Benedictow et al., 2018; p. 68).

The BFTB ratio across all of the government support we analysed (2015-2024) was 0.83. The BFTB ratio for Growth Grants for 2015-2019 was also 0.83. As explained in Section 5.2.1, we apply a bias adjustment which significantly lowers our input additionality estimates. Without any bias adjustment, the reported BFTB ratios would compare more favourably to international benchmarks, which do not generally make such adjustments. As discussed in section 5.2, the estimated input additionality from all government support is smaller than the combined estimates from Growth Grants and from RDTI, whereas we would expect it to be at least as large. Acknowledging that each estimate has a margin of error, we conclude that RDTI and Growth Grants are responsible for by far the largest share of overall additionality, with other forms of government R&D support contributing relatively little.

Accounting for all directly attributable costs—including administration, capital, and deadweight taxation costs—allows us to calculate the net impact of government support. We find that the RDTI (2020-2024) generated $221m dollars of R&D expenditure in excess of government costs. All government support (2015-2024) generated $1,467m R&D expenditure *less* than government costs. Growth Grants (2005-2019) generated $471m *less* R&D expenditure than government costs.

[38] By estimating administration costs on a cost per support dollar basis, rather than cost per active grant, we recognise that the administration burden of Growth Grants is materially larger than, for example, Student Grants. We are grateful for input from Callaghan Innovation's financial and contract management teams on this issue. We also used 2019 figures for estimation, rather than a multi-year average, to reflect evidence that Callaghan had become more efficient in administering R&D support over time (i.e., more R&D grants administered with comparable or lower funding).

[39] The commencement of New to R&D Grants (2023), and moving the administration of Ārohia Trailblazer Grants under the newly named Business Innovation Support Programme Management appropriation (2024), meant that we could not use the aggregated appropriation in 2023 and 2024.

Table 20: Bang for the Buck and Net Impact of Government R&D Support

	Pres. Value (8% Disc.) $ m	*Sensitivity 1: (15% Disc.) $ m*	*Sensitivity 2: (2% Disc.) $ m*
RDTI, 2020-2024			
Input additionality from the RDTI during the 5-year period from 2020-2024 (PV)	1,833	*2,034*	*1,677*
Direct support costs only (PV, no deadweight taxation cost)	1,308	*1,464*	*1,186*
Bang for the Buck (BFTB) ratio	**1.40**	*1.39*	*1.41*
All Costs of the RDTI during the 5-year period from 2020-2024 (including administration and deadweight taxation)	1,612	*1,805*	*1,462*
Net Impact of the RDTI	**221**	*230*	*215*
All government R&D support, 2015-2024			
Input additionality from all government support during the 10-year period from 2015-2024	2,711	*3,457*	*2,228*
Direct support costs only (PV, no deadweight taxation cost) of non-RDTI government support	1,975	*2,839*	*1,444*
Direct support costs only (PV, no deadweight taxation cost) of RDTI government support	1,308	*1,464*	*1,186*
Bang for the Buck (BFTB) ratio	**0.83**	*0.80*	*0.85*
All costs of non-RDTI government support (including administration and deadweight taxation)	2,567	*3,702*	*1,872*
All costs of all (RDTI and non-RDTI) government support	4,178	*5,506*	*3,334*
Net Impact of all government support	**-1,467**	*-2,050*	*-1,107*
Growth Grants, 2015-2019			
Input additionality from Growth Grants during the 5-year period from 2015-2019	906	*1,375*	*623*
Direct support costs only (PV, no deadweight taxation cost) of Growth Grants	1,094	*1,690*	*741*
Bang for the Buck (BFTB) ratio	**0.83**	*0.81*	*0.84*
All costs of Growth Grant support (direct support plus imputed administration costs plus deadweight taxation)	1,377	*2,128*	*933*
Net Impact of Growth Grants	**-471**	*-753*	*-309*

Notes: Nominals are converted to real values using the Producer Price Index (inputs) averaged across the full year (March 2024 Quarter=1000). Present values (PV) are discounted to the end of the 2024 financial year (30 June).

Additional R&D expenditure is an intermediate outcome from government R&D support. Net impact in terms of additional R&D expenditure is an important benchmark, but should not be interpreted as a measure of overall cost effectiveness. The ultimate effectiveness of government R&D support is determined by overall societal benefits, including wider potential economic, social and environmental gains from investments in R&D.

6.3 Impacts on the economy as a whole

Unlike the findings presented thus far, estimating the impact of government R&D support on the economy as a whole requires extrapolating beyond available data and projecting likely impacts based on secondary evidence. Much of this evidence comes from large, well-connected overseas economies (e.g., Hall et al., 2010) because there is limited New Zealand evidence linking R&D to productivity at the economy level. Johnson and colleagues (2007) reported a small within-industry productivity boost from privately provided R&D in New Zealand, though they focus on a subset of industries and emphasise the provision rather than the funding of R&D. Similar to Coe and Helpman (1995), their work started from a general Cobb-Douglas production function, before splitting R&D into publicly and privately provided. More recent pilot analysis from the OECD reported a large (relative to the other countries analysed) and significant (at the 10% level) positive effect of external R&D (in the same industry) on value added in New Zealand firms (Appelt et al., 2023). Taken at face value, this suggests that there are positive spillovers from New Zealand BERD experienced by nearby firms, which outweigh negative spillovers.

In the absence of adequate New Zealand evidence about the magnitude of BERD spillovers (e.g., rate of return to GDP), we proceed cautiously by drawing on overseas results. In Section 8, we highlight the future research opportunity to build New Zealand-specific evidence in this area.

Some evaluations of overseas R&D tax incentives have taken a rather conservative view of potential positive externalities from BERD. In the first evaluation of Norway's SkatteFUNN programme, for example, Cappelen and colleagues cautioned against expectations of large externalities, noting "the innovations that the scheme mainly stimulates – new products for the firm and not for the market – are not of such a nature that large external effects should be expected" (Cappelen et al., 2010; p. 102).[40]

Nonetheless, the wider academic literature points to a myriad of externalities occurring from BERD. In competitive markets, where firms "hold only temporary market power" (Corrado et al., 2022, p. 13) and cannot capture the "full quality price" of their R&D (Griliches, 1992, p. 32; Teece, 1986, p. 86; Winter, 2006), positive externalities accrue to other firms. These can be driven by advancements in new and existing products and technologies, improved networks and organizing methods, as well as the training of scientific and managerial personnel (Bach et al., 1992; Hall et al., 2010). Many externalities are intertemporal by nature, meaning that today's R&D enables additional R&D and associated gains in the future (e.g., Romer, 1990). These arguments appear to outweigh negative externalities from BERD, which include the obsolescence of products, services or firms (Bloom et al., 2013), the prevention of competition (Hall et al., 2010), or "patent races" that result in duplicative R&D (C. I. Jones & Williams, 1998).

It is inadvisable to use the lack of evidence of a productivity effect among supported firms as the basis for judgements about the likelihood of spillovers. To the extent that there are positive R&D spillover effects to other (unsupported) firms, our estimated treatment effects will be understated. Inability to keep proprietary knowledge within supported firms (i.e., high spillovers) might also be undermining productivity gains. Furthermore, in the case of the RDTI, it might simply be too early for productivity effects to be fully observed.

It is generally accepted that externalities to other businesses are concentrated among nearby firms (Griliches, 1958). For instance, firms in the same or related fields of activity may benefit from R&D producers' technological advancements (Dechezleprêtre et al., 2023), and firms in the same geographic area may benefit from tapping into a more skilled labour pool than would otherwise exist.

[40] Using an estimation approach that assumed that externalities would be observable in the productivity of proximate firms (geographic and industry), the more recent SkatteFUNN evaluation did not definitively identify externalities associated with R&D activity (Benedictow et al., 2018).

This has informed the choice of methods for estimating economic effects of externalities, which commonly involve adding a variable for 'proximity to external R&D' into a standard model of production or cost (e.g., Adams & Jaffe, 1996).

6.3.1 Approach to projections

We follow a two-step approach to offer some broad projections about the impacts of the additional BERD generated by government support on the economy as a whole. First, we review prior evidence from international macroeconomic studies which estimate an annual rate of return to GDP from R&D expenditure (e.g., Australian Productivity Commission, 2007; Coe & Helpman, 1995). Expressed in percentage terms, these returns reflect the annual impact of R&D expenditure on GDP. Second, we explore how the annual returns can be valued over the useful lifespan of the R&D (i.e., a perpetual return). This starts from an endogenous growth view that R&D investment expands the stock of knowledge and permanently raises the level of productivity in the economy (B. F. Jones & Summers, 2022; Romer, 1990). We use the annual rate of return to provide baseline calculations of the overall impacts on GDP, accounting for depreciation and discounting of future benefits. We also discuss how further modifications to the baseline could change our conclusions regarding overall impact.

6.3.2 Annual rates of return to GDP from R&D expenditure

Varying annual percentage rates of return have been reported in previous studies, reflecting the annual impact of R&D expenditure on GDP (Frontier Economics Ltd, 2023; Hall et al., 2010). Much work in this area builds from Coe and Helpman's (1995) approach, which estimates a rate of annual return from the elasticity of total factor productivity with respect to the national R&D stock, multiplied by the ratio of GDP to R&D.

The Australian Productivity Commission study used in the 2016 Australian RDTI review reported an annual return to GDP from BERD of 164.9% (2007, p. 651), meaning that a dollar of BERD raises GDP by $1.65. New Zealand shares certain challenges that may make Australia a more suitable benchmark than many other OECD countries. For example, the geographically remote nature of both may result in fewer opportunities for synergy between foreign and domestic R&D (Jaumotte & Pain, 2005). However, this reported rate of return is towards the high end of those reported internationally: for example, 85%-123% across 22 developed countries including New Zealand and Australia (Coe & Helpman, 1995),[41] 79%-120% with a similar sample (Kao et al., 1999), and 15%-68% for a 20-year panel of 13 countries (van Pottelsberghe de la Potterie & Lichtenberg, 2001). The reliance on macroeconomic averages in these studies means that they capture the mean return from both positive and negative externalities.

More recent evidence from Australia estimated a comparable return by aggregating R&D expenditure and linking it to the national production increase (Wynn et al., 2022). The authors reported a baseline annual return of 104%, calculated by aggregating gains of the growth attributed to new R&D investments (B. F. Jones & Summers, 2022).

The above reported annual rates of return are based on different data and methods, with elements that are more and less suited to our objective.[42] To reflect the variation in the reported rates, we opt to estimate a range of overall impacts on the economy using projected returns of 50%, 100% and 150%. These rates are broadly representative of low, midrange and high returns reported in the literature.

[41] Although Coe & Helpman's approach has been refined and extended in later studies (e.g., van Pottelsberghe de le Potterie, (2001), Coe & Helpman's 85% annual return from domestic BERD remains in the midrange of rates reported in the literature. A similar rate of return was also reported by Kao et al. (1999).

[42] For example, Wynn et al. (2022) use more recent data, but offer an average return (not a marginal return) and do not distinguish BERD from public R&D.

6.3.3 Projecting the overall impacts on GDP over the lifespan of R&D

These annual rates of return are the basis for calculating the overall impacts across the lifespan of additional R&D expenditure, accounting for depreciation and discounting of future benefits. The present value (PV) of the annual returns is:

$$\boldsymbol{PV = \frac{R(1-\delta)}{d+\delta}} \quad (1)$$

where R is the annual rate of return to GDP, d is the 8% discount rate (15% and 2% in sensitivity analyses), and δ is an assumed depreciation rate of 15% for R&D stock (Corrado et al., 2022). Expressed in present value dollars, this measure of overall impact reflects the benefit ratio to the economy across the lifespan of an additional dollar of R&D expenditure.

Table 21 lays out the projected returns in present value terms across the low, midrange, and high annual rates. Based on the low (high) rate of return, the present value of a dollar of additional R&D (also the benefit cost ratio to the economy) is $1.85 ($5.54). The midrange rate of return, $3.70, is similar to Thomson and colleagues' (2024) estimate of $3.10 based on recent Australian evidence (2012-2020).

Our earlier estimates of input additionality concluded that the RDTI generated $1,833m additional R&D expenditure in the five-year period 2020-2024. Based on these estimates, we suggest that the projected impact to the economy as a whole is in the range of $3,387m to $10,161m (midrange: $6,774m). We also suggest that the additional GDP generated by government R&D support for business generally in the ten-year period 2015-2024 is in the range of $5,010m to $15,031m (midrange: $10,021m). The additional GDP generated by Growth Grants is in the range of $1,673 to $5,020m (midrange: $3,347m).[43]

Table 21 also shows the sensitivity of the estimated impacts to the use of a higher (15%) discount rate. Using a higher discount rate lowers the future value of additional GDP generated, and raises the present value of R&D induced from earlier schemes more than recent schemes. This higher rate decreases the projected GDP generated by the RDTI (by 15%) and from government support for BERD generally (by 2%), but increases the projected GDP from Growth Grants (by 16%).

6.3.4 Further modifications

With the exception of Wynn et al. (2022) and Thomson et al. (2024) most of the earlier reported rates of returns are based on data prior to 2002. A pertinent concern is that productivity increases may have been greater when R&D stocks were smaller (Luintel & Khan, 2005). There has been a steady decline in elasticities with respect to R&D over time (Shanks & Zheng, 2006) which, in turn, implies a reduction in externalities over time. This decline may be partly associated with growth in other capital stocks, especially if economy wide benefits from R&D stocks are realized by embodying R&D into improvements or expansions in other capital ("embodied capital deepening").

Another set of issues relate to whether R&D expenditure generates a payoff immediately in the year following investment and whether there is a delay until the payoff peaks. For applied and product focused research, a delay of greater than 3 years from investment until peak payoffs may be appropriate (Jones & Summers, 2022). For basic research, delays are likely to be considerably longer. The longer the delay until R&D payoff peaks, the lower the present value of the return.

[43] As discussed in section 5.2, we rely on the central estimates of additionality for each type of support, despite the fact that the sum of estimated additionality from RDTI and Growth Grants slightly exceeds the estimated additionality from government support for R&D generally.

To account for the costs of capital deepening, and the likely delay between R&D investments and a return to GDP, we discuss (but do not include in our main projections) two modifications to the present values reported above:

a) To account for capital deepening, we include Wynn et al.'s (2022) corrective factor of 0.23 in Table 21, assuming that the capital deepening costs of R&D investment are equivalent to the (Australian) GDP per capital growth rate multiplied by the capital-output ratio (Wynn et al., 2022, pp. 600602).

b) To account for delayed payoffs from R&D investment, we assume an average 6.5 year delay until R&D use in the market peaks, which may be a midrange aggregate of varying delays across different research types (Jones & Summers, 2022). The associated corrective factor is 0.66 (0.42 with the higher 15% discount rate).[44]

At the bottom of Table 21, we show how the present value of the annual returns, PV, can be modified by applying one or both of the corrective factors to account for (a) capital deepening and/ or (b) delayed payoffs. Combining both modifications (c), the projected overall impact per dollar of additional R&D (also the benefit cost ratio to the economy) falls below $1. When accounting only for an average 6.5-year delay in payoffs, the present value of additional R&D ranges from $1.23 to $3.68.

Most of the reduction in the present value of returns is driven by the corrective factor accounting for embodied capital deepening. Embodied capital deepening assumes that the payoffs from R&D are jointly derived from R&D and other capital, and that realising the full economic benefits from R&D depends on embodying R&D within improved and expanded capital investments. An alternative view is that payoffs from R&D are achieved directly (i.e., independent of capital improvement and expansion) (Jones & Summers, 2022). Adopting a 'disembodied' view of capital deepening would result in a smaller corrective factor for capital deepening.

6.3.5 Conclusions about impact on the economy

We estimate that the RDTI generated an overall impact to the economy in the range of $3,387m to $10,161m (midrange: $6,774m). Relative to the $1,612m total investment made by the government for the same five-year period, this suggests an economic impact of 2.1-6.3 times government investment (midrange: 4.2).

Across ten years of government investment in R&D support, the overall impact to the economy is projected to be in the range of $5,010m to $15,031m (midrange: $10,021m). Relative to the $4,178m total investment made by the government, this suggests an economic impact of 1.20 to 3.60 times government investment (midrange: 2.40).

The projected overall economic impact of Growth Grants (2015-2019) was in the range of $1,673m to $5,020m (midrange: $3,347m). Relative to the $1,377m total investment made by the government, this suggests an economic impact of 1.22-3.65 times government investment (midrange: 2.43), significantly less than the equivalent ratio for the RDTI.

[44] The corrective factor for delayed benefit realisation is $\left(e^{-\frac{(d-g)}{100}L}\right)$ where L is the delay in years, d is the discount rate, and g is a GDP per capita growth rate of 1.7% (imputed based on Australian figures) (Wynn et al., 2022, p. 597).

Table 21: Impacts of the additional BERD on the economy as a whole

		d=8%			*d* =15%			*d* =2%	
	Low	Mid-range	High	Low	Mid-range	High	Low	Mid-range	High
	50%	100%	150%	50%	100%	150%	50%	100%	150%
Present value (PV) of an additional $ of R&D expend $	$1.85	$3.70	$5.54	$1.42	$2.83	$4.25	$2.50	$5.00	$7.50
RDTI during the 5-year period from 2020-2024									
Input additionality (PV) $ m	1,833	1,833	1,833	2,034	2,034	2,034	1,677	1,677	1,677
Impact on the economy as a whole (PV) $ m	3,387	6,774	10,161	2,882	5,764	8,646	4,193	8,386	12,578
All government costs (PV) $ m	1,612	1,612	1,612	1,805	1,805	1,805	1,462	1,462	1,462
Ratio of economic impact to government investment	2.10	4.20	6.30	1.60	3.19	4.79	2.87	5.73	8.60
All government support during the 10-year period from 2015-2024									
Input additionality (PV) $ m	2,711	2,711	2,711	3,457	3,457	3,457	2,228	2,228	2,228
Impact on the economy as a whole (PV) $ m	5,010	10,021	15,031	4,897	9,794	14,691	5,569	11,139	16,708
All government costs (PV) $ m	4,178	4,178	4,178	5,506	5,506	5,506	3,334	3,334	3,334
Ratio of economic impact to government investment	1.20	2.40	3.60	0.89	1.78	2.67	1.67	3.34	5.01
Growth Grants during the 5-year period from 2015-2019									
Input additionality (PV) $ m	906	906	906	1,375	1,375	1,375	623	623	623
Impact on the economy as a whole (PV) $ m	1,673	3,347	5,020	1,948	3,897	5,845	1,558	3,116	4,674
All government costs (PV) $ m	1,377	1,377	1,377	2,128	2,128	2,128	933	933	933
Ratio of economic impact to government investment	1.22	2.43	3.65	0.92	1.83	2.75	1.67	3.34	5.01
Further modifications									
Corrective factor: (a) Capital deepening	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Adjusted value of R&D expenditure dollar $ (PV)	$0.43	$0.85	$1.28	$0.33	$0.65	$0.98	$0.58	$1.15	$1.73
Corrective factor: (b) Delayed payoffs	0.66	0.66	0.66	0.42	0.42	0.42	0.42	0.42	0.42
Adjusted value of R&D expenditure dollar $ (PV)	$1.23	$2.45	$3.68	$0.60	$1.19	$1.79	$1.05	$2.11	$3.16
Combined adjustment (c): value of R&D exp. dollar $ (PV)	$0.28	$0.56	$0.85	$0.14	$0.27	$0.41	$0.24	$0.48	$0.73

Even the low projection of the present value of an additional dollar of R&D expenditure suggests a positive benefit cost ratio $1.85 from R&D expenditure, with significantly greater ratios for midrange ($3.70) and high ($5.54) projections. There are several reasons that actual returns may be smaller or larger than these projections. On one hand, these calculations do not include additional corrective factors for delayed payoffs or capital deepening. Such factors are presented for reference in the bottom panel of Table 21. If included, they would reduce the projections considerably. Having said that, it is worth noting that even the embodied capital deepening assumption does not necessarily diminish societal benefit – rather, it suggests that benefits are realised through both R&D and other capital investment.

On the other hand, the benefits we project are limited to those manifesting in measurable domestic economic activity. The projected returns do not capture other societal benefits, including social and environmental benefits. For example, R&D plays an important role in medical advancements, contributing to longer and better quality lives (Jones & Summers, 2022). In this regard, it seems likely that we are understating the full societal benefits from government R&D support.

7 Policy design and implementation

We next consider how the policy design of the RDTI is working in practice, including improvements and challenges during its first five years of operation. Drawing on qualitative interviews and available statistics, we unpack to the appropriateness of compliance costs for business (Section 7.1), the effectiveness of scheme administration (Section 7.2), and adherence to legal provisions (Section 7.3). We also incorporative quantitative evidence to assess how findings would change under three alternative policy settings requested by MBIE, or if Growth Grants were to have continued for the same five-year period (Section 7.4).

7.1 Are compliance costs for businesses appropriate?

Compliance costs experienced by firms seeking RDTI support include administrative, resource, and time costs required for obtaining pre-approval and completing Supplementary Returns (SRs), maintaining accurate records to substantiate claims, and responding to inquiries from Inland Revenue and Callaghan Innovation. Our interviews suggested that RDTI compliance costs experienced by New Zealand businesses are commonly attributable to three sources: (1) documentation and record-keeping; (2) engaging professional advisory services; and (3) difficulties claiming full entitlements. We discuss key points in each of these areas below.

There are also certain factors that help firms to limit or reduce compliance costs, such as building on established R&D management processes and learning from previous experiences with the scheme. There is little evidence that firms are using Approved Research Providers (ARPs) as a vehicle to lower compliance costs.

The overall appropriateness of compliance costs depends on weighing the burden to firms against the policy intent, including the need to mitigate against non-compliance. The experiences of many businesses interviewed, and a vast majority of professional advisory firms, suggest that RDTI compliance costs are appropriate. Of the 39 firms interviewed who received RDTI support, just over half (51%) were broadly positive about the appropriateness of the compliance costs relative to the support received. Most of the other half (41%) perceived compliance costs as excessive relative to the incentive. Whereas some professional advisory firms felt compliance costs were too high, the majority felt they were fair and appropriate in light of the policy intent.

Nonetheless, low R&D expenditure firms faced disproportionately high compliance costs, making the scheme less attractive and, in some cases, financially unattractive. This may be contributing to the comparatively low rate of uptake among this subgroup. There was general consensus that firms needed to be spending at least $300k-$500k on eligible R&D expenditure for the RDTI to be financially worthwhile.

In this section, we document the range of compliance costs associated with the operation of the RDTI, and the variation in those costs across different sized firms. We use this as a basis for considering the overall appropriateness of compliance costs, recognising that this issue is inseparable from the effectiveness of RDTI administration and overall legal adherence. Appendix section C.2 provides supporting evidence to contextualise these findings in the form of a compliance cost “mini-case” overviews for each supported firm we interviewed.

7.1.1 Defining "appropriate" compliance costs

Generating societal benefits in New Zealand via spillovers is a core rationale for government support for BERD. The RDTI was introduced, in part, to compensate a wider range of firms for spillover benefits from their R&D, and to incentivise R&D investments. This policy intent suggests that appropriate compliance costs are those that maximise accessibility to government R&D support and limit undue administrative burden, while ensuring legal compliance.

International evidence suggests that compliance costs tend to decrease in line with the scale of claims, with larger R&D spenders benefiting from economies of scale and established internal reporting systems. For instance, Australia's R&D tax incentive scheme had compliance costs estimated at 9% of the benefit value, with around 46% of these costs attributed to fees paid to consultants. Smaller firms (SMEs) face higher relative costs at 23% of the benefit, compared to 8% for larger firms. Parsons and Phillips (2007) estimate that the administrative and compliance costs for Canada's R&D tax incentive program account for 10% of the subsidy value, while an earlier survey conducted by Finance Canada and Revenue Canada (1997) estimated compliance costs to be 5.5-15%, depending on the size of the claim. These studies suggest that compliance costs can be a particularly significant barrier for smaller R&D spenders. Contributing factors include larger firms having better in-house legal and tax expertise, economies of scale, and the flat rate charging practices of certain advisory services.

In this context, appropriate compliance costs are those that preserve a proportionate incentive for small and large R&D spenders, do not create an excessive barrier to participation at modest levels of R&D expenditure, and remain competitive with international benchmarks. At the same time, compliance requirements are necessary to prevent fraud, such as the potential for misclassification of routine business expenditure as R&D activities. International evidence suggests that tax incentives can be vulnerable to opportunistic behaviour if compliance mechanisms are weak, underscoring the need to deter misuse through sufficiently rigorous record-keeping, audits, and eligibility assessments. Appropriate compliance costs therefore require a balance between broad access on one hand, and a need to preserve the integrity and sustainability of the incentive on the other hand.

7.1.2 Documentation and record-keeping

The need to develop and implement new systems, processes, and record-keeping practices to ensure compliance is a key cost driver for RDTI supported firms. Beyond initial setup, firms reported that the ongoing administrative complexity of identifying, assessing, and recording eligible activities is a significant burden. Many businesses have invested in RDTI-specific capability development, including hiring dedicated coordination staff, or providing ongoing education and training to improve awareness and understanding of the scheme.

The RDTI requires firms to maintain detailed records of expenditure and R&D activities, with requirements that are often more rigorous than standard record-keeping practices. Implementing, maintaining, and applying these requirements can be costly. While more precise documentation can bring positive externalities—such as encouraging firms to be more deliberate in planning and assessing their R&D activities—these requirements can also impose high compliance costs, particularly on firms conducting numerous small research projects within their overall portfolio of R&D activities. For instance, one firm estimated that their compliance costs amounted to approximately 12–15 weeks of work (i.e., 450–560 hours) per year. This firm had a practice of including only projects that had 20+ weeks of work. For smaller projects (i.e., <20 weeks of time), the firm said it was cost-prohibitive to apply the same systematic documentation processes, even though typically there was clear technical uncertainty associated with this work.

Startups and SMEs, who often lack structured record-keeping systems, faced additional adaptation challenges. One business noted that micro-innovations—comprising 20–40% of its daily projects—were not worth tracking due to the administrative burden, making compliance costs a deterrent to participation. One small R&D spender described the compliance process as an "elaborate triage system" that was difficult to navigate, requiring considerable time and effort from senior management and engineers, ultimately making participation in the scheme feel burdensome rather than beneficial. Conversely, a high R&D expenditure firm reported spending over 300 hours on record-keeping specifically for the RDTI but considered it a justified expense given the support received. To alleviate this burden, some tax consultants offer timesheet software to streamline compliance. In Australia, commercial software has been developed specifically to help firms with their Australian R&DTI claims (www.synnch.com).

The need to identify and separately record core and supporting R&D activities within a single project emerged as a major compliance cost for many firms. Despite continuous education efforts, R&D personnel found this requirement difficult to justify. Some firms suggested that Inland Revenue's expectations for record-keeping detail were impractical given the realities of business operations. A common suggestion from firms and advisory firms was for a "light GA approach" or "a shrunk down CAM process" for smaller R&D spenders (e.g., <$300k annually). This is a suggestion we revisit later in the report.

Relatedly, firms also discussed the administrative burden of expenditure reviews and supplementary inquiries. Inland Revenue may request additional information on expenses or activities included in a firm's Supplementary Return to verify eligibility, with the volume and complexity of these inquiries varying significantly by firm and industry. While such monitoring is crucial for maintaining scheme integrity, some firms reported being asked to justify relatively small amounts—for example, one professional advisory firm suggested that IR had questioned one of their customers over a $500 expense (equivalent to $75 worth of support). Some firms perceived that Inland Revenue's inquiries extended beyond eligibility verification into assessing the legitimacy of their R&D activities, despite having already received a General Approval.

For firms using the Criteria and Methodologies (CAM) approval pathway, compliance costs were often perceived as excessive due to framework setup, audits, and certification fees. While CAM provided certainty, several businesses reported that the approval process was inflexible, lengthy, and inefficient—often requiring repetitive responses to similar questions. Some firms suggested a less burdensome compliance process, with one stating they were exiting CAM in favour of the General Approval (GA) process, as the certification fees were not justified by their R&D spend. Others suggested that Inland Revenue could handle certification instead of professional service firms to reduce costs.

Among advisory firms there were differing opinions on CAM approval. Some said the threshold could be lowered and the CAM route made more accessible to firms. Others supported the rigour of the CAM process and warned against widening of the CAM base. Lowering the bar might mean that the CAM pathway could become the "Achilles heel in terms of the integrity of the regime." These informants said a widespread adoption of CAM would increase the "risk of things becoming a bit unstuck". These informants also said many firms benefited from the binding approval of GAs – "for most businesses that don't have big R&D facilities, that gives you a certainty that you should treasure." They also suggested that, in their experience, many firms preferred to have real-time oversight on what activities were supported each year. Having such accountability assisted with tracking and recording, rather than having a broader methodology approved.

More generally, several businesses suggested that a leaner, trust-based model for determining activity eligibility might be appropriate in some situations. They suggested that firms with an

established track record of R&D could face fewer compliance interruptions, arguing that after multiple years of eligibility assessments, an efficient online approval process with minimal paperwork could expedite the process. Additionally, several firms called for greater flexibility in the time period covered by GAs, noting that the maximum three-year window often does not account for delays in R&D work or changes in project scope. While policy settings allow applicants to apply for scope changes via a variation, or an extension via an updated GA, interviews suggest that some firms perceive these options as additional administrative burdens or do not fully understand them.

Finally, some firms emphasised the opportunity costs of documentation and record-keeping, highlighting that R&D personnel were frequently pulled away from research activities to attend meetings, reviews, and administrative tasks related to the RDTI. These firms felt that the additional duties provided little value-add and undermined their R&D efforts. As an example, one high R&D expenditure firm pointed to the time-consuming administrative task for engineers of separating out core and supporting activities when all of the activities were eligible and taking place in departments wholly focused on R&D. A lower expenditure firm suggested that RDTI compliance took considerable time from their CEO and finance manager, as well as the engineering team.

7.1.3 Professional advisory services

Engaging professional advisory services is a significant compliance cost for many RDTI applicants, with tax consultants playing a central role in the pre-approval and Supplementary Return processes. Businesses seek external advisory support due to uncertainty about eligible expenditures, limited experience dealing directly with Inland Revenue, and the opportunity cost of acquiring the necessary knowledge and skills in-house.

Many firms found the in-depth description of eligible activities (IR1240) difficult to navigate, making tax consultants a valuable resource in interpreting scheme requirements. It was common for businesses to struggle to understand what was required without external advice. For example, one firm with a moderate level of R&D spending explained: “It’s hard enough to understand [expenditure eligibility] when someone’s drip-feeding it to you… If we had to go and work out what we have to record, what is the difference between supporting and something else, and what percentage of total salaries can be claimed, we’d really struggle.”. Clarifying and updating the list of eligible expenditures could reduce uncertainty and lower the burden on businesses, particularly smaller firms and new applicants.

Data provided by Inland Revenue suggested that at least 460 firms have listed a tax advisor as their main point of contact when engaging with the RDTI. However, our first-hand interactions with businesses indicate the actual number of firms using tax advisors may be much higher. Reliance on tax consultants also varies by R&D expenditure levels. Our interviews suggested that advisory firms were utilised as follows based on the level of firms’ R&D expenditure:

- 100% of firms with >$5m eligible R&D expenditure
- 88% of firms with $1m–$5m eligible R&D expenditure
- 50% of firms with $300k–$1m eligible R&D expenditure
- 43% of firms with $100k–$300k eligible R&D expenditure
- 25% of firms with <$100k eligible R&D expenditure

Tax advisors offer varying levels of service based on a firm's needs. One large consulting firm reported that 80% of its clients opt for full end-to-end support, while 20% seek general guidance. Another stated that 20% of their clients manage the process internally using in-house expertise, with only minor oversight from consultants. The extent of support required typically depends on the

complexity of the claim, the number of R&D activities involved, the firm's internal tax expertise, and its preference for external assistance.

The cost of using tax consultants also varies widely. Some interviewed firms said they benefitted from free pre-enrolment guidance from professional advisory firms. Consultants specialising in SMEs and startups charge either a percentage of the tax credit received (typically 20%) or a flat fee ranging between $5k and $15k per application. Larger consulting firms often assess whether a company's eligible R&D spend justifies participation in the scheme, with many recommending a minimum of $300k in eligible R&D expenditure. In this scenario, a firm receiving $45k in credits could see a substantial portion of that benefit absorbed by compliance costs.

7.1.4 Difficulties claiming full entitlements

A significant compliance cost for many firms was the inability to efficiently capture and claim all eligible R&D activities, particularly smaller-scale projects. Across a variety of R&D expenditure categories, firms expressed concern that the administrative burden of documenting and proving technical uncertainty often outweighed the benefits of claiming, leading them to deliberately overlook eligible activities. One firm estimated that approximately 30% of their researchers' time was spent on these overlooked activities, meaning a substantial portion of their eligible R&D was not claimed.

This issue was especially pronounced for projects involving iterative development, where tracking and substantiating individual research efforts proves disproportionately costly. For instance, one resource-constrained startup with a relatively low level of eligible R&D expenditure found the compliance requirements too complex to navigate. The founders underestimated the level of work needed, and their accountant struggled with the SR claim, ultimately requiring costly professional advisory assistance. The firm remained uncertain whether participating in the scheme had provided a net benefit.

One of the most frequently cited challenges was the ambiguity surrounding software eligibility. While revised guidelines and case studies provided some clarification, many firms felt they did not go far enough to align with the nature of software development or design-led innovation. The requirement to demonstrate technical or scientific uncertainty was seen as particularly restrictive, failing to accommodate the iterative and evolving nature of software R&D. As a result, some firms opted not to include what they believed to be eligible R&D, either due to (i) excessive compliance costs in tracking and proving eligibility or (ii) a lack of confidence that Inland Revenue would approve their claims. One firm suggested that this ambiguity caused them to claim only about 50% of their actual R&D activities. Another firmed explained how the lack of confidence created significant uncertainty within their business "this payment, if we have issues and they (i.e., IR) don't agree what we've done (is) R&D, it will be quite scary, like wholesale redundancies, because we've already done the work and we did it last year in the anticipation that the funds will come through…we've done R&D and kept records as best we can, but it's kind of scary to think that we're operating in such uncertainty."

In a variety of firms, it was perceived that a conservative mindset among technical staff further contributed to under-claimed entitlements. Several firms reported that engineers and technical staff were reluctant to record eligible activities, either because they assumed the novelty and uncertainty of their work was self-evident or because they were concerned about incorrectly categorising activities for Inland Revenue. This cautious approach, while understandable, may have resulted in some firms failing to claim their full RDTI entitlements.

Delays in processing Supplementary Returns added to these challenges by creating uncertainty and liquidity pressures. Processing times varied significantly, with firms in the upper quartile facing

extended wait times. These delays were a recurring source of stress, with some firms resorting to high-interest short-term loans to manage cash flow while awaiting approval. Others reported that insufficient capital had forced them to postpone or scale back R&D projects. To mitigate these issues, some firms sought assistance from tax consultants to navigate the Supplementary Return process more efficiently.

7.1.5 Reflections on compliance costs from professional advisory firms

Among professional advisory firms—well-positioned to share insights gathered from interactions across multiple firms—there were differing views on the appropriateness of compliance costs. One firm said the scheme's compliance costs were too high, and in particular the reliance on advisory firms such as their own was questionable. They stated,

> *"I've said this for the past five years, it's nothing new. It does my head in that we've got really, really smart companies doing R&D, yet the process to claim the expenditure is too complicated. They need to pay an advisor to do that for them. It makes no sense."*

However, the vast majority of advisory firms perceived that compliance costs were fair and appropriate to ensure the scheme was funding what it intended. As stated by one advisory firm informant,

> *"The compliance cost and accessibility are reasonable, given that we don't want to give away taxpayers' money (by) ticking the box to say we're doing it. We actually want to achieve the outcomes. I think that the targeting of R&D within it is quite well done in the application."*

Another advisory firm commented,

> *"The purpose and intent of the regime is to allow activities that seek to resolve technological uncertainty, therefore it's important in the application you actually are expressing what's unknown about it and why it's not deducible and why it's the information is not readily available. And I think if you stick to that core principle, which I feel is a fair principle, what you need to put in and what reviewers accept, I think it's totally fair and reasonable."*

Consistent with some firm insights, the advisory firms also said that adhering to compliance costs developed firm capability, and that compliance costs were likely to reduce as firms gained more experience within the scheme.

The minimum threshold for eligible expenditure was a source of broad agreement among advisory firms. $50k was regarded by many as "a waste of time, even if not using an advisor." $100k was viewed as marginal and a toss of a coin when accounting for advisory fees. The general consensus was that firms "needed to be spending $300k-$500k for it to be worth your while." One informant said if you were not spending that amount "you may be better off putting that effort into your business." Notably, these views were supported by other stakeholders, with some CI informants saying that, in their experience, the scheme was less attractive to firms spending under $500k on eligible R&D.

7.1.6 Compliance costs and levels of R&D expenditure

The interviews revealed that it was difficult, if not impossible, for firms to estimate with any confidence a precise dollar or time allocation for their compliance costs. Firms have different GA/CAM and SR experiences across different years and these experiences, along with scheme familiarity and capability development, largely dictate compliance costs. It was also apparent some firms framed, and/or were better prepared to frame, RDTI compliance processes as distinct costs or FTE allocations; while other firms were less prepared to provide such details and/or had absorbed RDTI compliance processes into their standard R&D management processes. The high R&D

expenditure firms we spoke to were better able to provide quantitative estimates of compliance costs.

Having said that, a pattern of proportionately higher compliance costs among small R&D spenders was evident across the firms we interviewed. The highest R&D spenders reported compliance costs that ranged from approximately $50k per year in advisory fees, plus routine administrative work on top of existing R&D systems, to $300k–$500k per year, comprising a dedicated 1 FTE RDTI coordinator, additional administrative support, and substantial advisory fees for CAM reviews. Some firms reported allocating 12–15 weeks of internal work per year (450–560 hours), while others estimated 500 hours per half-year cycle, with contributions from finance, R&D, and general management teams.

For modest R&D spenders, compliance costs appeared lower in absolute terms but higher relative to their benefit. Estimates ranged from one to three weeks of internal work, with additional advisory fees of approximately $4k.

For low spenders, compliance costs often absorbed a substantial portion of the tax credit received. One low R&D expenditure firm reported spending $6k on the GA stage alone, plus uncosted time from finance and R&D teams. Another firm in this expenditure category reported that 40% of their total claim was consumed by compliance costs.

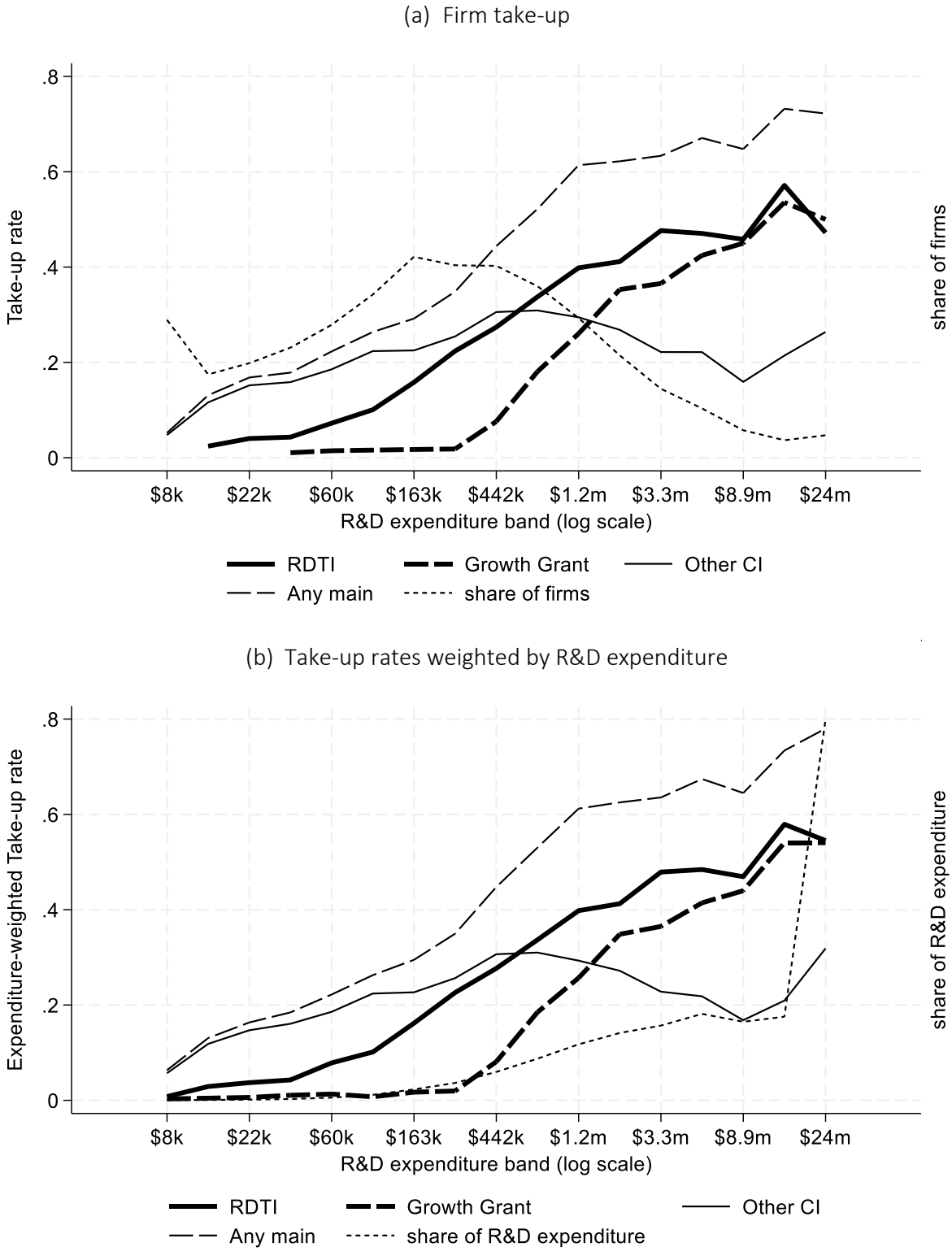
Disproportionately high compliance costs faced by small R&D spenders made participation in the scheme less attractive and, in some cases, financially unviable. One firm estimated $24k in compliance costs (3–5 weeks of work plus $4k in external advisory fees), exceeding the 15% benefit they received in their first year. Another firm reported that even with just one week of internal administration, the time investment made the scheme marginally worthwhile at best.

Many smaller firms and start-ups lacked the capacity, resources, or technical and financial expertise to engage effectively, with limited ability to track R&D in a way that aligned with RDTI requirements. Some firms indicated that projects had to exceed $75k–$80k for participation to be worthwhile. A start-up that estimated their claim was around $50k remained uncertain whether engaging in the scheme had actually cost them money. Another small firm decided not to participate again, stating that their time would be better spent on other priorities.

These insights suggest that while absolute compliance costs are higher for large R&D spenders, the burden is proportionately heavier for firms with smaller R&D expenditures. As Appendix section C.2 demonstrates, most high R&D expenditure firms we interviewed perceived compliance costs as appropriate for the benefit received. Firms with modest R&D expenditures (e.g., $300k -$1m of eligible expenditure) were split relatively evenly on the appropriateness of compliance costs. In the lower R&D expenditure categories, more than two thirds of firms were either broadly critical or neutral on the appropriateness of compliance costs. For these firms, compliance costs often consumed a significant share of the tax credit received, reducing the net benefit of participation and possibly discouraging engagement with the scheme.

Proportionately higher compliance costs may be affecting RDTI take-up among low R&D expenditure firms. Figure 9 depicts the take-up of the government support mechanisms considered in our impact analysis, using the *RDExp* measure described in Appendix section B.1.5. The solid bold line illustrates that the rate of take-up for the RDTI is below 20% for firms up to $163k R&D expenditure (log scale). In contrast, take-up of non-Growth Grant Callaghan Innovation support ("Other CI", non-bold solid line) exceeds 20% for firms with as little as $60k R&D expenditure. Similar trends for take-up weighted by R&D expenditure are reported in Figure 9b. Take-up rates may reflect a wide range of factors, however, it is plausible that RDTI compliance costs are an important contributor to the relatively low take-up among small R&D spenders.

Figure 9: Take-up rates by R&D expenditure band



Notes: 51.5% of total R&D expenditure is accounted for by firms with R&D expenditure of $24m or above. "Other CI" support refers to Project Grants, Student Grants or the R&D Loan. "Any main" refers to the RDTI, Growth Grants, or Other CI support.

7.1.7 Approved Research Providers

The use of Approved Research Providers (ARPs) exists, in part, to be an avenue for low-R&D expenditure firms to access R&D support, perhaps without incurring all of the associated compliance costs. However, when we looked at the extent to which ARPs have been used, and by whom, overall usage of ARPs appears rather low across-the-board.

Table 22 reports engagement with ARPs from the perspective of firms submitting SRs (panel a) and ARPs featuring in SRs (panel b). Based on the overall evidence presented across both panels of the table, there have been somewhere between 279-333 instances of ARPs providing research which was then claimed by firms as part of their Supplementary Returns. The lower bound of the range, 279, is the total number of Supplementary Returns with non-zero ARP payments. In panel A, this is the total of the first four rows of the left column (decomposed by average annual R&D expenditure brackets) or the following eleven rows (decomposed by consolidated industry (ANZSIC06) grouping).

The upper bound, 333, draws from panel b and is the count of the total number of instances where Approved Research Providers (identified and unidentified) have been linked to SRs.[45] More than one ARP can be included on a firms' SR. Panel b also breaks down the most common industry areas and sector categories for ARPs who have been linked to an IRD identifier.

Many ARPs do not appear to provide any 'approved research' after going through IR's enrolment process. As of February 2024, there were 143 Approved Research Providers listed on the Inland Revenue website. There are 54 unique IRD identifiers for ARPs with a total of 213 appearances in SRs (average of 3.94 SR claims per ARP).[46] If this average number of SR claims per ARP is consistent among the 120 ARP appearances in SRs for which an IRD identifier is unavailable, it suggests that at least 59 (41%) ARPs have never provided approved research claimed on a SR.

Panel a of Table 22 also suggests that smaller spenders are not engaging with the RDTI via Approved Research Providers at the levels hoped (just 12% of low R&D expenditure firms have ever claimed ARP payments). Our interviews suggested that, by and large, ARPs had not featured in the firm decision making with regard to the RDTI. It is interesting that usage of ARPs (in terms of number of SRs, % of SRs, % of distinct firms, and % of R&D expenditure) is greatest among the highest R&D expenditure bracket. We lack data to determine how relevant, if at all, the "ARP" process was in these relationships—it seems plausible that many relationships were in place before, or would have gone ahead regardless of, the RDTI (e.g., large R&D performers' ongoing relationships with universities, Crown Research Institutes or Callaghan R&D Services).

7.1.8 Internal capabilities and processes

Certain factors help firms to limit or reduce compliance costs. Several firms were able to integrate or build on established R&D management/tracking processes when embedding RDTI compliance, rather than starting from scratch. Firms that had necessary technical and financial expertise internally also appeared to fare better. One high R&D expenditure firm described how they successfully built on existing R&D practices to streamline compliance, embedding RDTI requirements into normal business operations. They explained that monthly eligibility meetings and a centralised documentation system allowed them to manage compliance efficiently, stating: "It's no different than any other sort of business activity that we do. It's pretty easy." As a result, they significantly

[45] Within the upper bound, some of the "unidentified" ARPs without an IRD identifier are likely duplicated records. The table design within the Longitudinal Business Database (i.e., with multiple file versions for the same SR) means we have no way to identify duplicates within the 120 records of unidentified ARPs.

[46] This calculation excludes ARPs with missing IRD identifiers. The median number of Supplementary Return 'appearances' per (identified) ARP was 2 and the 90th percentile was 14.

Table 22: Engagement with Approved Research Providers

a) Payments to Approved Research Providers (ARPs) in Supplementary Returns

Firm background	# of SRs with ARP payments	% of SRs with ARP payments	% of distinct firms with ever ARP payments	% of SR RDExp to ARPs
R&D Expenditure less than $100k	45	10.1%	12.0%	1.0%
R&D Expenditure $100k to $299k	48	8.0%	7.3%	2.1%
R&D Expenditure $300k to $999k	69	7.3%	9.1%	1.2%
R&D Expenditure $1M or greater	117	12.2%	14.1%	2.8%
C1 - Manufacturing group 1	27	14.3%	10.3%	4.4%
C11 - Food Product Manufacturing	18	17.1%	18.8%	1.1%
C2 - Manufacturing group 2	36	10.4%	11.8%	0.2%
F3 - Wholesale Trade (except F34)	33	23.4%	28.6%	.s
F34 - Mach and Equip Wholesaling	.s	.s	.s	.s
J5 - Info Media & Telecomm (not J60)	.s	.s	.s	.s
M69 - Prof/Sci/Tech Serv (not M691/M70)	36	10.1%	10.4%	2.9%
M6910 - Scientific Research Services	45	23.4%	26.9%	23.3%
M7000 - Comp Sys Design & Rel Serv	6	1.0%	.s	.s
OSERV - Service industries nec	36	9.8%	10.3%	1.1%
OTHER - Other non-service industries nec	39	11.0%	12.3%	1.4%

b) ARPs appearing in Supplementary Returns

Approved Research Provider background	Distinct providers	# of appearances
Private - Engineering and Computer Design	12	27
Govt - Higher Ed	9	75
Govt - Scientific Research	9	66
Private - Scientific Research	6	15
Not for Profit - Scientific Research	.s	12
Govt - Other (includes Agri. Survey/Archit., Mgt Advice)	.s	.s
Private - Other (includes Agri. Survey/Archit., Mgt Advice)	12	18
Unidentifiable (missing IRD identifier)	unk.	120
Total	54	333

Notes: Values are rounded/ suppressed (".s") in accordance with Statistics New Zealand requirements. Due to rounding, the totals for the R&D expenditure and industry grouping decompositions in panel a) may not exactly match.

reduced reliance on external advisors, keeping annual professional service costs to around $50k while securing a multi-million-dollar credit.

There was also evidence that firms interviewed had been able to learn from their previous experiences with the scheme. As they became more familiar with the RDTI, firms said they were better placed to reduce their compliance costs and had greater confidence to include more eligible R&D activities. These firms referenced knowledge and capability enhancements through RDTI engagement over time, which led in some cases to reduced reliance and spend on professional advisory services. Another firm described how they initially engaged a professional advisory firm for guidance but gradually built the confidence and expertise to manage the scheme internally. They noted that they developed a better understanding of eligibility criteria with each successive claim,

enabling them to expand their claim while intending to reduce external advisory fees; "I think as we've gone through a couple of claims, we are more confident in those assessments than we perhaps were… we have a much better idea of how it all works now."

7.1.9 Why firms don't engage

We did not speak to firms that deliberately chose not to engage with the scheme. However, we did gather second-hand insights on reasons firms do not engage or proceed with their intention to engage from informed stakeholders, including supported firms (speaking about their peers), the CI customer engagement team, and professional advisory firms.

There was broad agreement across stakeholders interviewed that the main reason for non-engagement was a gradual realisation that the scheme was not sufficiently financially beneficial to justify the compliance costs. For these firms, the 15% credit did not seem enough to attract them;

> *"their perception of how much effort and time it would take versus the impact it would have on their business, I think they're viewing it as a net loss, if not a breakeven exercise."*

Some firms may also opt not to engage as a result of opportunity costs;

> *"there are some businesses where it might be worth it for us (i.e. advisory firm), but $100k credit for them is nothing, and they might say, look, it's not worth it because we generate 250k a month in revenue or a week in revenue, and this is going to cost us more in opportunity cost than it otherwise would."*

There were a range of other reasons associated with non-engagement. One is simply a lack of awareness. It was said there are still a significant number of firms "that disqualify themselves based on not knowing it exists at all." Another reason for non-engagement is that there is no one within the firm to take responsibility for engagement (e.g., firms that employ a Chief Financial Officer on a fractional basis). Some firms appear to have made a decision based on first impressions; "based on what they read on the website, the language that they use to describe their own innovation is different than what Callaghan use." Other stakeholders suggested small firms may be turned off by myIR;

> *"myIR is one of the biggest barriers for small firms. It's very user unfriendly. Just the way it's presented. You have to upload it and do it all in the system. You can't download it in bulk to review what's been prepared. I think that's a barrier for smaller firms."*

Some firms engaged with CI engagement specialists and decided they were not ready to apply and/or were better suited to another scheme, such as New to R&D grants. Some firms engaged in a technical scoping exercise with advisory firms, and realised there was less eligible expenditure than they initially envisaged. Other firms said they knew of firms that enrolled in the scheme, proceeded through the technical application process, but grew frustrated at the SR stage and decided to withdraw;

> *"IRD come back with this list of questions that are incredibly difficult to navigate and interpret and understand and respond to, and they go, yeah, nah, not worth it."*

Finally, several advisory firms cited the payroll taxes cap as a barrier that made the scheme unattractive for legitimate businesses, including many smaller, and often 'deep-tech', firms. Because the total amount of R&D tax credits refundable are subject to a cap based on labour-related taxes, firms operating a lean business model with specialist contractors and high costs of materials were unable to get the credit refunded in cash. A carry forward to future tax liability was not attractive, particularly if there is uncertainty about future profitability.

7.1.10 Overall appropriateness of compliance costs

As discussed, the overall appropriateness of compliance costs depends on weighing the burden to firms against the policy intent, including the need to mitigate against non-compliance. The experiences of many businesses interviewed, and a vast majority of professional advisory firms, suggest that RDTI compliance costs are appropriate. There are, however, two areas where the appropriateness of compliance costs could be improved.

First, there was general consensus that firms needed to be spending at least $300k-$500k on eligible R&D expenditure for the RDTI to be financially worthwhile. Legal provisions to mitigate against fraud appear to be contributing to proportionately higher compliance costs for low R&D expenditure firms. There is evidence that the incentive for low R&D expenditure firms is not proportionate to that for higher R&D expenditure firms, and this may be undermining the scheme's attractiveness to low R&D expenditure firms. There are different options to address this issue which we discuss in our assessment of alternative policy settings (Section 7.4). Each offers advantages and drawbacks, and we acknowledge that there may be an inevitable trade-off between supporting low R&D expenditure firms and minimising fraud risks.

Second, there are a range operational issues outlined in the following sections, and perhaps some legislative clarifications, that may improve compliance cost appropriateness. These include the extent of collaboration between CI and IR, technical resourcing within IR, formal RDTI intermediary roles between GAs and SRs, variability in assessor approaches, and transparency during SR processing. Among other opportunities, which are detailed below, further policy and operational consideration of these issues could improve the appropriateness of compliance costs without a major associated trade-off in other areas of the policy intent.

7.2 Is the scheme being administered effectively?

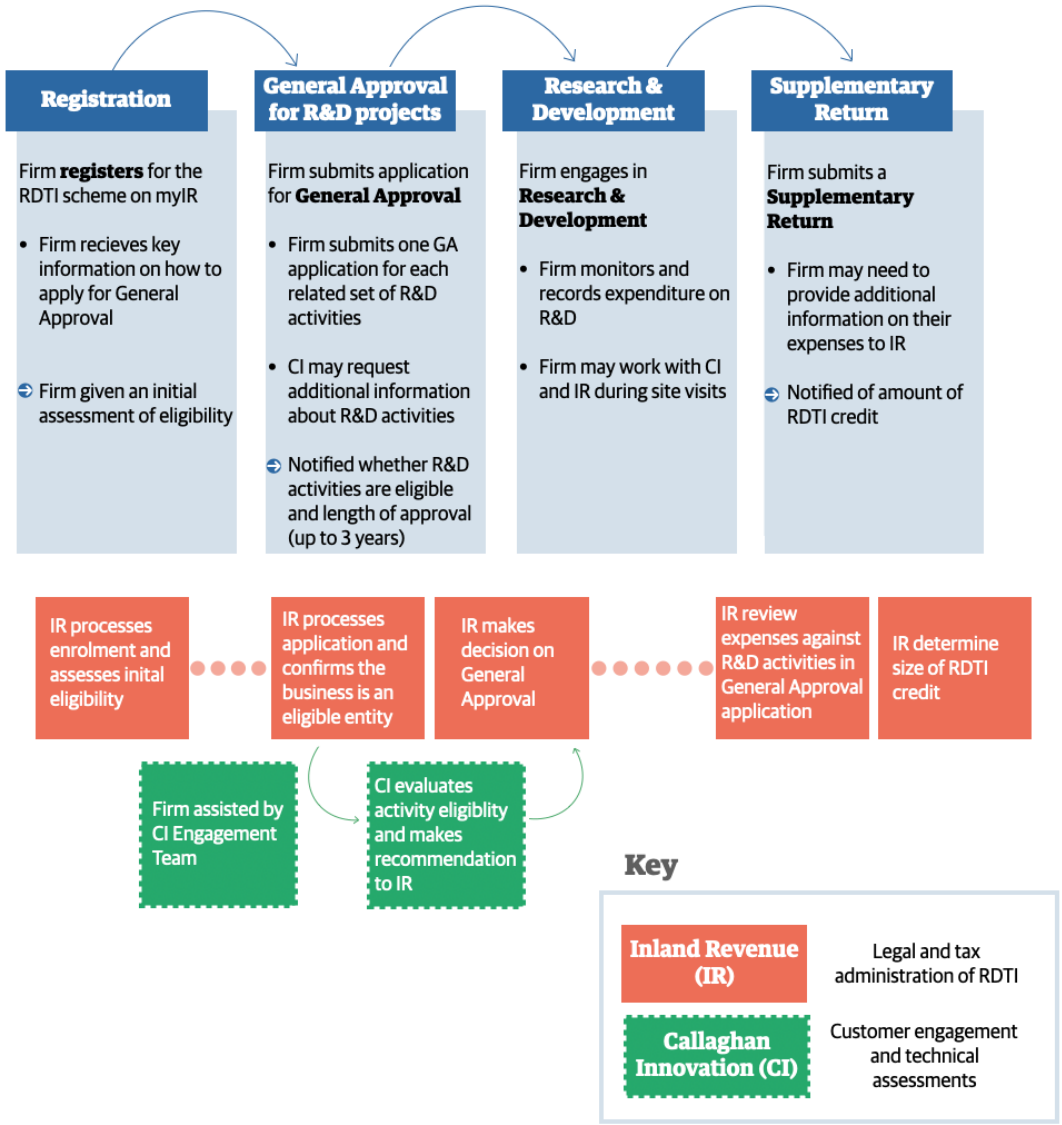
The RDTI is administered through a tripartite agreement between IR, MBIE, and CI, outlined in the Operational Memorandum of Understanding (IR et al., 2024). MBIE and IR are joint policy leads for the RDTI. MBIE have responsibility for science, innovation and technology policy, and IR have responsibility for tax policy. The RDTI is administered by IR and CI. IR is responsible for delivery of the scheme through the tax system. CI supports the scheme's delivery and operation through two teams, one focusing on customer engagement and another providing scientific and engineering expertise for RDTI technical assessments. To illustrate core roles provided by both agencies, Figure 10 presents a simplied administrative flow based on a firm following the General Approval (GA) pathway.[47]

To assess whether the scheme is being administered effectively, we analyse data from multiple stakeholders including firms, operational leads, policy experts, and professional advisory firms. In aggregating data across these constituents, we find that, on balance, the scheme is being administered well and has continued to make improvements in important areas identified by previous reviews.

The educational and on-boarding roles of CI's customer engagement team are adding significant value, particularly among smaller firms and lower R&D spenders. The CI assessment team have made further improvements in how the criteria are applied when assessing the eligibility of R&D activities. Processing times have reduced and are now better than stated performance targets. Many firms appreciated IR's efficiency, clarity relating to their Requests for Information, and pragmatic approach to immaterial issues.

[47] An in-depth administrative schematic of both the GA and CAM pathways is provided in Appendix D (reproduced with permission from Callaghan Innovation).

Figure 10: Administrative flow of the RDTI



Notes: This figure reflects a simplied administrative flow for firms following the General Approval (GA) pathway. In practice, many firms are already engaged in R&D prior to registration as the deadline due dates allow for a firm's first Supplementary Return to relate to work already carried out in the tax year of application. A more detailed General Approval schematic, as well as a corresponding schematic for the Criteria and Methodology (CAM) pathway, can be found in Appendix D.

Insights from the business and professional advisory sectors suggest that the customer experience has improved over time. There was almost unanimous agreement across stakeholders that CI and IR had distinct roles, the roles were complementary and well aligned, and that overall, the RDTI team were working well collaboratively.

Our review also points to administrative challenges. Most significantly, in terms of administrative efficiency, it appears the pendulum has swung, with issues shifting from the initial overly restrictive application of eligibility tests during pre-approval to delays and unpredictability in the processing of Supplementary Returns (SRs). Despite decreases in SR handling times, the interviews highlighted

some frustration with delays and inconsistencies in SR processing. This issue stems from fundamental operational and resourcing issues relating to how approved activities are interpreted as eligible expenditure at the SR stage.

We highlight several opportunities for improvement that could be considered, in combination or individually. These include, but are not limited to, scope for CI and IR to work (even) more closely together. Irrespective of how this might be approached in practice, two key areas for improvement worth considering are better alignment between GA and SR processing; and support for, and improvements in, SR processing. Further opportunities for improvement include resourcing support for the CES team, greater discretionary powers for the tax commissioner, and some clarification on contentious legislative exclusions.

7.2.1 Customer engagement and education

The CI engagement team, known as Customer Engagement Specialists or "CES", generate awareness and provide guidance and education about the scheme. CES try to demystify the legislation relating to the RDTI and offer a hand of support to make customers confident about engaging with the scheme, if it is appropriate for them. CES do not provide tax advice, but are sometimes perceived as a free substitute to advice offered by professional advisory firms at the outset of a firm's RDTI journey. CES disengage from the journey once a firm submits their GA. They do not make recommendations on business eligibility nor customer applications.

Typical CES customers are smaller firms and R&D spenders who are unsure how the scheme works or if it applies to them. CES interviewees said approximately 25% of customers came through website queries, 33% from RDTI enrolees passed on from IR, and 42% via proactive outreach from the CES and broader CI teams. The CES team provide a range of services to customers including initial "RDTI Introduction Advice" meetings (e.g., explaining the concepts of eligibility), consultative sessions to discuss the customer's R&D, coordination of and guidance to scheme resources (e.g., case studies and website resources) and reviews of customers' draft GA applications prior to formal submissions.

In 2024, the CES team contacted 99.7% of new RDTI enrolees within five business days of IR sharing their information (target was 80%). CES informants said a current priority for their team was engaging with firms earlier (i.e., pre-enrolment) as they were concerned that many firms were missing out on the scheme through a lack of awareness or engaging incorrectly with the scheme through a lack of understanding. This view was supported by IR with one IR informant commenting, "there's some customers that, for whatever reason, don't know about the RDTI, which I find a little bit concerning", and further explaining:

> *"there is still a portion of our customers that don't understand the regime. For example, we had one this week where they just claimed the whole profit and loss account. They obviously hadn't read what the requirements are for the regime. So there are still those sort of customers."*

Feedback gathered through interview data shows the majority of firms that engaged with the CES team appreciated the positive support, quality of the briefings, excellent communication, resources, and draft reviews. Many commented that the team provided good clarity and gave them a good starting point for the process. These endorsements affirm the positive feedback gathered by the CES themselves through email and customer satisfaction surveys. The team also appear to be well aligned with other operational components of the scheme. Most members of the CES team have had secondments in the GA assessment team which helps them understand assessment expectations. The CES team also work with IR to do roadshows and receive training on legislative issues, record-keeping and filing returns, which they can then share with customers. The CES team also feed their insights on the customer experience back to the other operational teams through "concern and

actions" meetings. As an example of how the CES team respond to customer feedback, they launched a new web tool in December 2024 that helps customers understand deadlines for GAs and SRs. These deadlines were highlighted as a source of complexity for several interviewees.

There are also some points for the CES team to consider. Some firms expressed frustration at the overly cautious language used in their engagements with CES. These firms would prefer more purposeful explanations, rather than pointing towards guidelines. Some firms and advisory firms said the cases and resources needed to be updated and to cover more industries and further clarify software related issues. Some advisory firms also expressed concern at the frequent staff turnover within the team. They said this detracted from establishing a deep understanding on the details and nuance of the tax legislation – "(the) team don't have a broad and deep enough understanding of the scheme". Another advisory firm said that too often the "free service" was incorrect, and that they knew of several firms now spending millions on R&D in the scheme who were given the impression through their engagement with the CES team that they were ineligible.

It is important to contextualise these comments from advisory firms by noting that CES provide a free alternative to some of the (typically) fee-based advice professional service firms provide their customers pre-enrolment.[48] The CES team emphasised that they do not provide tax advice or advise firms on the eligibility of their business or R&D activities. They also emphasised that they do not typically work or engage directly with advisory firms and were unsure how advisory firms would have insights on CES staff turnover or their knowledge of the tax legislation.

7.2.2 Assessment of activities and criteria and methodologies (CAM)

IR are the ultimate decision-makers on GA and CAM approvals, but the Callaghan Innovation assessment team lead much of the work on activity assessment and determining eligibility. There are approximately 13 members in the assessment team. The number can fluctuate depending on workflow demands and secondment arrangements, but generally the assessment and CES teams are 2:1 in size. Previous scheme reviews have highlighted problems (PWC, 2020) and improvements (MartinJenkins, 2023) in how eligibility tests are being applied. This evaluation finds that previously reported improvements in the activity assessments have continued and there is evidence that the assessment team have embedded good practices. On balance firms and advisory firms are broadly satisfied with how eligibility criteria are being applied in GA and CAM assessments.

The assessment team said that in general, the quality of GAs has improved and the team have enhanced the customer experience. The assessment team engage with customers and advisory firms (e.g., seeking clarifications or further information) to give applications the best chance of meeting the eligibility criteria and being approved. The team said that approvals can be delayed by poor quality or incomplete responses to RFIs (Requests for Information) from firms or advisory firms, or when applications are under closer inspection. Where activities are declined, the customer will always have had an opportunity to address the reason for the decline and will receive an explanation for the decision.

The assessment team have also worked hard on learning from alignment processes. Alignment discussions relating to complex eligibility issues took place within the assessment team among CI assessors; and also, more formally, in regularly scheduled "Alignment Meetings" where the assessment team discussed cases with IR legal and technical specialists. On occasion, MBIE could also participate in alignment discussions if clarification is required on policy intent relating to a particular issue. The assessment team said they utilise dynamic assessment models that, based on specific objective parameters, inform the team's workflow management. The team said these

[48] Some firms interviewed said they benefitted from free pre-enrolment guidance from professional advisory firms.

models are regularly updated and subject to regular quality approval processes that help to test and strengthen their predictive abilities.

Similar to the CES team, the assessment team look to integrate with other operational components of the scheme. For instance, the assessment team have worked from time to time with the CES team to learn about the customer experience. This included RDTI roadshows to increase awareness and education relating to eligibility criteria. In the GA and CAM approval process, as well as formal alignment meetings, there are also continuous engagements with IR staff and technical specialists. More recently, members of the assessment team have been seconded to IR to assist with SR processing.

In terms of current priorities and challenges, the assessment team said that internal software development (i.e., Schedule 21, Part A Clause 11 and Part B Clause 11, Income Tax Act, 2007) was proving difficult for firms to navigate and it was the most challenging item for CI assessors to administer and make a determination on. The assessment team said, in general, software eligibility issues were increasing with many non-digital businesses becoming involved in software development. It was estimated that cases relating to Clause 11 took up to three times longer for CI assessors to work through.

There was also some feedback that the assessment team and wider RDTI team should consider. Some advisory firms said that, while assessments at the GA stage on the whole had become "more predictable" and were "on the right track", there continued to be some variability in approval timelines that made little sense. For instance, it was explained that applications with clear technological uncertainty could get held up with many questions, while other applications with less clear technological uncertainty went through, surprisingly, without question. Other advisory firms said that some "residue of the old system" remained in terms of assessors' levels of scrutiny. More precisely, it was explained that certain assessors insisted on playing "bad cop" and went further than the legislation required in trying to fully understand, and almost solve, the firm's R&D activity. On such occasions, advisors said that they ended up doing their job three times and would have been better off re-writing the application than dealing with all of the questions. A particular point of frustration for some advisory firms was the assessment team's expectations around articulating a systematic approach for granting three-year approvals. These advisors questioned how realistic or worthwhile this was given the level of uncertainty often involved, and suggested that a more streamlined process could credibly demonstrate firms' R&D planning.

Feedback from customer firms corroborated many of these points. For example, some GA and CAM firms referred to frustrations with assessment staff turnover and/or inconsistency across assessors.[49] These firms said such issues led to delays in GA processes and that it was inefficient having to re-explain activity eligibility to different assessors who had different interpretations and/or points of interest on the firm's R&D. Other firms said they would appreciate better feedback from the assessment team so they could become less conservative with subsequent GAs. While these firms were happy to hear their GAs were of a high standard, they were frustrated that they did not get feedback on where the bar was or how close they were to it in terms of activity eligibility. Without such feedback, it was difficult for firms to broaden their claims with confidence. Some firms also commented that, based on their experience, particular assessors had styles that were more akin to those of suspicious auditors who did not believe what the firm was saying, tried to make the process too difficult, and attempted to catch the firm out. On balance, while activity assessment processes seem to have improved and are broadly well received, it is worth noting that unsatisfactory customer

[49] According to Inland Revenue, there has been little to no staff turnover within the CI Assessment team.

experiences can impact business certainty and overall confidence in the scheme, even if they are not the norm. The following quotes from GA and CAM applicants illustrate this point.

> *"I think for me with this GA it's been eight or nine months now. We still don't know really where it stands. And we've asked when could they get back to us? The simple answer is we don't know. And it's just like, how's a business meant to function? There's just complete uncertainty there. They won't even give us a timeline as to when they could come back to us. Even if it was three or four months away.....we still haven't had a conversation with the person that seems to be driving the concern. We're trying to arrange that conversation. And it's difficult to know where the concern originates or whose concern it is.... businesses need more certainty. Having something like that where we're just getting no feedback and there's no time frame around it. Government might be able to work like that, but businesses can't."*

> *"Within the year after we got our initial CAM approved, they (Callaghan) wanted to come in and do a review meeting. Off the back of that we had a six-page document recommending updates to our CAM. We hadn't changed our process, but they felt that there were some things that could have done with clarification…It was wordsmithing. We marked it up and sent it back in…They took months to look at it. They then wanted to have a phone call about it, then they sent us 44 requests for information and wanted to have two days worth of meetings. We updated the document again (and) they took months and months to look at it, and it wasn't until we had just finished our three-year period that they contacted us wanting an urgent meeting to tell us that they declined our framework update at which point I just hit the roof…you're telling me that you've just declined our framework, and we've just finished the financial year. Where does this leave us? Luckily, IRD stepped in and said no, just to be clear, because your changes were just wordsmithing then your original CAM approval stands, you can still claim for the last year, but it left us in a position of going, what the hell do we do for re-applying? This is a lot of money for us. We definitely want to reapply."*

There was broad positivity among advisory firms about the role of the CI assessment team. It was commented that there has been a "massive shift" from earlier stages of the scheme. Other comments from advisory firms included references to how the assessment team's ethos to support R&D was increasingly apparent, their processes were improved, they were clear on what their role was and expectations were, they turned things around quickly, the questions they asked were reasonable and helpful, they were accessible and patient when seeking clarifications, they were informative (e.g., open to re-classifying activities or giving input on what firms needed to present and how), and they provided encouraging feedback on firm processes. Firms echoed much of this positive sentiment. Several firms commented that the assessment team's processes had improved greatly, that they had impressive subject matter expertise, their questions were prompt and detailed, they provided good communication and transparency during the approval process, and their explanations enhanced firm knowledge about the scheme.

7.2.3 Time between creation and completion of General Approval applications

The CI assessment team have improved processing times and provide customers with greater transparency on the status of their applications during the approval process, although they have less control once their recommendation is passed to IR for review and final approval. The assessment team have an agreed KPI with MBIE that they will process 80% of their assessments within 37 working days. From a low of 30% in the early years of the scheme, the assessment team report that since May 2024 they are processing approximately 90% within this 37-day timeframe. (For the 2023 income year, this figure was around 85% of assessments.) The team said they are comfortable with this percentage as they believe the 10-20% tail is important to ensure their processes and targets do not incentivise behaviours that could lead to non-compliance. The team explained that the main factor contributing to improvements in processing times was better RFI practices, including ensuring that questions asked were necessary and targeted.

Table 23: Time between creation and completion of GA applications (calendar days)

	Income year in which the application was created					
	2021	2022	2023	2024	2025	Total
Total # of GAs	153	1758	1407	1300	510	5130
R&D Exp. bands						
$1 - $49k	288	298	152	82	60	216
$50k - $99k	244	293	157	98	63	197
$100k - $299k	308	288	159	96	57	190
$300k - $999k	345	276	167	93	60	171
$1M - $5M	484	289	164	96	57	171
$5M +	309	275	169	112	47	160
Average	324	287	162	95	58	182

Notes: The table was created using data provided by IR in August 2024, which includes information about the date when a case was created (i.e., the received date from the customer) and the date when the case was completed (i.e., when IR send the most recent letter to customers informing of the outcome). These average time differences reflect approved GAs applications only.

Table 23 reports the time differences between creation and completion of approved GA applications, using information from IR about the date when a case was created and when it was completed. This is a different time measure from that used by CI for their GA assessment KPI and should be interpreted with caution as the GA "completed" date is overridden in the system when there is an update to the GA after original approval. As such, we do not recommend that this is interpreted as an indication of processing/ handling time. Nonetheless, without over-reaching in interpreting the time differences, Table 23 is suggestive of two broad patterns regarding GA handling times. First, consistent with prior reviews and accounts from interviewees, there appears to have been a significant shortening in handling times as processes have matured. Second, at the GA stage, handling times appear similar for low and high R&D expenditure firms. There does not seem to be consistent evidence of handling time differences based on size of R&D spend.

7.2.4 Processing of Supplementary Returns

Several firms and some advisory firms commended IR assessors on their very good job processing SRs. Some of these informants said that SRs were processed quickly, sometimes without a single question. Others said that IR were approachable and willing to try and understand the business and its expenditure. Some firms said the IR's questions were quite straightforward, while some advisory firms said that IR were clear what information they wanted and that their high-quality questioning "shows they are starting to really understand some of the nuance of the legislation and the practicality of how it works out". Firms said it was helpful to provide as much information as you could— "over and above" —and to try and pre-empt IR questions when submitting returns. Some informants appreciated how IR adopted a practical approach where possible, including their efforts to educate claimants— "they are quite pragmatic and relaxed on immaterial things (…) and ask them to think about it for next year." Lastly, some firms and advisory firms appreciated the stability of the IR team, as well as how certain named assessors were excellent and had become familiar.

However, on balance, the interviews provided strong evidence that there is frustration among some firms and most advisory firms with delays and inconsistencies in expenditure reviews by IR. These informants said that, for many claims, the process seemed to have become far more rigorous. However, because there was a lack of clarity or understanding around why this was the case for some

returns over others, the process was also said to have become more unpredictable. The general consensus among these informants was that SR processing will take either a few days or four to six months. Key points of frustration relating to SR processing included:

- Variability in IR assessors in terms of the questions they ask, positions they take on expenditure items, and what information they want to see.
- A sense that once questions (and follow-up questions) are asked by IR, the review process slows and lengthens considerably. Some informants said that when they responded to a question, it felt like they re-joined the back of the processing queue.
- Relevance or value of some questions. For example, informants spoke about having to revisit questions that had already been addressed at the GA stage, without IR explaining why the original answer was no longer appropriate. There was frustration with reported reliance on question bank templates—"they [IR] ask about feedstock rules with a software company and please confirm and tell us why you don't believe they apply"— as well as line by line scrutiny and questions about what seem like immaterial amounts (e.g., tea and coffee, toilet paper, stationary).
- Lack of insight or pattern about acceptable apportionment methodologies. For example, using an apportionment methodology that is approved one year but then scrutinised or rejected another year.
- Lack of transparency about the processing stage of open returns.
- Lack of accountability for unnecessary delays and costs to business.
- Having to engage with IR leadership/management to expedite cases.

There were also some questions among these informants about the role identity of IR and whether this might result in conflicting messaging about policy priorities. There was a sense that most IR assessors had backgrounds in forensic accounting investigations and tax fraud, and were bringing this mindset and skillset to SR processing—"IRD's DNA is it doesn't like money going out the door". While there was strong support for the need to maintain integrity in the tax system, and to ensure returns were processed appropriately, there were also questions about how well IR understood that a key policy goal was supporting R&D companies by providing them with funding. Some questioned whether IR's role was too focused on telling businesses how to cost activities that had been assessed for eligibility and approved at the GA stage—"[they] are less interested in supporting R&D companies and more about ensuring compliance and safeguarding the government purse." Emphasising that maintaining integrity in the tax system needed to be balanced against the type of message received by the business community on the RDTI's policy intent, one informant commented:

> *"I've had experiences with the Inland Revenue and I continue to have them and no doubt they'll continue into the future where you've got a person who you think who feels like they're giving away their own money and the immediate answer is always no. And then you'll tell them something and it's like they just don't believe you. So you've got this absolute audit mindset at Inland Revenue. If you go back to the policy and you go, well, the idea is to give money to taxpayers who are doing good R&D (that) has been approved. The view of Inland Revenue is definitely policeman and that is going to be very hard to change (...) it gets pretty tenuous sometimes when the assessor at Inland Revenue just doesn't believe what you're saying."*

Stated implications of delays in SR processing included cashflow problems for cash-constrained businesses, firms taking out high interest short-term loans from commercial banks, cuts in R&D budgets and activities (i.e., the opposite of the policy intent), lay-offs within firms' R&D function; business uncertainty, a tendency to submit more conservative RDTI claims in subsequent years to avoid contests, and exiting the scheme.

Interviews with IR officials offered an alternative perspective on the delays in SR processing reported by business and advisory firms. On one hand, some IR informants acknowledged there was variability in approaches across compliance officers; for example, new team members not customising template letters or questions to customers. To manage workload, IR also said they had a framework that categorised risk of non-compliance in customer returns. While confirming that such a framework was utilised, IR said they did not comment or share details on the nature of this framework. On the other hand, beyond these points, IR said there were other issues which they had less control over. For instance, IR said they had a general target of processing SRs within 10 weeks. However, this was a moving and largely uncontrollable target that depended on how quickly customers responded to requests for information, and whether responses raised further questions. One customer compliance specialist said they typically had 10-13 returns on hand at a time. They prioritised in accordance with oldest return first and thereafter, which customers responded quickest with information. IR informants said they had some customers from 2021 that they were still waiting on information from. They said that a slow (or no) response indicated the customers did not like the way their case was going. This partially aligns with insights from firms and advisory firms that said that firms can become despondent, view the process as too difficult and withdraw from engaging with IR out of frustration, or because they see their claim amended down to an insignificant amount. IR informants said there were a range of other issues that contributed to delays in processing returns. These included:

- Poor quality returns where former Growth Grant customers don't appreciate the raised bar of the RDTI. IR said some customers mistook understanding R&D for understanding the RDTI.
- Customers not attaching workbooks, depreciation schedules and other relevant support information upfront with the return. IR officials said that when everything was included there was generally a quick turnaround.
- Advisory firms or customers providing piecemeal or partial responses to RFIs.
- Technical review hold-ups stemming from differences of opinion between IR legal and technical specialists versus advisory firms on interpretation of the legislation. This could relate to interpretation of key exclusions such as commercial production, internal software development, and feedstock.
- Disentangling grants in cases where the customer has an R&D or innovation grant, and this has been misunderstood or not disclosed to the advisory firm or IR.
- Manual processing of high workloads. IR informants said processing of returns was still a highly manual process that took time. Compliance and customer engagement on GAs was almost wholly done through phone calls, email and the myIR platform. Site visits were very rare at the SR stage, although still common for CAM reviews. Notably, low levels of technological sophistication seemed to be impacting the customer experience. For instance, some firms said myIR did not allow for tracking of conversation threads relating to returns, while one advisory firm explained how reliance on a limited system and manual processing contributed to delays within the scheme.

"The difficulty is the current mechanics of the myIR system (…) if you have any (GAs) that are open for assessment, you can't actually use myIR to submit your Supplementary Return, which is a real mechanical flaw in the process because you have to submit a paper return. We submitted a paper return back in April for one client. We've been told that it's a lot of work to get that data into myIR and it's in a backlog. So, we're now six months after the fact and it still hasn't been uploaded by IRD to myIR. We could have put it in there ourselves to save them that work back when we submitted. But because of this requirement to have all your GAs approved before you put the data in, there's a few mechanical pieces."

7.2.5 Supplementary Return average handling times

Table 24 reports that the average handing time of SRs (calendar days) have decreased over time. These figures are most relevant/useful in earlier years. In later years, and particularly 2024, the averages exclude the slowest and most challenging SRs. Handling times vary somewhat based on eligible R&D expenditure, with slightly longer average handling times for middle-expenditure firms. We also looked for, but did not find, a discernible difference in SR handling times between firms doing software R&D and those not.

The change in average SR handling time from 2020 to 2023 (189 days to 45 days) affirms processing improvements reported by interviewees. Handling time at the bottom (i.e., fastest) quartile of SRs fell dramatically from 106 days for SRs relating to the 2020 income year to 5 days for SRs relating to the 2023 income year. There were also handling time improvements at the top (i.e., slowest) quartile of SRs from 241 days to 69 days during the same period.

However, consistent with firms and advisory firms' experiences of unpredictability regarding SR processing, there remain large handling time differences between SRs processed quickly and those processed slowly. For the 2023 income year (latest year with reasonable SR coverage), the handling time at the top quartile (69 days) was almost 14 times greater than the handling time at the bottom quartile (5 days).

7.2.6 RDTI team coherence and operational gaps

There was almost unanimous agreement across stakeholders interviewed that the CI and IR teams had distinct roles, the roles were complementary and well aligned, and that overall, the RDTI team were working collaboratively and in partnership. Team members across both agencies spoke of the "immense trust" and mutual respect, reliance on each other's expertise, and the open and efficient communication when required. Communication and engagement were both ad-hoc and informal to assist with case management, as well as formal via cross-functional collaboration, secondments and meetings (e.g., concerns and actions, alignment, and steering group meetings). CI had their own budget and responsibilities and were satisfied their role was no longer perceived as a type of service provider to IR, an operational framing issue that had been highlighted in previous reviews. There was an updated and continuously evolving—said to be getting simpler and better—operational MOU that both Callaghan and IR team leads were satisfied with. A main area of focus within the MOU is detailing procedures for sharing information. Customer and advisory firm input largely corroborated these views, suggesting that there was no longer ambiguity around the respective roles of CI and IR and what they should be focusing on. In general, scheme administration was said to be "smoother" and more aligned as the teams had "figured each other out".

Notwithstanding the improvements in overall team coherence, operationally there appears to be scope for the CI assessment team and IR compliance team to work more closely together. More precisely, in reviewing scheme administration, the main finding is that there appears to be an issue with how approved activities are being interpreted as eligible expenditure at the SR stage. Ultimately, the evidence indicates there is a gap in this process that needs to be addressed with closer operational collaboration to deliver greater certainty and efficiency within the scheme. Specifically, more technical expertise and capacity may be needed at the SR stage and/or, due to time lags between the processing of GAs and returns, more consideration (or line of sight) of expenditure may be needed at the GA stage. We expand on these two issues.

Table 24: Average handling time of Supplementary Returns approved (calendar days)

	Filing period					
	2020	2021	2022	2023	2024	Total
Total # of firms	556	577	851	801	99	2884
Expenditure bands						
$1 - $49k	154	75	36	91	3	95
$50k - $99k	180	116	101	44	29	116
$100k - $299k	197	100	86	46	12	105
$300k - $999k	185	119	92	43	15	97
$1M - $5M	198	134	102	45	13	96
$5M +	173	137	73	51	12	84
Avg. handling time	189	116	92	45	14	100

Note: These figures refer to calendar days, not working days, and use data provided by Inland Revenue in August 2024. Only completed SRs are included. The truncated nature of the data means that average handling times are significantly under-estimated in most recent years.

Insufficient technical expertise at SR stage

Some IR informants said their team was sufficiently resourced, but did not have the right resourcing. They said people could be seconded to help with processing tasks when workloads required it, but technical expertise remained low. There are reportedly 23 staff in the IR compliance team, but there are only 2 FTE technical experts and 2.5 FTE legal experts. Some IR staff said they needed more of this expertise. This is not surprising given there is such reliance on these technical and legal experts to help resolve the more complex cases at both the GA and SR processing stages. The following comment illustrates this point:

> *"The team itself I think it's probably big enough. I'm not sure that it's necessarily got the right people in it. Some of the work that's needed to understand the R&D and the claims that are made is quite complex. It requires quite a lot of time, and that's not something you have (with) someone whose job it is to process things quickly."*

There was evidence of positive outcomes when IR had access to additional technical resourcing. For instance, there has recently been a secondment from the CI assessment team to IR to help with SR processing. This appears to have been valuable and well received by all, and another secondment is planned. Two CI informants commented:

> *"Connection and coming together always is going to yield a better result and every time we've dipped our toe in the water of helping with SRs we've found it's got better and better."*

> *"Sometimes looking through that expenditure report can likely be made an awful lot easier if there's somebody technical there to explain how it links to the R&D that was described three years earlier in an application."*

The CI assessment team are also beginning to get some SRs for review outside of formal secondments which is a new development—"for the first time, we're getting sent some Supplementary Returns to have a look at. So, we're applying technical eyes to that Supplementary Return process in the hope that we can help with some sticking points." The CI assessment team believe that some of the processing and customer experience improvements they have achieved at the GA stage could add value to the processing of SRs. They expressed a willingness to play a greater role at this stage of the scheme. Summarising how additional technical assistance could add value and greater efficiencies at the SR stage, one CI informant stated:

"Sometimes when Supplementary Return assessment is not simply an accounting process, you'll have to basically look at some piece of R&D work that's happened and reference it back to a General Approval, which is actually quite a technical document. It's talking quite detailed about some of the R&D plans. How is an accountant really confident in saying, this receipt, this account I see here, is that piece of work that's described in the General Approval there? That's quite a difficult thing and it might lead them to ask a question that the business sees as weird or unreasonable. And then you start this exchange, right, that goes back and forth that costs both the customer and the RDTI some time."

Insufficient consideration of expenditure until SR processing

Processing times of GAs have improved but it is questionable to what extent this can benefit the customer experience across the overall scheme if there are delays and inconsistencies at the SR stage. Insights from IR informants indicate that improvements in GA processing times are not necessarily being capitalised upon at the SR stage and may even be contributing to slower SR processing times. This is because IR compliance officers are not always clear how expenditure claims map onto approved activities that may be too broad. This point is illustrated in the following comments from IR informants:

"Someone comes to me with the claim, and I look at the expenses, and I look at what's been approved, I think, I don't understand. There is no way, the application or the approval is just so broad that it's impossible to figure out what the approved activities are. And so we've spent quite a lot of time talking to the Callaghan team to say, these sorts of things are causing us problems and we need a lot greater clarity when it comes to what has been approved, so that we can then apply our minds to the expense claims and whether the expense claims are correct or not."

"(They have) to get to the bottom of some of these really complex things and that kind of leads to approving what's been put in front of them, which then leads down the track to the difficulties that we have when we say, well, it's not clear what has been approved, and so how am I supposed to figure out whether expense X relates to the approved activities if I don't understand what the approved activities are?"

Likely compounding this issue is the time lag between activity approval and SR processing, meaning IR compliance officers are also considering things in retrospect. As explained by an IR informant:

"I'm always working in the past. So, you know, someone gets their GA approved (and) a year later they file their return. Six months later, somebody might come to me and say, help me out with this claim. So, it's already 18 months or longer before I get to see the expense claims. And then it can take quite some time to resolve those expense claims."

Thus, in addition to the aforementioned forward integration in the scheme where CI assessors with technical expertise are helping with SR processing, it appears that IR compliance officers are also reaching backwards to connect with CI assessors and revisit certain approved activities. According to IR, these discussions are always constructive, and the CI assessment team are very open to feedback.

"We're able to sit down with the Callaghan team and say, this is the problem that we're having when we review the expenses and this is why we need a lot more clarity in the applications and the approvals. And the people that we're dealing with on these particular cases, you know, they've got it, like, they can say they've already sort of probably come to that conclusion themselves."

However, IR are ultimately responsible for final approval of GA recommendations. As explained by an IR informant "you know, IR is going to take some responsibility for that, because it's IR that's accepted the recommendation and approved something that's not clear." This draws attention to the level of oversight or insufficient consideration given to expenditure when assessing activity eligibility. While it is a fact that activities are the focus of the approval process at the GA stage,

arguably it is problematic if consideration of associated expenditure (from a SR mindset) is being overlooked at this point in the scheme (i.e., in real time).

We learned that GA assessments brought to formal alignment meetings, and CAM approval processes, are given significant attention and collaborative oversight by both CI and IR. As illustrated by the following comment, it appears that this process works well:

> "Every time we've worked with IRD...., (the) significant performer regime (is) a wonderful example. Side-by-side working. Literally talking expenditure, talking research and development activities, working in harmony with each other that's yielded a much better experience for the scheme operationally."

However, we also learnt that approximately 95% (or higher) of GA recommendations from CI are accepted by IR, sometimes within days. Thus, there is a possible question about the extent to which IR are engaged with what has been approved in a way that enables them to interpret approved activities at the expenditure assessment stage, which is often over a year later. To illustrate this point, several firms commented that IR—or, more specifically, attention to expenditure—appeared less relevant at the activity assessment stage and some suggested it would be helpful if these were more prominent at that approval point.

> *"With the GA process, after we submitted, I think it's probably about seven months, they (IR) raised an issue with our application around commercial production. So, they'd raised a concern about that, but it felt like that was being raised really far after. Like, they had came in, they talked to us in person. They knew what we were all about. We'd submitted the GA. It had been approved. Now, we're submitting the supplemental return, and they're reviewing it, and they're questioning commercial production. So, it just felt like it was quite far along, and that commercial production is really questioning everything that we've submitted."*

> *"From my perspective, IRD generally will follow Callaghan's lead. So, Callaghan's actually doing all the hard yard work and IRD, they are just waiting for their call to say, you know, if they say yes, that they will release the payment. So, IRD…have the software rights for the submission process, but apart from that, Callaghan, they are the one actually looking after this scheme."*

> *"Have (the) SR team work with the Callaghan team at the assessment, right up front because we kind of know what our costs are likely to be, it's more the quantum and when. So we know that we're going to have staff, we're going to have developers, we're going to have testers, we're going to have project managers, we're going to have, you know. We also know that we're going to contract in….I think it would be really good if…IRD was part of the team and they went, oh, okay, yeah, well, I remember we had this discussion with XXX about his employees, and so then it could probably flow a bit quicker."*

According to IR, both administering agencies are working together to improve how approved activities at the pre-approval stage are being interpreted as eligible expenditure at the SR stage.

7.2.7 Opportunities for improvement

In evaluating how effectively the scheme is being administered, several areas for improvement are identified. Broadly, we find that the scheme is being administered well and has continued to make improvements in key areas identified by previous reviews. However, the scheme could be administered more efficiently, and the customer experience could be better. For customers to navigate the RDTI effectively, they must have access to sufficient technical/scientific and financial/accounting expertise. The same expertise is needed to administer the scheme effectively. From an administrative perspective, there is an argument that these skill sets remain too detached, resulting in a detrimental impact on customer experience and the efficiency of the scheme. Overall, in terms of administrative challenges, it appears the pendulum has swung, with problems shifting from the initial overly restrictive application of eligibility tests (i.e., GA processing) to delays and unpredictability in the processing of expenditure returns (i.e., SR processing). This finding is by no means solely directed at, or the responsibility of, IR. We find that the issue primarily stems from

broader operational and resourcing issues relating to how approved activities are interpreted as eligible expenditure at the SR stage.

Operationally, there appears to be scope for CI and IR to work (even) more closely together. For instance, some informants suggested that a single RDTI team be formed, with the CI teams joining the IR team in one RDTI team within IR. While this suggestion could be considered, irrespectively, we believe two areas for improvement worth considering are 1) better alignment between GA and SR processing; and 2) support for, and improvements in, SR processing. Further opportunities for improvement include 3) resourcing support for the CES team, 4) greater discretionary powers for the tax commissioner, and 5) some clarification on contentious legislative exclusions.

Better alignment between GA and SR processing

Without creating additional compliance costs, ways of incorporating expenditure estimates/ mindset/ skills in GA processing should be explored. It appears that scheme efficiency would benefit if SR processing were less reliant on "living in the past" and disentangling recent expense from prior activity approvals from earlier years. Potential improvements may include having IR officials more engaged from an expenditure perspective at the GA stage, or engaging the private accounting industry to work with firms on developing expenditure estimates alongside their activities (e.g., developing an RDTI expenditure software tool that would give everyone – firms, CI and IR – more confidence when processing returns). As noted, commercial software has been developed specifically to help firms with their Australian R&DTI claims.

Support for and improvements in SR processing.

Insofar as is possible, and without jeopardising the integrity of the tax system, IR could reduce inconsistencies and delays in SR processing times. This may include implementing training and practices that reduce variability across compliance officer approaches, reviewing practices around RFIs, and providing greater transparency to customer firms and advisory firms on return processing times to reduce uncertainty. Increasing the resourcing of technical/legal expertise within IR and/or having CI technical experts more formally involved in SR processing could also be considered. While secondments by CI technical experts have proved beneficial, they are transient and may be insufficient in the medium to long-term. More generally, CI could consider opportunities to work more closely with IR to ensure the pre-approval process improvements they have achieved do not create problems later in SR processing. Without this, a sharp distinction between the respective roles of CI and IR may re-emerge, and this will be unhelpful for the overall scheme.

Resourcing support for the CES team

Interviews indicated there are R&D performing firms that remain unaware of the RDTI and others that do not understand it very well. Alongside these views, the CES team expressed concern about the firms they miss out on engaging with. They also said that pursuing earlier engagement (i.e., pre-enrolment) with firms was a priority for their team. Building on these insights, it is important that the CES team are equipped with sufficient resourcing and expertise to continue to engage early, effectively, and potentially more broadly, with firms. The CES team are an important constituent within the RDTI. They help to increase awareness and understanding about the scheme, particularly among smaller firms. They may also help to reduce compliance costs to the extent that "theoretically the engagement (team) could educate the customer well enough that they actually wouldn't need to use professional services." Resourcing support for the CES team will become even more pertinent if there are any legislative changes that make the scheme more attractive and relevant to low R&D expenditure or smaller firms.

Tax commissioner discretion

IR, customers, and advisory firms agreed that there may be advantages in allowing the tax commissioner a greater degree of discretion. Several firms commented that they struggled with tracking deadlines for filing returns, and it was a constant worry for them that they would accidently miss a submission deadline, which occasionally occurred. Other firms said they had difficulty accessing their claim as they registered within the scheme under a parent company name but did the R&D within a daughter or subsidiary firm with a different name.[50] As detailed in the comments below, these issues are also noticed by IR (first quote) and advisory firms (second quote). These stakeholders said the tax commissioner could have greater ability to apply discretion to resolve minor administrative problems that increase compliance costs unnecessarily.

> *"Most of my work is trying to apply the legislation, it's really, really complex. And there's some really tight timeframes that if you miss your timeframe, you're just out of luck. I know that the reason for putting them there is to stop what's happened in other countries where professional services firms tout for clients and say, hey, we can get you a tax credit going back the last five years. So, our policy team decided to put strict timeframes in to prevent that (but) that can lead to some pretty horrible results if you miss by a day. So, it would be good to see some ability to have a bit of discretion around that sort of thing…we've got no discretion to accept late returns."*

> *"Inland Revenue have interpreted the law as meaning that they have very little discretion in their application of the law, locking out people or creating problems where in other areas of tax, the commissioner will use discretion and say I will accept that. Some (firms) get denied access to the regime who are doing high end R&D but made an error (due to a) misunderstanding. Parent and daughter company, the R&D was being done in daughter company and it was by accident registered in the parent company and got completely denied, they say hands are tied, no discretion. Missing a filing deadline by mistake when everything [has been] done correctly…the commissioner needs to apply some more discretion where things are overwhelmingly the right thing to do rather than being overly rigid and fixed…having the commissioner have discretion has to be brought in. That's something which is a real problem at the moment."*

Legislative clarifications

Some IR officials said the legislation around internal software development needed to be "scrapped and replaced with something else". They also said that lowering the $25m limit could help to "reduce fiscal risk" around this issue. IR officials said greater consistency around the treatment of grant expenditure, regardless of what organisation it came from, would help to streamline the processing of returns.

7.2.8 Alternative administrative consideration

With a view to establishing whether the current administrative approach is effective, we were also asked to consider the potential for an alternative administrative setup. We do so by expanding on the advantages and disadvantages of a single operational team, which could include the CI team joining IR. Currently, the RDTI scheme employs a dual agency operational model (MBIE is not directly involved in the administration of the scheme). The following discussion should not be interpreted as a recommendation that a single operational team be formed—it is merely an outline of likely advantages and disadvantages of an alternative administrative setup.

Most OECD countries administer their R&D tax incentive schemes through a single institution, typically the national tax authority or Ministry of Finance (OECD, 2024a). Of the existing R&D tax schemes, 40 operate under a single-agency model, 26 involve two agencies, and 6 rely on multiple agencies (OECD, 2024a). In cases where a dual-agency model is used—such as in Australia, Austria,

[50] This specific issue has since been remedied in legislation.

Germany, Iceland, the Netherlands, and Norway—it most often involves a partnership between a financial authority and an innovation or science agency (OECD, 2023). We highlight some key opportunities and challenges associated with a single agency model for scheme administration, drawing on academic literature and international case studies.

One set of advantages arising from a single agency model concerns information. An evaluation of Iceland's R&D tax incentive scheme highlighted that a dual-agency model can lead to communication challenges between agencies, particularly due to the confidential nature of tax returns (OECD, 2023). Similar concerns have been identified in Australia's R&DTI, where "the inability for the co-administrators to share information causes frequent delays to review processes and results in inefficiencies, duplication of work/information requests and increased costs for companies" (Australian Board of Taxation, 2021, p. 32).

The legislation governing the RDTI scheme in New Zealand helps overcome some of the inherent communication challenges in dual agency structures. The RDTI legislation allows for IR to disclose necessary tax expenditure data to CI for the purpose of determining the appropriateness of R&D expenditure. As implied above, this allowance is critical for the agencies' collaborative relationship. However, given the confidentiality requirements surrounding tax information and commercially sensitive R&D expenditure, there are reasonable limitations on cross-agency information sharing. Consolidating these functions within a single agency could improve the efficiency of processing SRs while addressing some of the communication challenges and security risks associated with a dual agency model.

Consolidating taxation, legislative, scientific, and administrative expertise within a single operational agency could also improve the customer experience. This approach would create a single point of contact for businesses, reducing the need to interact separately with CI for GAs and IR for SRs. Some businesses have reported difficulties navigating the scheme, in part due to the separation of expertise and the knock-on effects we have discussed for assessment of expenditure at the SR stage. A single-agency model could streamline services, offering a more efficient and comprehensive customer experience throughout the RDTI process.

Conversely, many R&D firms have long-standing relationships with CI, having accessed other R&D grants, received training, or attended events. These connections may not easily extend to IR. As a tax agency, businesses may be reluctant to engage with IR as openly as they would with CI, which could discourage them from asking certain questions or sharing information. This likely explains why many dual-agency schemes appear to rely on the scientific agency to handle the majority of customer-facing interactions.

A further limitation of the single-agency model is the potential for resourcing and expertise constraints. Under the current structure, each agency has developed significant technical expertise in its respective domain—Callaghan Innovation in engagement and technical assessment, and Inland Revenue in tax administration. Transitioning to a single-agency model would require a substantial transfer of personnel and skills to IR to ensure that engagement and technical expertise are maintained within the institution (Australian Board of Taxation, 2021). As with any structural reorganisation, there is a risk that specialised talent may not be retained, long-standing working relationships could be disrupted, and IR may face funding challenges in managing an expanded scope of responsibilities.

While IR has a strong reputation for tax administration, it is not traditionally recognised as a hub for scientific and technical expertise. As a result, highly skilled innovation, scientific, and technical professionals may not be naturally drawn to roles within IR. Moreover, studies from Norway and Spain indicate that financial authorities in these jurisdictions have faced challenges in determining whether activities qualify as R&D under their respective regulations (Benedictow et al., 2018).

Inability to evaluate the appropriateness of R&D spend may increase fraudulent claims, non-compliance, and a misuse of funds (Benedictow et al., 2018; HM Revenue and Customs, 2023). Retaining CI's expertise is critical, as without sufficient scientific and technical knowledge within IR, a single agency model would almost certainly compromise the overall quality of scheme administration.

Lastly, a recurring theme in international evaluations and stakeholder interviews is the importance of stability to build certainty in a R&D tax incentive. Despite the identified weaknesses of Australia's dual-agency administrative model, stakeholders were "strongly supportive of the dual-agency administrative model continuing" to avoid the "increased uncertainty, confusion and increased administrative burdens involved" in transitioning to a single-agency model (Australian Board of Taxation, 2021, p. 22). Similarly, a review of the Norwegian SkatteFUNN reported that "stability over time was important to maximize the scheme's impact" (Benedictow et al., 2018, p. 5). New Zealand businesses express a strong preference for policy and regulatory stability to help build trust in government support schemes and encourage long-term investment (Business New Zealand, 2023). As we have outlined, this preference extends to the RDTI. Uncertainty regarding application processes, review procedures, or scheme management can deter firms from applying or increase compliance costs for those that do. Any changes to the existing administrative structure should be carefully considered to minimise disruption and maintain confidence in the scheme.

7.3 Are taxpayers complying with legal requirements?

Evaluation Question E asks "*Are taxpayers complying with the legal requirements of the scheme, particularly those designed to ensure the funds are being used to support actual R&D?*" Comprehensively answering this question requires review and audit powers beyond those granted to us for this evaluation.

Although IR were forthcoming with time, expertise and data that fed into other parts of the evaluation, they shared rather limited information in response to key questions relating to non-compliance. Information has not been recorded by IR relating to the number of site visits and virtual audits of business R&D expenditure that have been conducted. We also requested but were not granted information about IR's approach to risk profiling entities and expenditure, their methods of selecting claims for in-depth review, and the rate of disallowed expenditure and amended Supplementary Returns during the schemes' first two years. The extent to which we can speak definitively in response to Question E is limited by a lack of information in these areas.

Our evaluation considers evidence in three areas which provide some insights that taxpayers are complying with legal requirements. First, all of our interviews with firms asked about this issue explicitly. We did not encounter first- or second- hand reports of non-compliance. Second, many SR claims appear to have been reviewed vigorously, resulting in a significant amount of revisions to exclude non-R&D and include R&D. Third, the RDTI's provisions for mitigating non-compliance seem strong relative to international norms, particularly when compared against overseas schemes where significant fraud has been identified.

To thoroughly assess the compliance of firms, as well as the effectiveness of the RDTI's legal provisions and administrative efforts against non-compliance, it may be necessary to commission a compliance audit as the RDTI matures.[51] Any future audit should be empowered to gather necessary evidence.

[51] For example, the Auditor General's 2021-22 assessment of the Australian R&DTI conducted an ex post compliance audit of years 6-10 of the Australian R&DTI scheme (Australian National Audit Office, 2021)

7.3.1 Noncompliance insights from qualitative interviews

All interviewees were asked about the risk of non-compliance within the scheme. The qualitative data indicates that instances and risk of non-compliance are minimal. Aside from a small number of firms (~10%) saying there was always a possibility of fraud emerging in such incentive schemes, most firms said there are sufficient perceived controls, checks and balances in place. Several firms believed that businesses would need to be very determined and highly motivated to attempt to benefit fraudulently from the scheme.

Approximately 20% of firms said the level of due diligence was excessive and that "a lighter touch" and taking "a few steps out would not increase the level of fraud risk." Common views among these firms were that 1) a proven track record in R&D activity and spend within the scheme should be considered, and 2) the potential reputational damage of doing anything fraudulent was already a significant deterrent.

Insights from advisory firms largely mirrored these views from business, with virtually all advisory firms saying the risk of non-compliance was low and they did not encounter any non-compliance. Several advisory firms said the labour-related tax cap on the refundability of credits could be reviewed as this control was challenging for many businesses, particularly deep-tech start-ups. CI informants said there was a "really high barrier" to fraud, and outside of one or two extreme cases, they believed the two-step review process and complementary skills between CI and IR served to reduce the risk of non-compliance considerably. The following insight from a CI informant illustrates this point:

> *"We've got these completely orthogonal skill sets and backgrounds in either the technical science area and then a kind of financial, almost investigative financial area, accounting. I think this is a real asset for our assessment setup in terms of protecting against fraud. For example, we'll have something where an application is written, satisfies all the criteria perfectly well. There's nothing about the written application that looks unreasonable from the point of view of eligible R&D. However, Inland Revenue might spot, when they're looking at the entity eligibility, the address of this application is a car park on the edge of town. (They ask) can you look a bit closer at the R&D just to check? No, the R&D is absolutely fine as written. So, this is a case where we'd say, well, Inland Revenue have seen something that gives us pause. In this case we actually asked for a visit to the site to see some of the labs, meet some of the staff and it turned out that that meeting never happened because that was actually a genuine attempt at fraud. It's very rare, but the fact that on our scheme, you have to get past basically these two layers of entirely orthogonal requirements, which is to satisfy the kind of legal entity, financial side of things, and talk the language of a scientific expert who has tens of years' experience in R&D in your industry. That's a really tall order for people to achieve. And if they do that, it's still only a pre-approval. They've still then got to show evidence of having done that work later."*

IR provided further support for the above views. As one IR informant commented, "when the money goes out, I feel quite confident that it's correct and it's eligible and it is actually R&D." Another informant, commenting on the various steps in the approval process from enrolment through to the expenditure review, said "I'm very happy there, everything's checked along the way…the integrity measures we've got are great." Other IR informants said they were satisfied New Zealand's RDTI was not experiencing fraud like some similar schemes internationally were.

In terms of IR's due diligence processes, while CAMs usually involved a site visit within the approval period, site visits for GAs during expenditure reviews were said to be "rare". According to IR, site visits are used during GAs and SR reviews where the assessment teams need additional clarity regarding expenditure or activities. Due diligence was primarily carried out through phone calls, email and myIR. Key drivers for this approach were time and cost. IR informants stated clearly that the processing of SRs was not an audit, rather they were reviews of expenditure that took place in consultation with the customer firm or advisory firm.

Table 25: Approval Rates for General Approval applications and Supplementary Returns

	Application creation year (GAs)/ filing year (SRs)						
	2020	2021	2022	2023	2024	2025	Total
General Approvals							
Approved	14%	64%	92%	96%	95%	96%	93%
Denied	36%	12%	5%	5%	2%	0%	3%
Discarded	50%	25%	3%	3%	3%	4%	4%
Supplementary Returns							
Approved	87%	96%	94%	95%	94%	-	93%
Denied	13%	4%	6%	5%	6%	-	7%

Notes: Figures calculated based on data provided by Inland Revenue. The rate of denied Supplementary Returns includes claims which are recorded by IR as "Approved" but where eligible expenditure was reduced to zero upon review. Firms that have not yet submitted a return or who have decided against doing so, are not included in the Supplementary Returns Approved/Denied calculations.

> *"If you talk about audits, we don't technically, if we've got a discrepancy, we don't open an audit case. We will work with the customer to get the returns right. So every customer gets a financial review on the SR."*

Several IR informants said no disputed cases had gone through the courts to date or were planned to go through the courts. However, one compliance officer said some cases they were currently working on could end up in the courts, although that was likely some time away.

> *"I suspect that some of the cases I'm working on now may end up through the courts because there's some really fundamental differences and opinion about the eligibility rules for expenditure…unfortunately, the way the wheels grind, that could be several years away."*

7.3.2 Approval rates for RDTI applications and returns

The RDTI's early implementation briefing, following the PWC (2020) review, reported a SR approval rate of 44% for 2020 and a General Approval rate of 20% for 2021. These approval rates were based on part-year figures at an extremely early stage of the scheme. As Table 25 demonstrates, the approval rates for both GAs and SRs have increased very significantly, affirming the qualitative evidence outlined in the previous sections.[52]

7.3.3 Revisions of Supplementary Return expenditures

Despite a high rate of SR approval, there is evidence of vigorous review of approved SRs resulting in significant implications for specific types of firms and R&D expenditures. Table 26 shows the number of SRs amended in 2022 and 2023. In total, 18.5% of 2023 returns and 43.3% of 2022 returns were amended.

In 2022, SRs involving lower eligible R&D expenditure amounts were more frequently adjusted. Over 50% of Supplementary Returns involving between $100k and $250k of R&D expenditure were revised, compared to 30% of returns claiming over $10M. Furthermore, 15% of expenditure in the $100k to $250k range was disallowed, compared to just 0.4% of expenditure from SRs involving over $10M of eligible expenditure.

[52] In Table 25, it may be inappropriate to read too much into the distinction between "Denied" GA applications and those "Discarded"— in many instances, these cases may have been heading down the same path.

Table 26: Revisions of 2022 and 2023 Supplementary Returns filed

Expenditure Band	SRs filed	SRs amended	% SRs amended	Total expenditure	% disallowed expenditure
2022					
All Supplementary Returns	846	372	43.31%	$1,559m	2.35%
$100k and below	86	37	43.0%	$5.6m	11.2%
$100k to $250k	139	70	50.4%	$24.0m	14.5%
$250k to $500k	163	75	46.0%	$59.5m	7.0%
$500k to $1M	170	72	42.4%	$120.0m	4.0%
$1M to $5M	225	106	47.1%	$459.7m	4.3%
$5M to $10M	36	5	13.9%	$228.6m	0.6%
$10M+	27	8	29.6%	$661.5m	0.4%
2023					
All Supplementary Returns	701	130	18.5%	$1,248m	0.7%
$100k and below	60	13	21.7%	$4.0m	7.76%
$100k to $250k	107	16	15.0%	$18.6m	2.14%
$250k to $500k	130	31	23.9%	$47.4m	1.20%
$500k to $1M	155	25	16.1%	$109.8m	2.35%
$1M to $5M	206	36	17.5%	$420.8m	0.84%
$5M to $10M	26	6	23.1%	$172.1m	0.93%
$10M+	17	3	17.7%	$475.8m	0.01%

Notes: These figures are differed to corresponding values for approved SRs in previous tables. This difference is due to the time at which IR undertook this analysis, which results in a slightly different set of records than those shared with us in August 2024.

By 2023, the amendment rate across expenditure bands was more consistent, ranging from 15% to 24%. However, the rate of disallowed expenditure remained higher for low R&D expenditure amounts. Expenditure for firms spending under $100k saw an 8% disallowance rate, while expenditure for firms spending over $10M had only a 0.01% disallowance rate.

Compiling these patterns required significant manual effort from IR, who did not have the resourcing to provide similar figures for 2020 and 2021. It would be unwise to speculate as to how the rates of amendments to approved SRs may have been different in these years.

Table 27 elaborates upon these trends by examining patterns of changes in claimed R&D expenditure at the project level between the first and last Supplementary Return project record in the LBD. This offers some further insights across the full five years about how RDTI project expenditures have been revised upwards or downwards at the Supplementary Return stage.[53]

[53] The table was compiled by looking at changes between different (first and most recent) versions of the Supplementary Return project records uploaded to the LBD. Records are transferred by IR to Statistics NZ twice annually (May and September), with each record offering a snapshot of a claim from IR's START system at that point in time. For this reason, the table likely underestimates the total volume of revisions, perhaps by a significant amount. This underestimation occurs because we only see a single record in the LBD if the Supplementary Return project was fully processed within the same upload period, regardless of how many revisions were made.

There are 13,317 records of 8,154 distinct projects observed in Supplementary Returns (mean: 1.63 records per project, median: 2, 99th percentile: 3). We find that most projects (n=4,872) have multiple records. 3,279 projects have a single record (to date). Table 27 summarises the patterns of revisions for 1,410 Supplementary Returns for which we see multiple records in which a revision is evident. The table highlights how most revisions involve decreases in total eligible expenditure, but there is also a notable proportion of increases (18.3%). From our interviews with IR claims assessors, we understand that this occurs when firms are made aware of unclaimed eligible expenditures. The expenditure increase can be significant in these cases (aggregate 25.3% of the original claim).[54]

Materials, consumables and overheads, followed by employee-related costs, were the most commonly revised—and most commonly decreased—expenditures. Aggregate decreases across the expenditure subcategories ranged from 16.3%-58%. Materials, consumables and overheads was also the expenditure category most commonly revised upwards, while there were large aggregate increases in revisions to contractor payments (n=171, agg. 92.7%), eligible depreciation (n=162, agg. 428.9%), and "any other expenditure" (n=39, agg. 783.9%). Instances of revisions involving commercial production expenditure, internal software, feedstock, and overseas R&D expenditure resulted in major aggregate changes, where they occurred (mostly downwards). Overseas R&D expenditure was the only expenditure area where revisions at the Supplementary Return stage more commonly involved increases than decreases.

7.3.4 Overseas instances of fraud

The RDTI's provisions for mitigating non-compliance seem strong relative to international norms, particularly those where significant fraud has been identified. Before a firm can claim the R&D tax credit, they must gain pre-approval from IR which confirms the eligibility of their R&D activities or systems. Many international schemes, including the Australian R&DTI, Canadian SR&ED, and UK's RDEC, have no equivalent general approval process (Business AU, 2025; Canada Revenue Agency, 2021; HMRC, 2023). Instead, firms are required to self-assess the eligibility of their R&D activities and expenditures. This can create uncertainty about eligibility, anxiety over misinterpreting guidelines, concerns about penalties or audits, inconsistencies in which firms receive tax credits, and situations where firms invest in R&D without assurance of qualifying for a tax credit. While supporting infrastructure does exist (SR&ED offers pre-claim consultations and R&DTI offers online tools), a firm may engage in their respective scheme without certainty of their eligibility and may undertake R&D which cannot be covered by the scheme (Canada Revenue Agency, 2021; HMRC, 2023).

After a Supplementary Return is submitted, IR's manual review helps detect errors and non-compliance, which likely increases the integrity of the system. Manual reviews of claims are not especially common in many international schemes. The Australia Tax Organisation may review claims for high-risk firms and the Canada Revenue Agency aims to audit each firm every 5-6 years (Auditor-General, 2021; Canada Revenue Agency, 2021). This 'lighter touch' approach can be observed in the rates of denied expenditure and amended claims. In the 2022 income year, 91% of Canadian SR&ED claims were approved in full, compared to 57% of RDTI claims (Canada Revenue Agency, 2024). A notorious case of non-compliance is the UK R&D tax credit, which has reportedly lost over £4.1 billion to fraud and error since 2020 (Labiak, 2024). HRMC estimates that 90% of expenditure claimed by small firms represented by a tax agent were non-compliant, in part due to a system where "computers automatically approved any claim" (Hailey, 2022; HM Revenue and Customs, 2023). To

[54] The aggregate figures reflect the ratio of revised expenditure to the original expenditure for firms subjected to a decrease or increase in claimed expenditure.

Table 27: Changes in Supplementary Return expenditure – First vs. most Recent Record

Expenditure category	Revisions	Decreased	% agg. decrease	Increased	% agg. increase
Total eligible R&D expenditure	1,410	1,149	17.6%	258	25.3%
Main project expenditure categories:					
Employee-related costs	906	741	23.7%	162	29.5%
ARP payments	39	27	16.3%	12	.s
R&D contractor payments	531	360	46.5%	171	92.7%
Eligible depreciation	474	312	41.3%	162	428.9%
Materials/consumables/oheads	1,071	810	37.0%	261	57.3%
Any other expenditure	195	156	58.0%	39	783.9%
Expenditure relating to defined rules/ exclusions:					
Commercial production	189	180	75.3%	9	.s
Feedstock expenditure	.s	15	100.0%	.s	.s
Internal software development	183	171	57.5%	9	.s
Overseas R&D expenditure	276	120	81.0%	156	111.2%

Notes: Values are rounded/ suppressed (".s") in accordance with Statistics New Zealand requirements. Total revisions may not exactly equal the sum of increases and decreases due to rounding.

address this, the UK has introduced additional information requirements and increased penalties for non-compliance, but levels of fraud and non-compliance remain higher than in other schemes.

The General Approval process, and manual review of Supplementary Returns are rare amongst R&D tax credit policies and are effective safeguards against error and fraud. A more thorough assessment of the effectiveness of the RDTI's legal provisions, and administrative efforts against non-compliance, will likely require an audit of this issue as the RDTI matures.

7.4 Alternative policy settings

The final component of the evaluation (Question F) considers how the findings presented so far might be different with alterations to certain policy settings. This includes three alternative policy settings specified by MBIE, as well as a hypothetical scenario that was also requested, involving Growth Grants continuing (instead of the RDTI) for the same 2020-2024 period. We begin by considering the three policy settings, before exploring the hypothetical continuation of Growth Grants.

The three policy settings are:

- The single rate for all businesses. Since the 2020 year, a uniform tax credit rate of 15% has been applied consistently across all eligible entities and expenditures.
- The cap on overseas expenditure. Expenditure on supporting R&D activities outside New Zealand can form up to 10% of an entity's total RDTI claim. Expenditure on R&D performed outside New Zealand must be integral to a core R&D activity conducted in New Zealand.
- The treatment of expenditure on software development. The RDTI treatment of eligible expenditure (based on the Frascati definition of R&D) has generally been less favourable for software expenditure than Growth Grants, where eligible R&D expenditure was based on accounting definition of R&D (expenditure on intangible assets not capitalised under IAS 38). Expenditure on bespoke software for internal administration, and

expenditure above $25m on internal software development, is also explicitly excluded from RDTI eligibility.

We consider each of these settings individually, beginning with the selection of appropriate counterfactuals. The choice of counterfactual settings were influenced by the evidence presented above, while also incorporating relevant academic literature and insights from overseas schemes. Broadly, our decisions began with the challenge posed by the current setting, before exploring a counterfactual that addressed the challenge in some way.

We then undertook a focused assessment of how the counterfactual settings would change our conclusions about the RDTI's input additionality. Under each of the three counterfactual settings, there are two mechanisms through which firm behaviour may change:

- The marginal cost of additional R&D expenditure is lowered, providing an incentive for firms to increase their volume of eligible R&D expenditure (an intensity mechanism); and
- The marginal cost of additional R&D expenditure is unchanged, but firms benefit from a "windfall" of additional support which may partly/wholly be spent on additional R&D (a scale mechanism).

Our calculations assumed that the primary impact of policy adjustments would be driven by the intensity mechanism. For the first two settings, we do not anticipate changes in R&D expenditure due to the scale mechanism. It seems unreasonable to expect additional R&D expenditure among firms receiving a windfall for R&D activity they were doing anyway. This means that we may understate the true impact of the counterfactual settings. However, the understatement may be reasonably minor in magnitude if additionality generated through the scale mechanism is small and/or longer-term in nature. Sensitivity checks suggest that the difference would be trivial if calculations added a factor to account for a scale mechanism.[55]

7.4.1 The single rate for all businesses

Most R&D tax incentives offer varying tax rates to provide greater proportional support for certain firm categories or expenditure types. These tiered approaches can include higher support for firms with lower R&D expenditure (e.g., France's *Crédit d'Impôt Recherche*), preferential rates for experimental and industrial research (e.g., the Italian R&D Tax Credit), or separate rates based on firm size (e.g., the Australian R&D Tax Incentive) (OECD, 2023; PricewaterhouseCoopers, 2025). Some schemes offer more generous rates for R&D undertaken in rural or economically disadvantages regions (Innotax OECD, 2023). Additionally, targeted schemes such as France's JEI/JEU offer more favourable terms to young firms and Portugal's Tax Incentives Scheme for Corporate R&D provides a higher rate for start-ups (OECD, 2023).

Most commonly, schemes will use a tiered system that provides greater benefits to smaller firms or firms with lower R&D expenditures. For instance, the Icelandic R&D tax scheme offers higher relief for SMEs than for larger firms (OECD, 2023). Australia's R&D Tax Incentive offers a refundable tax offset of up to 43.5%, and Canada's SR&ED tax credit provides a 35% rate for SMEs compared to 15% for larger-spend firms (Innotax OECD, 2025). Similarly, Norway's SkatteFUNN had previously provided SMEs with a 20% tax credit, whereas large firms received 18%. (A recent evaluation of the Norwegian scheme recommended eliminating these differentiated rates in favour of a uniform incentive structure (Benedictow et al., 2018).)

[55] Sensitivity checks assumed that firms maintained their R&D expenditure at 2-3% of revenue and that their marginal propensity to spend on R&D was the same as their average propensity.

Of the varying rates available, we prioritised a counterfactual scenario involving a higher (20%) tax credit rate for entities' first $300k of R&D expenditure and 15% thereafter. This was chosen to channel additional support to low R&D spenders. Section 7.1 outlined the factors that contribute to higher compliance costs for smaller R&D spenders, and that mean that that costs of doing R&D for this group may be reduced less by the RDTI. Higher compliance costs may partly explain the trends in Figure 9, where the level of uptake of the RDTI, and the extent of supported R&D expenditure, are lowest among low R&D expenditure firms. A higher credit rate for R&D expenditure below a certain threshold may result in a more consistent incentive regardless of R&D expenditure level, and may harness the greater responsiveness to R&D support among small spenders (e.g., Section 5.2.4).

To calculate the change in impact of this counterfactual, we began by isolating the volume of supported eligible R&D expenditure that would be impacted by a lowered marginal cost (i.e., the intensity mechanism). These figures are reported on a year-by-year basis in real terms in the third column of Table 28. To identify the firms and their R&D expenditures which would be affected by the higher 20% tax credit rate, we extracted the volume of RDTI eligible R&D expenditure for firms with less than $300k of annual RDTI eligible R&D expenditure in a given year.[56]

In addition to R&D expenditure that was already the subject of support, we also considered the potential change in uptake due to attracting non-supported R&D performers to the RDTI. We assumed that a higher tax credit for the first $300k of R&D expenditure would increase the take-up rate among small spenders (below $300k of average annual *RDExp*) to the level of take-up among those in the next highest bracket ($300k-$1m of average annual *RDExp*). We rated up the volume of supported R&D expenditure for small spenders by 1.06 to reflect anticipated higher take-up.

Next, to project the input additionality associated with the counterfactual settings, we calculated implied elasticities based on the input additionality treatment effect in Section 5.2.1. The implied elasticities reflect the responsiveness of firm R&D expenditure to a one-unit change in the "implied subsidy rate" (i.e., the pre-tax price reduction from the RDTI).[57] To calculate implied elasticities, we divide the percentage increase in R&D expenditure observed in treated firms by the implied subsidy rate. We then calculate the projected input additionality ("I.A." in Table 28) by multiplying the implied elasticity by (a) the change in the implied subsidy rate for impacted eligible R&D expenditure, and (b) the volume of R&D expenditure impacted (already supported + potential newly supported firms).

The higher 20% tax credit rate lowers the marginal cost of additional R&D expenditure only for firms with R&D expenditure below $300k, so we calculated a standalone elasticity for this subgroup. As discussed, low R&D spenders were particularly responsive to RDTI support (implied elasticity of -5.64). We then calculated the projected input additionality in two parts: first based on the 6.9% change in implied subsidy for R&D expenditure from firms already supported ($44.4m), and then based on the 27.8% change in implied subsidy for R&D expenditure in the projected additional uptake $25.02m). In combination, this suggests that a 20% tax credit for the first $300k of eligible R&D expenditure would have increased the additional R&D expenditure generated by the RDTI by

[56] We used firms' Supplementary Return records, supplemented when needed by estimated annual spend from pre-approval records.

[57] The implied subsidy captures the percentage pre-tax cost reduction in R&D following a decision to spend one additional monetary unit on R&D (i.e., "c/1-t", where "c" is the tax credit rate and "t" is the corporate tax rate). The denominator, 1-t, converts the 'after-tax' credit into pre-tax terms. The implied subsidy is the counterpart to the BIndex measure widely used in international and cross-country analyses of government R&D support (e.g., Appelt et al., 2019; Thomson, 2017). The implied RDTI subsidy rate for a representative NZ firm who can fully utilise the existing tax credit (i.e., not loss-making firms, firms spending below the threshold, etc.) is 0.208.

$69.42m (un-discounted) or 4%. This would be equivalent to less than a half of a percent increase in aggregate BERD in New Zealand during this period.

Moving further towards the right side of Table 28, we also recalculate the costs to government of providing further support. The $61.56m cost to the government of direct support from a higher tax credit rate is made up of a further 5% credit to all expenditure falling within firms' first $300k ($1,167.33m * 0.05) plus a 20% credit for firms with less than $300k of eligible expenditure whom we project would enter the scheme ($15.97m * 0.2). A proportional increase in RDTI indirect costs (which to date have comprised 2.7% of direct support), and a 20% deadweight cost of raising the additional funds, were also included.

When the additional R&D expenditure generated is weighed against the government costs, we suggest that there would have been a net negative impact of -$6.20m (PV, 8% SOC discount rate) from a higher tax credit rate for the first $300k of R&D expenditure. The negative net impact occurs because around 78% of the additional support would go to firms that spent more than $300k on R&D expenditure annually and whose marginal cost of additional expenditure would not change.

By necessity, the modelling of the counterfactual scenarios is coarse and overlooks many of the real-world complexities involved in a policy adjustment. For example, a higher rate for the first $300k of R&D expenditure might cause a redistribution of expenditures from entities with common ownership, as well as R&D joint ventures and partnerships. Limitations in our modelling may conceal major real-world flaws. We encourage more precise consideration of these and other issues as part of any real-world policy modification.

Broader implications.

Finding additional levers to increase incentives and uptake among small R&D spenders would appear to be consistent with the policy intent even though the RDTI already appears more inclusive than the previous Growth Grant regime. While there is evidence that the RDTI has stimulated R&D investment across all expenditure bands, the R&D expenditure of small R&D spenders appears particularly responsive. Once supported, there is a pattern of growth in support over time in R&D expenditure and number of supported R&D projects.

A higher credit rate for R&D expenditure below a threshold, as exists in other jurisdictions, would be one approach to boost RDTI support among low R&D spenders. This approach could plausibly offset higher compliance costs for low R&D expenditure firms, resulting in an incentive proportionate to midrange and high spenders. An obvious drawback, however, is that a higher credit rate could be quite inefficient in achieving this—most of the additional support would go to firms that spend more than $300k annually. This highlights that the tiered approach we explored has limitations when it comes to prioritising low expenditure firms. A tiered rate would also inevitably lead to greater administrative and compliance complexity, undermining the simplicity of a uniform 15% tax credit.

Table 28: Projected changes in impacts and government costs under counterfactual policy settings

Setting	Year	Impacted RDExp. supported firms ($ m)	Projected change in uptake ($m)	Projected I.A. ($ m)	% of overall RDTI I.A.	Govt. direct support costs ($ m)	+ Indirect and deadweight cost ($ m)	Net impact ($m PV, 8% disc.)	Net impact ($ m PV, 15% disc.)	Net impact ($ m PV, 2% disc.)
Single rate. 20% credit first $300k eligible RDExp.	2020	35.06	2.27	9.87	6%	7.05	8.69	1.60	2.06	1.27
	2021	42.89	2.78	12.07	5%	8.45	10.41	2.10	2.53	1.77
	2022	53.48	3.46	15.05	4%	13.75	16.95	-2.21	-2.50	-1.97
	2023	59.30	3.84	16.69	4%	16.33	20.13	-3.72	-3.96	-3.51
	2024	55.90	3.62	15.73	3%	15.98	19.70	-3.97	-3.97	-3.97
	Total	246.63	15.97	69.42	4%	61.56	75.88	-6.20	-5.84	-6.41
Overseas expenditure. Capped at 50% of total claim	2020	11.43	0.00	1.63	1%	2.42	2.98	-1.85	-2.37	-1.47
	2021	14.63	0.00	2.08	1%	2.48	3.05	-1.23	-1.48	-1.03
	2022	22.93	0.00	3.26	1%	4.28	5.27	-2.35	-2.66	-2.09
	2023	26.64	0.00	3.79	1%	4.42	5.45	-1.79	-1.91	-1.69
	2024	26.64	0.00	3.79	1%	4.42	5.45	-1.66	-1.66	-1.66
	Total	102.28	0.00	14.55	1%	18.02	22.21	-8.87	-10.08	-7.95
Software. Supporting RDTI ineligible Growth Grant eligible RDExp.	2020	.s	0.00	0.00	0%	0.00	0.00	0.00	0.00	0.00
	2021	13.33	0.00	2.44	1%	2.00	2.46	-0.03	-0.04	-0.03
	2022	70.56	0.00	12.90	4%	10.58	13.05	-0.17	-0.19	-0.16
	2023	0.00	70.56	12.90	3%	10.58	13.05	-0.16	-0.17	-0.16
	2024	0.00	70.56	12.90	3%	10.58	13.05	-0.14	-0.14	-0.16
	Total	83.88	141.12	41.14	3%	33.75	41.60	-0.50	-0.54	-0.50

Notes: "I.A" refers to input additionality. TSP support for 2020 is suppressed (".s") due to Statistics NZ confidentiality requirements. Nominals are converted to real values using the Producer Price Index (inputs) averaged across the full year (March 2024 Quarter=1000). Present values (PV) are discounted to the end of the 2024 financial year (30 June).

There could, however, be other ways to adjust the credit rate to mitigate the disproportionately high compliance costs faced by low R&D expenditure firms. Rather than increasing the subsidy rate, one could also consider how to intervene at an earlier stage to reduce compliance costs; for example, by streamlining the approval process for low R&D expenditure firms (Parsons & Phillips, 2007). As noted, a common suggestion from firms and advisory firms was for a "light GA approach" or "a shrunk down CAM process" for smaller R&D spenders (e.g., <$300k). A more user-friendly approach that helped to streamline application processes and reduce compliance costs for smaller R&D spenders was viewed as a viable way to engage more smaller R&D spenders in the scheme. A significant number of informants said that many smaller firms across a wide range of industries didn't do single projects, rather they tended to do 15-20 micro-projects. Putting these through as one coherent GA or 15-20 separate GAs, as required under the current regime, was viewed as complex and unattractive in terms of the benefit per project. Simplifying the application process and eligibility criteria for a group of micro activities was recommended by several firms and advisory firms. As commented by one advisory firm,

> *"…if your project or your total spend is under X, I don't know what that number would be, half a million dollars, two hundred thousand, I don't know. Then here's another form to fill out that just really nails the eligibility requirements for each of the small projects, and that can be submitted all in one go rather than filing 15 times, doing 15 times the work. Because it's not just filing 15 general approvals, for each general approval, you actually have to cost out separately. So if you can put in this light version, and manage the risk by keeping some thresholds and caps on it, and some expectations in there, I think that could balance the risk with making it a lot more engaging for these smaller businesses."*

A streamlined approval process has drawbacks, particularly in terms of non-compliant and fraudulent claims. There is strong evidence from overseas that "As the size of expenditure decreases, the value of non-compliance expressed as a percentage of the value of the claim increases." (HMRC, 2024) The non-compliance risk was front-of-mind among policy experts we interviewed, who noted that a less onerous approval process would cause more public funds to be directed towards expenditures that were "not R&D".

Another alternative might involve channelling resources into providing hands-on support to low R&D expenditure firms (or other firms that are new to the RDTI). This could involve, for example, providing record-keeping training, templates or software to firms—or even providing a government grant to use a tax advisor in an entities' first year of support. The Approved Research Provider (ARP) pathway could also be better utilised as an avenue for reducing compliance costs if ARPs were incentivized to take more of the compliance burden away from firms (both during and after General Approval). These "hands-on" supports seem like a less expensive and potentially more effective way to rebalance the incentive for low R&D expenditure firms than moving to a dual rate, while preserving the integrity of the approval process.

7.4.2 The cap on overseas expenditure

Governments generally seek to incentivise domestic R&D activities to maximize local economic benefits and knowledge spillovers. As a result, many jurisdictions impose restrictions on the eligibility of overseas R&D expenditures, although exceptions may apply based on specific regions, activities, or expenditure thresholds. A common approach is to cap foreign R&D expenditure relative to domestic spending. For instance, under Australia's Research and Development Tax Incentive (R&DTI), overseas R&D costs can be claimed only up to the level of eligible domestic R&D expenditure (Centre for International Economics, 2016). The Canadian SR&ED tax credit provides a tax credit on overseas expenditure, but is subject to strict eligibility rules and has a cap of 10% of domestic expenditure on wages (OECD, 2024a). Within the UK scheme, R&D activities must be conducted domestically unless doing so would be 'wholly unreasonable' (BDO UK, 2024). Many schemes within the European Economic Area (EEA) treat R&D conducted in EEA or EU states as domestic expenditure

(France's *Crédit d'Impôt Recherche* (CIR) and Norwegian *SkatteFUNN*). Similarly, Iceland's R&D tax scheme actively promotes cross-border collaboration within the EEA, reinforcing regional research integration (OECD, 2024a). Some tax schemes may also allow specific activities to qualify regardless of location. The French CIR scheme, Norwegian SkatteFUNN, and Italian R&D Tax Credit cover international expenditure related to patent registration, patent defence, and technology watch activities (OECD, 2024a).

Consistent with a policy intent centred on stimulating R&D undertaken in New Zealand, the RDTI's cap on overseas expenditure is more restrictive than many international schemes. We did not encounter compelling qualitative evidence that the cap on overseas expenditure was a major obstacle for most firms. Nonetheless, the pattern of overseas expenditure in Supplementary Return records suggests that 31% of firms' total eligible overseas R&D expenditure is deemed outside the cap.

We therefore chose a simple counterfactual which relaxed the overseas cap to an amount equivalent to eligible R&D expenditures undertaken in New Zealand (i.e., 50% of an entity's total claim). Using firms' Supplementary Returns records, supplemented with General Approval information, as needed, we established that, in real terms, a more relaxed overseas cap would cause $120.11m of extra R&D expenditure to become eligible for support. The figure is used to calculate the government direct support costs ($18.02m) in Table 28. Of the $120.11m, $102.28m comes from firms whose total overseas expenditure is less than 50% of their eligible expenditure and whose marginal R&D cost would therefore change as a result of the more relaxed cap. This is the volume of impacted RDTI expenditure that we expect to respond to the changed policy setting. [58]

We did not find a basis for anticipating additional RDTI uptake under an increased overseas expenditure cap. The level of supported expenditure among firms whose marginal cost would be lowered (who have between 10% and 50% of overseas expenditure) is already higher than those unaffected by the cap (less than 10% of overseas expenditure) (63.8% vs. 55.1%). This may be because both overseas R&D expenditure and RDTI support are correlated with size of R&D spending.

The correlation between size of R&D expenditure and overseas R&D expenditure means that the marginal R&D cost reduction from higher cap on overseas expenditure would mostly benefit large R&D spenders. We therefore calculated an implied elasticity of -0.68 from our empirical estimates for treated firms with $1m or more of annual R&D expenditure, and we used this as the basis to project input additionality under the counterfactual scenario.

We calculated that changing the overseas cap from 10% to 50% would have generated a further $14.55m of additional R&D expenditure, an increase of around 1% (un-discounted) of the total R&D expenditure generated by the RDTI. The overall net impact of changing to a 50% cap on overseas expenditure is negative (PV -$8.87m), suggesting that the government costs would outweigh the additional R&D generated by changing this policy setting.

Broader implications.

A (quantitatively) more generous cap on overseas R&D expenditure would align the RDTI more closely with the Australian R&DTI's approach to overseas expenditures. Some firms we interviewed felt that the current 10% cap on overseas expenditure unfairly penalised them in cases where regulatory constraints or a lack of local expertise made it impossible to conduct certain core R&D activities in New Zealand. One large R&D spender noted that they are required to conduct clinical trials overseas due to regulatory restrictions in New Zealand, describing the cap as a barrier that prevented them from fully optimising the programme. Another firm working in AI and sustainability

[58] Lack of Supplementary Returns records would cause us to significantly underestimate the volume of overseas RDTI expenditure in 2024, so we use the 2023 figure to approximate the actual 2024 amount.

noted that they had no alternative but to engage international expertise, as the necessary capabilities simply do not exist domestically. These firms emphasised that the relevant activities were integral, core components of their R&D efforts. They suggested that in cases where conducting R&D locally is not viable, a more flexible approach may be warranted.

A higher/ more flexible cap would involve additional business compliance costs and administrative complexity. In Australia, for example, there is a standalone process for securing an Advance Overseas Finding (e.g., demonstrating a scientific link to an Australian core activity, demonstrating that the overseas activity cannot be conducted domestically, and so on). Even without adjusting for extra compliance or administration costs, our modelling suggested that a higher cap on overseas expenditure would result in a negative net impact, meaning that the marginal incentive would generate less additional R&D expenditure than government costs.

We also note the Minister's intention to prioritise areas that offered the greatest return to New Zealand when defining RDTI-eligible R&D expenditure prior to the scheme's introduction. It seems possible that additional R&D expenditure generated by the overseas cap may fall short of this criterion. For these reasons, we are unsure whether—on balance—channelling additional support to overseas R&D expenditure would result in benefits to New Zealand that are aligned with the policy intent.

At the same time, other elements at the intersection between domestic and overseas R&D activity may merit consideration. It was highlighted in our interviews that NZ R&D contractors doing work for overseas firms struggle with the RDTI's treatment of overseas-funded (i.e., inbound) R&D expenditure, which is often ineligible for RDTI support. In theory, R&D Contractor rules permit NZ firms to claim on overseas funded R&D (provided the funder does not have a fixed establishment in New Zealand) and, notionally, the NZ firm could choose to pass the credit onto the funder via reduced pricing. However, the RDTI's legislation also requires that the NZ contracting firm must own (or have the right to use at no further cost) the knowledge or intellectual property arising from the R&D. In practice, these R&D ownership requirements mean that much overseas-funded R&D may be ineligible for RDTI support. This appears to impede NZ firms that compete internationally for contracted R&D work, and who struggle to compete with R&D contractors from certain jurisdictions (e.g., Canada) where policy settings are more favourable on this issue. Returning to the original policy intent of the RDTI, it is perhaps a question for policymakers to (re)consider—(a) to what degree do societal benefits from NZ-owned-and-conducted R&D exceed benefits from NZ-conducted R&D; and (b) does the difference warrant the RDTI's current approach to R&D ownership requirements?

7.4.3 The treatment of expenditure on software development

Like New Zealand, many international schemes have arrived at restrictive eligibility criteria for software R&D, using the Frascati definition as a point of departure. According to the Frascati Manual, "…[f]or a software development project to be classified as R&D, its completion must be dependent on a scientific and/or technological advance, and the aim of the project must be the systematic resolution of a scientific and/or technological uncertainty." (OECD, 2015, p. 65) Ireland's R&D tax credit, for example, takes the position that much software development does not qualify as eligible R&D because "using known methodologies in standard development environments using the standard features and functions of existing tools would not typically advance technology and would not address or resolve technological uncertainty." (Revenue: Irish Tax and Customs, 2025, p. 33).

The most practically appropriate counterfactual for software development expenditure involved replacing the Frascati definition of R&D activity (used to assess eligible expenditures under the RDTI) with an accounting definition of R&D expenditure (as was used to assess Growth Grant

expenditures).[59] The need to demonstrate technological uncertainty is less explicit under an accounting definition of R&D, while other parts of the software development process (e.g., beta testing) can more often meet the eligible expenditure criteria. Moreover, to our knowledge, Growth Grants did not explicitly exclude bespoke internal administration software. Measuring this counterfactual is problematic; but the modelling limitations seem worthwhile given the strength of business sentiment on this issue.

Quantifying the impacted R&D expenditure from broadening the RDTI to include Growth-Grant-eligible R&D expenditure was a difficult challenge. We opted to measure R&D expenditure which changed from 'supported' to 'unsupported' during the transition from Growth Grants to the RDTI as a proxy. Such expenditure is captured by the Transitional Support Payments (TSPs) made to former Growth Grant recipients for the income years ending in 2020, 2021 and 2022.[60] Transitional Support Payments supported R&D expenditures that were ineligible for the RDTI, but eligible for Growth Grants (Office of the Minister for Research, Science and Innovation, 2021).[61] Digital technology firms were heavily represented among Transitional Support Payment recipients, but treatment of software expenditure was clearly not the only difference between Growth Grant and RDTI eligible R&D expenditure. As such, it may be more appropriate to think of these calculations as an analysis of broadening the RDTI definition of eligible expenditure to include RDTI ineligible but Growth Grant eligible expenditure.

A consequence of broadening the RDTI definition of eligible expenditure is that TSPs themselves become redundant under the counterfactual. Therefore, instead of evaluating our policy adjustment against what actually happened (i.e., TSPs), we evaluate it against what would have happened without TSPs. The question we ask is "*how would the consequences of the RDTI have changed under a broader definition of expenditure eligibility, when compared against the existing narrower definition?"* which seems like a more useful/ interesting question than "*when compared against the existing narrower definition, plus up to three years of TSPs filling a hole"*. What this means for our modelling is that government support channelled through TSPs is assumed to be channelled through the RDTI instead, with impacts and costs attributed accordingly.

Treating the final year of Transitional Support Payments (TSPs) as a peak (2022, 57 grants active), we also used the 2022 level of support as an indication of the potential change in uptake in later years (2023 and 2024). A 20% support rate was used as the basis for calculating the total R&D expenditure supported by TSPs ($70.56m).

We then use the implied elasticity for the whole-of-estimation sample (-0.88) to project the input additionality associated with the expanded definition of eligible R&D expenditure. Our calculations suggested an overall increase in input additionality of $41.14m (3%) from supporting RDTI ineligible but Growth Grant eligible expenditure. As noted, this is the projected change relative to the current definition of RDTI eligible expenditure if there was no post-Growth Grant Support for RDTI-ineligible expenditure—not the change relative to what actually happened (i.e., TSPs). The net impact of supporting RDTI ineligible but Growth Grant eligible expenditure after the conclusion of TSPs was negligible (-$0.5m, PV), suggesting that the additional R&D expenditure generated was almost exactly offset by government costs.

[59] We also considered increasing the $25m cap on software development for non-administrative internal purposes, but noted that 98.3% of internal software expenditure was within the cap during the five-year period.

[60] TSPs were offered in the 2022 year only, although they were also provided in specific cases for the 2021 and 2020 years to avoid disadvantaging Growth Grant recipients who transitioned early.

[61] To account for situations where a business had slowed its level of recent R&D, Transitional Support Payments were also capped at the average of Growth Grant payments across the three prior years.

Broader implications.

We do not believe that the quantitative modelling offers a credible basis for making a decision regarding software R&D, largely because of limitations in the measurement of RDTI ineligible but Growth Grant eligible expenditure. For example, we cannot rule out the possibility that TSP activities were supported by other government funding after March 2022, and we lack a suitable proxy for non-Growth Grant R&D expenditure ineligible for the RDTI (including software R&D expenditure). We also have not considered software for internal administrative purposes. Conversely, our qualitative interviews offered strong evidence that firms believe that the RDTI is ill-equipped to support R&D in the software sector. This seems to boil down to two issues: (1) wording and interpretation of the legislation and (2) the iterative and cyclical nature of software R&D.

First, businesses noted that the legislative framework (i.e., wording and interpretation) appears better suited to traditional R&D. The requirement to demonstrate "technological uncertainty" was seen as particularly problematic, as many software challenges stem from integrating complex systems, optimizing performance, and refining usability—elements that do not always fit neatly within the administering agencies' interpretation of technological uncertainty. One firm described the difficulty of proving eligibility, explaining that "99.99% of software development doesn't easily fit under [technological uncertainty], as all this stuff tends to focus more on things that are possible but complex and take time to figure out." Another firm highlighted perceived ambiguity in the rules, noting that "you can make an easy argument for and against technological uncertainty—it all depends on how you interpret it." It was felt that the "uncertainty" criterion is applied more gently to traditional (non-software) sectors. It was also argued that technological uncertainty in software R&D may not be in the code or technology itself—it may lie in the integration with other systems, finding a path to usability and scalability, and so on. The difficulty for software firms to navigate the technological uncertainty test is not a new issue. It is widely recognised internationally and mentioned in PwC's early review of the RDTI.

Even when firms sought clarification, some believed they encountered conflicting guidance. One firm reported that a Callaghan Innovation official told them, "You're clearly doing R&D, but I can't sign it off." This reflects broader concerns that, while officials may recognise that software firms are conducting R&D, the legislative wording (rooted in the OECD's Frascati manual) is not aligned with the way R&D is conducted in the software sector. Several firms suggested that IR1238 (R&D Activity Eligibility Guidelines for the Digital Technology Sector) remains too ambiguous, and that clearer definitions or better industry-specific examples could help to improve accessibility for software businesses. This frustration regarding the treatment of software R&D is shared by some administrators. Administrators reported significant time and complexity involved in interpreting software-related claims, especially those relating to software for internal administration. This suggests that the legislation also creates challenges for those tasked with implementing it.

Second, it was perceived to be more difficult to access support for software R&D projects because they involve continuous iteration and refinement, versus traditional R&D following a more linear path. Many firms described their R&D processes as continuous, with innovations evolving incrementally over time rather than following a defined start and end point. This approach—common in modern software development—can clash with the RDTI's requirement to define distinct R&D projects. One firm explained "software development is a lot more circular than just a traditional linear hardware project… we are constantly iterating, learning, and refining." The need to frequently reassess eligibility adds compliance costs and administrative complexity, particularly for firms operating in agile environments. Some businesses reported breaking projects into artificial "chunks" to fit within the scheme's requirements, which they described as cumbersome and counterproductive.

Policymakers shaping the original design of the RDTI placed a lot of emphasis on ensuring that only activities involving genuine scientific or technological uncertainty qualified as R&D. This was

Table 29: RDTI versus Growth Grant continuation, 2020-2024

	RDTI, 2020-2024	Growth Grant continuation, 2020-2024
Input additionality (PV) $ m	1,833	1,478
Direct support costs only (no deadweight taxation cost) (PV) $ m	1,307	1,548
Bang for the Buck (BFTB) ratio	1.40	0.95
All costs, including admin. & deadweight taxation (PV) $ m	1,612	1,949
Net impact (PV) $ m	221	-471
Impact on the economy as a whole (PV) $ m	6,774	5,461
Ratio of impact on economy to government investment	4.20	2.80
BOS Innovation effect	6.1 ppt higher	5.2 ppt higher
Multifactor productivity effect	n.s.	n.s.

Notes: Nominals are converted to real values using the Producer Price Index (inputs) averaged across the full year (March 2024 Quarter=1000). Present values are discounted to the end of the 2024 financial year (30 June) using an assumed 8% discount rate for both schemes. The midrange annual rate of return to GDP from R&D expenditure (100%) is used to compare the impact of both scenarios on the economy as a whole. n.s. means no significant impact.

motivated by a strong aversion to erroneously supporting non-R&D, including other types of innovation or commercial advancement activities. Those who defend the restrictive treatment of software expenditure often point to a high fraud risk from software development expenditures (e.g., Australian National Audit Office, 2021) arising from the ambiguous boundary between R&D versus product development, the ease with which intangible asset expenditures can be reclassified (relative to tangible assets), and the concentration of software R&D in startups and smaller businesses that may lack stringent record keeping. Taken together, these factors have led to a deliberately restrictive approach that is felt acutely in areas like software, where it is particularly difficult to regulate the distinction between R&D and non-R&D. Naturally, this is not just a New Zealand challenge—there is recognition internationally that a narrow interpretation of the Frascati Manual emphasises exclusion rather than inclusion of software R&D activities (e.g., ASBFEO, 2019).

Overall, there is strong evidence suggesting it may be helpful to revisit the RDTI's approach to software R&D, as well as how this is communicated to businesses and implemented by agencies. During the RDTI's design, the legislative challenges and fraud risks of making the RDTI more accessible to software firms were viewed as significant. Is this still the case? If so, is the tax system the appropriate vehicle to support software R&D? Given that digital technologies are the fastest growing element of New Zealand's technology sector (MBIE, 2023b), is there sufficient value to the economy to warrant an alternative support mechanism? At minimum, cleaning up the communication and implementation of software settings can mitigate the burden of software R&D claims, which are a frustration for businesses and administrators alike.

7.4.4 How would the impact of government R&D support have been different if Growth Grants had continued?

As part of the evaluation, we were also asked to consider how the impact of the RDTI would compare to a hypothetical scenario whereby Growth Grants continued for the same 2020-2024 period. To construct the scenario where Growth Grants continued for the five-year period 2020-2024, we need to impute the level of support provided once Growth Grants were phased out. In years 2021 and later, we do this by assuming that direct support channelled through the RDTI scheme is channelled

instead through Growth Grants.[62] We assume that the (nominal) cost of administrating this support calculated earlier ($4.92 per $100 post-tax of direct support) remained consistent. We also assume that that the nominal level of (after-tax) support per firm remained consistent, which would result in an average of 558.8 treated firms in each of the five years.

Table 29 compares the two schemes across 2020-2024 on the basis of additional BERD generated, BFTB and net impact after deducting costs to government, a midrange estimate of the projected impact on the economy as a whole, and effects on innovation and productivity. For each scheme, we use the earlier estimation results as the basis for the comparison.

We find that the RDTI compares favourably to the continuation of Growth Grants in terms of input additionality, BFTB, net impact, as well as the impact (and magnitude of impact) on the economy as a whole. In present value terms, the introduction of the RDTI was associated with $1,833m of total additional R&D (versus a projected total of $1,478m from Growth Grant continuation). The bang for the buck from the RDTI (1.4) is greater than the corresponding projection for Growth Grant continuation (0.95). Although innovation and productivity results appear similar for both schemes, it is inappropriate to compare these on a like-for-like basis given the short follow up period for the RDTI. A midrange projection of the impact of both scenarios on the economy as a whole suggests that the RDTI's overall impact has been 4.20 times greater than total government investment, whereas the impact of Growth Grant continuation would have been 2.80 times greater than total government investment.

[62] We considered whether this approach might overestimate Growth Grant take-up, but were somewhat reassured when this assumption produced more conservative levels of Growth Grant support than assuming a consistent average annual increase (18.57% from 2015-2019).

8 Limitations and research implications

Our evaluation has several limitations that may represent opportunities for additional research. The estimates of the impacts of RDTI support may not be a reliable guide to the longer run impacts if the policy were to continue in its current form. The follow-up window of 0-3 years is very short, and the number of entry cohorts is small. In addition, the patterns of entry into the RDTI are affected by the transition from Growth Grants, the cessation of Project Grants, and disruptions due to Covid-19. The impacts could increase as the scheme matures (see e.g., Bloom et al., 2002) and businesses become more confident in the long-term availability of support.

The estimated impacts tell us about the impacts of RDTI support on the initial cohorts of entrants. The effects on future entrants may differ. There is some evidence that the impacts of support on R&D expenditure are higher for smaller firms and firms with low initial levels of R&D expenditure. Given the entry patterns into the RDTI, and government R&D support generally, many future entrants may be smaller firms. If most large R&D expenditure firms are already receiving support, the impacts may be larger on future cohorts. Conversely, if the firms that benefit most from support are represented disproportionately among early entrants, the impacts of further expansion may be smaller than estimated for the first 5-year period.

The short follow-up period for the evaluation has made it impossible to speak confidently about the impacts on firm innovation and productivity. If future RDTI evaluations allow for a longer follow-up period after the support window, this could result in more authoritative conclusions. A stable R&D support mechanism (combined with sustained data collection) would help to create the evidence base necessary to thoroughly assess government R&D support. This includes long-term impacts on firm innovation and productivity, as well as the ability to empirically examine spillovers from supported firms.

On a related note, we encourage research examining the extent of knowledge spillovers from R&D activity in New Zealand. As a small open economy, it would be worthwhile to assess how spillovers from R&D activity are distributed, with a particular focus on domestic benefits of spillovers (e.g., Bloom et al., 2002; von Brasch et al., 2021). An empirical study of the impacts of New Zealand R&D activity for the wider economy would be a helpful addition to the evidence base ahead of any future analysis of the RDTI's impact on the economy as a whole.

Our qualitative data provide rich insights on the scheme's workings from informants with a range of organisational (e.g., firm, operational, policy, and advisory) and capability (commercial, science, technical, financial, tax, and legal) backgrounds. Even so, and despite obtaining a large sample relative to norms for in-depth qualitative work, these insights do not represent the full population of R&D performers, including those who have never engaged with the RDTI. These qualitative insights could provide opportunities for additional primary data collection in the future (e.g., a survey), particularly if there are areas where categorical responses from a larger sample could contextualise these findings.

A 2022 memo from MBIE's Innovation Policy team suggested that RDTI engagement among Māori businesses may be lower than non-Māori businesses (MartinJenkins, 2023). The role of the RDTI in supporting Māori business was outside the scope of our evaluation. As this is an engagement priority for the administering agencies, it would be valuable to see more systematic analysis of RDTI engagement among Māori businesses, including how the RDTI complements or substitutes policy mechanisms specifically designed to support Māori innovation (e.g., the Māori Agribusiness Innovation Fund).

In addressing Question E, ("*Are taxpayers complying with the legal requirements of the scheme…?"*) we had access to only a fraction of the information required for a definitive judgement. To thoroughly assess the compliance of firms, as well as the effectiveness of the RDTI's legal provisions and administrative efforts against noncompliance, it may be necessary to commission, and empower, an audit of this issue as the RDTI matures.

9 Summary of key findings

We conclude the report by summarising our key findings across the six evaluation questions.

A. What is the impact of the RDTI on R&D expenditure, innovation, and productivity in the economy as a whole?

In the first five years of the RDTI, 1,752 firms have received support. This means that they have received a tax credit or had a successful General Approval application in any of the five years. We estimate that $1,074m (nominal value) of tax credits will have been provided through the RDTI relating to the first five years. By 2023, firms receiving RDTI support accounted for 65% of total measured R&D expenditure (relative to the peak of 44% from Growth Grant supported firms).

The RDTI appears to have been more inclusive than the earlier R&D grants regime. Just over half of RDTI entrants had not previously been supported by Callaghan Innovation's grants and loans. Just under half of RDTI entrants had average R&D expenditure below the annual level associated with Growth Grant eligibility ($300k). Among firms that received multiple years of RDTI support, we see growth in support over time reflected in the average number of supported projects, RDTI-eligible R&D expenditure, and estimated total R&D expenditure.

Firms supported by the RDTI spent more on R&D than they would have in the absence of RDTI support. The difference was stronger for smaller firms. Annual R&D expenditure was on average $274k higher per firm in real terms as a result of RDTI support (2020-2024). The total additional R&D expenditure generated by the RDTI was $1,833m (present value). The "bang for the buck" from the RDTI (additional expenditure relative to support provided) was approximately 1.4, which is in line with OECD benchmarks. The present value net impact the RDTI across the five years was $221m, which reflects the additional R&D expenditure generated less total government costs.

There is some evidence that RDTI support raised innovation from two years after support started. The average increase after that point was 6.1 percentage points, although after bias adjustment, not all of the estimated effects are statistically different from zero. There is no evidence that RDTI support affected the productivity of supported firms, suggesting that private returns to R&D are not evident in the relatively short outcome window where follow-up data are available. Our causal analysis suggests that output, capital inputs, intermediate inputs, and employment growth, were higher as a result of RDTI support.

Benefits that accrue to wider society from innovation are a core rationale for government support of business R&D. When we projected the overall economy-wide impact of the RDTI within a range of +/- 50%, the midpoint of the range is $6,774m. Relative to the $1,612m total investment made by the government, this suggests an overall economic impact of 4.2 times government investment.

Qualitative insights from businesses about the RDTI's impact are broadly consistent with the quantitative findings. When comparing the RDTI with Growth Grants, many businesses reported that significant compliance costs associated with the RDTI were more than offset by the ability to access greater levels of R&D support. A majority reported that the RDTI had a positive impact on their R&D activities and business outcomes. Several firms with international operations explained that the RDTI is influential in attracting and retaining R&D work in New Zealand. Insights from across the spectrum of interviewees also provided a strong indication that businesses prefer policy stability, with the implication that instability leads to lower R&D expenditure and lower uptake.

B. What is the impact of government support for business R&D generally on R&D expenditure, innovation, and productivity in the economy as a whole?

We find an annual increase in R&D expenditure of $429k per annum as a result of Growth Grant support (2015-2019). The comparable annual increase in R&D expenditure from receiving any government support for business R&D was $95k (2015-2024).

In total, Growth Grants generated $906m additional R&D expenditure, and any government support generated $2,711m additional R&D expenditure (both present value). The sum of estimated Growth Grant and RDTI additionality slightly exceeds the total estimated additionality for any government support. Because the total estimated additionality should be at least as large, this reflects the fact that each estimate has a margin of error. Taken together, the estimates suggest that Growth Grants and RDTI contribute by far the largest share of total estimated additionality.

Neither Growth Grants, nor business R&D support generally, generated as much "bang for the buck" (BFTB: additional R&D expenditure per dollar of support provided) as the RDTI. The BFTB ratio was 0.83 from Growth Grants, and 0.83 for any government support for business R&D. The net impact of Growth Grants was -$471m across 2015-2019, suggesting that the scheme generated less additional R&D than government costs. Government support for business R&D generally (across the five schemes) generated $1,467m of R&D expenditure less than government costs. This result does not consider the value of R&D expenditure to non-R&D performers or to the economy as a whole.

Both Growth Grant support, and business R&D support generally, were associated with an increased rate of innovation of around 5 percentage points. There was no evidence that either treatment affected the productivity of supported firms. We find some indication that firms experienced increases in capital inputs and employment as a result of Growth Grant support.

The projected overall economic impact of Growth Grants (2015-2019) was $3,347m (midpoint of +/- 50% range). Relative to the $1,377m total investment made by the government, this suggests an economic impact of 2.43, which is significantly less than the equivalent ratio for the RDTI.

Across ten years of government investment in R&D support, the overall impact to the economy is projected to be in $10,021m. Relative to the $4,178m total government investment, this suggests an economic impact of 2.4 times government investment.

The introduction of the RDTI compared favourably to a hypothetical scenario whereby Growth Grants continued for the same five-year period. In present value terms, the introduction of the RDTI was associated with $1,833m of total additional R&D (versus a projected total of $1,478m from Growth Grant continuation). The bang for the buck ratio from the RDTI (1.4) was greater than the corresponding projection for Growth Grant continuation (0.95). Although innovation and productivity results appear similar for both schemes, it is inappropriate to compare these on a like-for-like basis given the short follow up period for the RDTI. A midrange projection of the impact on the economy as a whole relative to government spending was 2.8 for Growth Grant continuation (versus 4.2 for the RDTI).

C. Are compliance costs appropriate in the context of the policy intent?

There are three primary drivers of compliance costs for firms, stemming from provisions put in place to mitigate against fraud. First, the documentation and record-keeping burden is ongoing and significant, involving identifying, assessing and recording eligible activities and expenditures. This was highlighted in interviews with firms across both the General Approval (GA) and Criteria and Methodologies (CAM) pathways. Beyond record-keeping, firms also reported significant costs from reviews and supplementary inquiries by the administering agencies.

Second, engaging professional advisory services is a significant compliance cost for many firms. Tax consultants play a central role in the pre-approval and Supplementary Return processes. Use of

tax advisors increases in line with eligible R&D expenditure, from 25% among the low R&D expenditure firms interviewed to 100% among high R&D expenditure firms interviewed. The extent of support received from advisors depends on the complexity of the application or claim, the number of R&D activities involved, the firm's internal tax expertise, and its preference for external assistance.

Third, a significant cost for many firms was the effort required to efficiently capture and claim all eligible R&D activities, particularly smaller-scale projects. Across a variety of R&D expenditure categories, firms expressed concern that the administrative burden of documenting and proving technical uncertainty often outweighed the benefits of claiming, leading them to deliberately overlook eligible activities.

There are certain factors that help firms to limit or reduce compliance costs. Several firms were able to integrate or build on established R&D management and tracking processes when embedding RDTI compliance, rather than starting from scratch. There was also evidence that firms were able to learn from their previous experiences with the scheme and increase the support received over time. There is little evidence that firms are using Approved Research Providers (ARPs) as a vehicle to lower compliance costs.

The overall "appropriateness" of compliance costs depends on weighing the burden to firms against the policy intent, including the need to mitigate against non-compliance. The experiences of many businesses interviewed, and a vast majority of professional advisory firms, suggest that RDTI compliance costs are appropriate. Of the 39 firms interviewed who received RDTI support, just over half (51%) were broadly positive about the appropriateness of the compliance costs relative to the support received. Most of the other half (41%) perceived compliance costs as excessive relative to the incentive.

Nonetheless, low R&D expenditure firms faced disproportionately high compliance costs, making the scheme less attractive and, in some cases, financially unattractive. There was general consensus across our interviews that firms needed to be spending at least $300k-$500k on eligible R&D expenditure for the RDTI to be financially worthwhile. The drivers of compliance costs result in proportionately higher costs—and a proportionately lower incentive—for low spenders, which may explain their comparatively low uptake of RDTI support. Our assessment of scheme administration is also suggestive of avenues to improve the appropriateness of compliance costs.

D. Is the scheme being administered effectively, particularly in terms of the costs and the nature of interactions with stakeholders and participants?

On balance, we find that the RDTI is being administered well and has continued to make improvements in important areas highlighted in previous reviews. Rates of approval have increased significantly, and average handling times have decreased as the scheme has matured.

The educational and on-boarding roles of CI's customer engagement team are adding significant value, particularly among smaller firms and lower R&D spenders. The CI assessment team have made further improvements in how criteria are applied when assessing the eligibility of R&D activities. Processing times have reduced. Many firms appreciated IR's efficiency, clarity relating to their Requests for Information, and pragmatic approach to immaterial issues.

Insights from the business and professional advisory sectors suggest that the customer experience has improved over time. There was almost unanimous agreement across all stakeholders that CI and IR had distinct roles, the roles were complementary and well aligned, and that overall, the RDTI team were working well collaboratively.

Our evaluation also points to administrative challenges. Most significantly, it appears that the pendulum has swung, with issues shifting from the initial overly restrictive application of eligibility tests during pre-approval (as highlighted in previous reviews of the scheme) to delays and

unpredictability in the processing of Supplementary Returns (SRs). Despite decreases in SR handling times, the interviews highlighted some frustration with delays and inconsistencies in SR processing. This issue appears to stem from fundamental operational and resourcing issues relating to how approved activities are interpreted as eligible expenditure at the SR stage.

E. Are taxpayers complying with the legal requirements of the regime, particularly those designed to ensure the funds are being used to support actual R&D?

Comprehensively answering Question E requires review and audit powers beyond those granted to us for the evaluation. Based on evidence available, taxpayers appear to be complying with legal requirements. All interviewees were asked about the risk of non-compliance within the scheme. Several businesses suggested that they would need to be very determined and highly motivated to attempt to benefit fraudulently from the scheme. Approximately 20% of firms said that the level of due diligence could be viewed as excessive, and that fewer checks and balances could reduce compliance costs for business without increasing the fraud risk.

Inland Revenue have a vigorous approach to reviewing expenditure, with 43% of Supplementary Returns amended in 2022 and 18.5% in 2023. These rates of SRs revisions appear to reflect a greater level of expenditure scrutiny than some overseas schemes. The RDTI's legislative framework, which involves assessments at both pre-approval and Supplementary Return stages, seems well-equipped to mitigate against non-compliance.

Legal requirements to ensure funds are being used to support actual R&D also influence the appropriateness of compliance costs for firms. A stated policy goal when the RDTI was introduced was that a lower eligible R&D expenditure threshold (relative to Growth Grants) of $50k would make the RDTI accessible to firms that were previously unsupported. Although the current legislative framework appears robust for mitigating against fraud, it brings significant compliance costs that may be undermining this policy goal, at least among low R&D expenditure firms.

F. How do the following three policy settings affect the conclusions on questions A, C, D, and E?

Given the rate of recent change in New Zealand's approach to supporting business R&D, and the potentially positive impact of stability on business decision making, there appears to be a strong case for preserving a stable support mechanism in the medium term. To explore options to strengthen the scheme, we were asked to determine a suitable counterfactual scenario for each of three policy settings and consider how our conclusions might change as a result. For each setting, we present preliminary quantitative modelling and consider the process-related implications of changing the policy settings.

THE SINGLE RATE FOR ALL BUSINESSES

Since the 2020 year, a uniform tax credit rate of 15% has been applied consistently across all eligible entities and expenditures. Given the proportionately higher compliance costs for low R&D expenditure firms, and the greater responsiveness of this subgroup to R&D support, we explore a counterfactual scenario involving a higher 20% tax credit rate for entities' first $300k of R&D expenditure. Our modelling suggests that this policy setting would have had a net negative impact (-$6.2m in present value terms), meaning that additional R&D expenditure generated would be less than the associated government costs. A majority of support would go to firms already spending more than $300k annually, for whom the marginal costs of additional R&D expenditure would not change.

This particular tiered approach would therefore require significant additional government investment, without significant additional incentive for business R&D activity in most cases. There could, however, be other ways to adjust the credit rate to mitigate the disproportionately high compliance costs faced by low R&D expenditure firms. There may also be targeted ways to reduce

RDTI compliance costs for low R&D expenditure firms; perhaps by streamlining the approval process or providing greater hands-on support at the outset of their RDTI journey.

THE CAP ON OVERSEAS EXPENDITURE

Expenditure on R&D activities outside New Zealand can form up to 10% of an entity's total RDTI claim, provided the activities support a core R&D activity conducted in New Zealand. Based on Supplementary Returns records, 31% of firms' eligible overseas R&D expenditure is currently outside the existing cap. However, most overseas R&D expenditure comes from high R&D spenders, who are generally less responsive to R&D support. We explore the potential effects of increasing the overseas cap from 10% to 50% of an entity's total claim and suggest that this would have had a negative net impact (present value -$8.87m). Like the previous scenario, this means that government costs would have outweighed the additional R&D expenditure generated.

More broadly, it is unclear whether channelling additional support to overseas R&D expenditure results in benefits that are aligned with the policy intent. Although we acknowledge that certain firms are required to conduct some of their R&D programme overseas and would benefit from a less restrictive cap, changes to this setting may create a considerable administrative and compliance burden. We also note the Minister's intention to prioritise support in areas that offer the greatest return to New Zealand.

THE TREATMENT OF EXPENDITURE ON SOFTWARE DEVELOPMENT

The RDTI, like many international R&D tax incentives, employs a rather restrictive approach to the eligibility of software R&D expenditure based on the OECD's Frascati manual. The wording and interpretation of the Frascati criterion relating to technological uncertainty is particularly problematic, as is the RDTI's requirement to define R&D activities and its exclusion of expenditure on internal administration software.

We explore a counterfactual setting involving an expanded definition of eligible R&D expenditure, using Transitional Support Payments provided to ex-Growth Grant recipients as an imperfect measure of RDTI ineligible and Growth Grant eligible expenditure. The resulting projections were highly imprecise. Instead, we suggest that the significant frustration among both businesses and administrators may be a more appropriate barometer of the actual impact that an improved software setting could achieve.

Recognising that the original design of the RDTI placed a lot of emphasis on ensuring that only activities involving genuine scientific or technological uncertainty qualified as R&D, we highlight opportunities to revisit the RDTI's approach to software R&D, how rules in this area are communicated to businesses and implemented by agencies, and the potential for complementary policies to provide support for software-related R&D.

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Appendix A Timeline of government R&D support

Appendix Table 1: Timeline of government R&D support

2008	1 April	R&D Tax Credit available for the 2009 income year.
	15 December	R&D Tax Credit repealed (with effect from 1 April 2009).
2013	1 February	Callaghan Innovation launched.
	16 May	Changes to the R&D Grants programme announced as part of Budget 2013. Targeted R&D Project Grants were introduced, as were Student Grants and Growth Grants.
	1 October	Contracts for Growth Grants start.
2016	1 April	The R&D tax loss cash out scheme was available from the 2017 income year onwards. It allows tax loss-making R&D firms to 'cash out' tax losses arising from R&D expenditure.
2018	26 February	Cabinet agreed to introduce the RDTI (beginning 1 April 2019).
	16 April	The RDTI discussion document, Fuelling Innovation to Transform our Economy, was launched.
	1 June	Consultation on the discussion document closed.
	3 October	A two-year extension for Growth Grant recipients was announced.
2019	31 March	The Growth Grant scheme closed to new customers.
	1 April	Part 1 of the Taxation (Research and Development Tax Credits) Act 2019 came into force. It applied for 2019–20 and later income years and included a limited form of refundable tax credits.
2020	March	Access to the limited form of refundable tax credits was broadened and brought forward to apply to the first year of the scheme.
	1 April	Part 2 of the Taxation (Research and Development Tax Credits) Act 2019 came into force. It applied to 2021 and later income years and introduced the pre-approval pathways (General Approvals and Criteria and Methodologies Approval).
	April	The RDTI Guidance document (IR1240) was published.
	1 July	The R&D Loan became available to assist R&D performing businesses impacted by COVID-19.
	November	PwC completed a review of the early implementation of the RDTI. Early figures provided by IR highlighted high rates of non-approval, both at the pre-approval and Supplementary Return stages.
	20 November	A tripartite MoU between MBIE, IR, and CI was signed.
2021	30 March	Short form guidance on RDTI eligible R&D activities was shared via the IR website.
	31 March	End of the Growth Grant scheme.
	31 March	Extensions due to Covid-19 pushed back the due dates for General Approval applications, as well as some Supplementary Returns, for the 2021 income year.
	25 May	A Cabinet Economic Development Committee paper was published seeking agreement on Transitional Support Payments for former Growth Grant recipients. (Ministerial Direction to CI was published on 6 July 2021.)
	30 September	Last date for existing Growth Grant customers to submit claims.
	December	A set of guidelines for Significant Performers were published on CI's RDTI website.
		CI reported increased RDTI engagements from the Engagement Team's 'Calling Campaign', particularly among former Growth Grant recipients.

(continued) Appendix Table 1: Timeline of government R&D

2022	March	R&D guidance document for the digital technology sector was issued.
	31 March	General Approval deadlines were pushed back for the 2022 income year for firms materially affected by Covid-19.
	26 May	It was announced that the Ārohia Trailblazer Grant and the New to R&D Grant would become available from September 2022.
	30 June	According to CI, 73% of eligible former Growth Grant customers had applied for RDTI.
	1 August	Final start date for new Project Grants prior to the scheme's closure.
2023	March	MBIE implemented a temporary scheme to provide RDTI in-year payments in the form of a loan which was repayable upon receiving the tax credit. administered by a third-party provider (Tax Management NZ).
	31 May	The Minister for Research, Science and Innovation welcomes news that the Government has provided in excess of $312m in tax credits via the RDTI since inception, about double the total from nine months prior.
	8 September	MartinJenkins delivered a Rapid Review of the RDTI which assessed implementation since the earlier PWC review.
	November	In the Briefing to the incoming minister, MBIE noted that providing in-year payments as a loan has encountered significant implementation challenges.
2024	31 January	The temporary RDTI in-year payments mechanism was closed because it was deemed to provide low value for money due to administrative complexities, operational issues, and risks.
	30 June	Final date for CI to accept applications for Transitional Support Payments. The timing of eligibility confirmation letters from IR meant that not all firms met this deadline. Late applications awaiting confirmation letters would be honoured (see Callaghan Innovation, 2024; p. 128).

Appendix B Quantitative analysis – Data and methods

B.1 Data

The main source of data used for estimating the effects of RDTI support is Statistics New Zealand's Longitudinal Business Database (LBD). This contains confidentialised and anonymised versions of: a) RDTI administrative data; b) data on other forms of government support for R&D (from Callaghan Innovation); c) data from the Research and Development Survey; d) data from the Business Operations Survey; and e) other administrative and survey data on firm performance. Records from the various datasets can, in principle, be combined based on a common (confidentialised) firm-specific identifier derived from Statistics New Zealand's Business Frame.

The LBD is a rich resource for evaluation and research but has two main limitations for the current evaluation. First, not all firms can be linked across all data sources. By design, survey data include only a subset of firms. Furthermore, some firms have not been linked to the underlying Business Frame. The second limitation is that data are missing for some variables, for some firms, and in some years. We use data covering the period from 2004 through until 2024. The data used for estimation excludes 2024 due to the absence of R&D and innovation measures beyond 2023. Estimates of the impacts on productivity exclude 2023 as well due to the lack of productivity microdata beyond 2022.

The rest of this section discusses the nature and implications of data issues that have shaped our approach to estimating the effects of government support of business R&D, including the RDTI, Growth Grants, and other forms of support provided through Callaghan Innovation.

B.1.1 IR administrative data on RDTI

Other than the LBD data, we were also given access to a secure folder on Microsoft SharePoint by IR, which contained further RDTI data, including tabulations of Supplementary Returns and General Approvals, and internal training documents. This contributed to some of the descriptive patterns reported, such as Table 8, which reports Supplementary Returns approved by RDTI eligible R&D expenditure bands. No attempts were made to directly compare business-level information accessed through the IR system with the anonymised and confidentialised information available in Statistics New Zealand's Longitudinal Business Database.

B.1.2 RDTI administrative data in the Longitudinal Business Database

The available administrative data relating to the RDTI cover the various stages of interactions that firms have with the scheme – as outlined in Section 2.2. Specifically, RDTI data that are available in the LBD include data on firms enrolling for RDTI; and on firms and projects approved as eligible for RDTI support. Following approval, firms submit annual Supplementary Returns, details of which are available in the LBD. Snapshots of the available data are transferred from IR and loaded into the LBD in May and September each year. We use data available from September 2024.

Although the primary measure of R&D expenditure that we use in our analysis is a hybrid measure documented below, an alternative estimate of R&D expenditure from RDTI administrative data is available for firms engaged with the RDTI. This measure is available for supported firms even where the hybrid measure is missing. RDTI-based measures of R&D expenditure, RDTI-eligible expenditure, and RDTI credits are reported by firms in their Supplementary Returns. These data are, however, incomplete. As shown in Appendix Table 2, new or revised versions of Supplementary Returns for RDTI-approved projects are still being received two years after the related return period. Appendix Table 3 shows that over 80% of projects included in Supplementary Returns that were first

Appendix Table 2: Availability and timing of RDTI Supplementary Returns data

	Return period				
	2020	2021	2022	2023	2024
Sept 2020	160				
May 2021	1,100				
Sept 2021	950	35			
May 2022	670	760	9		
Sept 2022	210	930	250		
May 2023	70	430	1,800	20	
Sept 2023	40	110	1,000	310	
May 2024	30	75	450	2,400	35
Sept 2024			110	910	420
ALL	3,100	2,400	3,700	3,600	450

Note: Dates refer to when the data were loaded into the LBD. Counts relate to the number of projects for which Supplementary Returns are available. Counts are rounded in accordance with Statistics NZ requirements.

seen in September 2020 or May 2021 had been subsequently updated.[63] Given potential delays in the filing of Supplementary Returns, we do not treat the availability of a Supplementary Return as the only evidence of a firm being supported. We construct estimates of annual R&D expenditure and RDTI credits from Supplementary Returns where available, and from approvals data (assuming an even spread of R&D activity over the approval period). We refer to the constructed measures as *RDTI_RDExp* for total R&D expenditure, and *RDTI_Elig* for RDTI-eligible R&D expenditure. We identify whether a firm has received R&D support through the RDTI on the basis of their having positive eligible expenditure in supplementary returns or approvals.

Appendix Table 3: Timing and revisions of RDTI Supplementary Returns data

	All returns	Most up to date version of returns	% revised
Sept 2020	160	25	84%
May 2021	1,100	200	82%
Sept 2021	980	480	51%
May 2022	1,500	760	49%
Sept 2022	1,400	800	43%
May 2023	2,400	1,200	50%
Sept 2023	1,500	1,200	20%
May 2024	2,900	2,000	31%
Sept 2024	1,400	1,400	0%
ALL	13,300	8,100	39%

Note: Dates refer to when the data were loaded into the LBD. Counts relate to the number of projects for which Supplementary Returns are available. Counts are rounded in accordance with Statistics NZ requirements.

[63] The nature of the revisions is discussed further in Section 7.3.3.

B.1.3 Callaghan Innovation grants and loans data

Summary information is available in the LBD on all of the forms of R&D support administered through Callaghan Innovation – as documented in section 2. For estimating the effects of support, we identify separately whether firms received support through the Growth Grant scheme—the main R&D support policy prior to the RDTI—or received support from other Callaghan Innovation schemes. Support through Callaghan Innovation is also included in a summary indicator of 'any main support', which indicates whether firms received support through any of the four main forms of Callaghan-provided support (Growth Grants, Project Grants, Student Grants, and R&D Loans) or through the RDTI.

B.1.4 Linking to other sources of data

As outlined in section B.2 below, our approach to estimating the effects of government R&D support relies on finding a comparison group of firms that are similar to supported firms. This requires that a common set of characteristics are observed for supported and comparison firms. We therefore require that data on supported firms can be linked with data from other LBD sources that include unsupported firms. Supported firms that are not linked to enterprises in the LBD are therefore excluded from the impact analysis. We also restrict attention to firms that are *ever* observed with R&D activity, meaning that they report positive R&D expenditure in the Research and Development Survey (RADS) or Business Operations Survey (BOS), or they appear in RDTI or Callaghan administrative data. The pool of potential comparison firms thus excludes a large number of non-R&D firms.

The requirement that comparison and supported firms can be linked to other data comes at a cost. Appendix Table 4 shows the reduction in the number of firms due to various data restrictions. The total (rounded) number of firms that we observe in the RDTI administrative data between 2020 and 2024 is 2,463. A number of these firms appear in the RDTI enrolment data but never with evidence of having been approved as RDTI eligible or receiving positive support in Supplementary Returns (or in the absence of a Supplementary Return, those that have been approved). There are 1,752 distinct firms observed with RDTI support. Appendix Table 4 shows, for each year from 2020 to 2024, how many of these firms are first supported in the year, and how many are receiving support. It also shows the number of firms for which we would have R&D expenditure data if we were to rely on linking supported firms to R&D Survey responses or to responses from the Business Operations Survey (BOS).

Of the 1,752 supported firms only 1,137 (65%) are included in the R&D Survey, and positive R&D expenditure data from the R&D Survey are available for only 873 (50%). Reliance on R&D expenditure measures from the BOS would be even more restrictive as only 531 (30%) of the 1,752 supported firms appear in BOS, and only 408 (23%) report positive R&D expenditure. Furthermore, neither R&D Survey nor BOS data are currently available for 2024.

Appendix Table 4: RDTI-firms observed, by year

	appears in RDTI data	Ever with positive RDTI support	With positive support in year	RDTI entrant in year	Of those with positive support in R&D Survey	in R&D Survey with positive R&D	in BOS	in BOS with positive R&D
2020	1080	783	561	561	306	231	162	99
2021	1125	972	684	243	408	321	204	141
2022	1362	1278	1110	465	747	549	363	246
2023	1512	1407	1281	288	972	618	459	303
2024	1308	1242	1233	195	0	0	0	0
Pooled	2463	1752	1752	1752	1137	873	531	408

Notes: The 'Pooled' row reports the number of distinct firms. The pooled row includes 33 firms with no enrolment record. This may result from imperfect linking of firms over time, resulting in some double counting of firms. RADS and BOS data for 2024 are not yet available. Counts have been randomly rounded in accordance with Statistics NZ requirements.

B.1.5 RDExp – a hybrid measure of total R&D expenditure

Firms' expenditure on Research and Development is a key measure in our analysis – both as an outcome that is affected by RDTI, and as a factor for identifying unsupported firms that are comparable to those that are supported. Ideally, we would have a measure that:

- is available for all supported firms;
- is available on a consistent basis for both supported and unsupported firms;
- captures RDTI eligible R&D expenditure.

Unfortunately, there is no measure that satisfies all of these three criteria.

Using administrative data on RDTI eligible expenditure is definitionally preferred, and is available for most RDTI supported firms, at least if information from approvals were used where Supplementary Returns are not available. However, by construction, RDTI-eligible expenditure is not available for unsupported firms, so cannot be used for identifying comparison firms or for comparing outcomes of supported and unsupported firms.

The R&D Survey (RADS) – jointly undertaken by Stats NZ and MBIE – is our primary, and preferred, source of information on firm R&D Expenditure. RADS offers full coverage of key R&D performers, plus a sample of other firms in most industries. As such, it provides comparable data for treated and non-treated firms. RADS broadly follows the Frascati definition of R&D, which is largely consistent with international norms for reporting R&D expenditure (OECD, 2015) and mostly consistent with the RDTI definition of eligible R&D expenditure (Jackson, 2023).

The official measure of BERD is derived from RADS data, and is based on *internal* R&D (carried out by the business) reported by the firm. It excludes *external* R&D (funded by the business but carried out by someone else) to avoid double counting. Because a business can claim RDTI tax credits for (most) *external* R&D that it funds, we have chosen to rely on a measure based on *total* R&D expenditure, to more fully capture the effects of RDTI on R&D expenditure by supported firms. Potential disadvantages of relying on RADS total R&D expenditure include (a) capturing RDTI impacts

in the reported expenditure of unsupported firms that are contracted to carry out research; and (b) including ineligible R&D expenditure (external overseas R&D) for supported firms.[64]

As noted in the previous section, reliance on RADS alone would greatly restrict the number of supported firms for which we have expenditure measures. To increase the number of supported and unsupported firms with non-missing R&D expenditure information, we combine data from the RADS with data from BOS, and IR10 (cf: Benedictow et al (2018), which also combines multiple sources). Where RADS data are not available for a firm, the BOS offers significant additional coverage of firm R&D expenditure. Consistent with RADS, it follows the Frascati definition of R&D. However, it provides less guidance to respondents on what they should include or exclude as R&D. For these reasons, we give highest priority to information extracted from the R&D Survey, prior to using information from the Business Operations Survey. Where we do not have R&D expenditure data from either BOS or RADS, we use the R&D Expenditure figures reported by firms in IR10 forms.[65]

Where firms report R&D expenditure in more than one of these three sources (RADS, BOS, IR10), we can gauge the level of consistency in the reported amounts. Using these observations, we adjust reported BOS and IR10 total expenditure by the ratio of mean RADS expenditure to mean expenditure from the alternative source. This coarse ratio adjustment is an imperfect method given the conceptual differences between the measures. IR10 reports, for instance, omit labour expenditures. A comparison of alternative measures of R&D expenditure is reported in Table 3. Overall, 70% of non-missing *RDExp* values are from RADS, with a further 22% from BOS and the remaining 8% from IR10.

To provide some sense of the comparability between the hybrid measure of R&D expenditure, and RDTI-measured R&D expenditure, Appendix Table 5 summarises the differences between each of the RDTI total R&D expenditure and eligible R&D expenditure, and the hybrid R&D expenditure measure. The first two columns summarise the absolute differences for the sample of RDTI firm-year observations with non-missing RDTI and hybrid R&D measures; and the next two columns summarise the relative (logarithmic) differences between the measures (which exclude observations for which either the RDTI or hybrid measure is zero).

At least three patterns are apparent from this comparison. First, R&D expenditure measured in the RDTI is lower than the hybrid measure on average. Across all matched observations, the average differences are $0.84m (total) and $0.88m (eligible) lower; and the average relative differences are 0.32 – 0.34 log-points (27-29%) lower. This is broadly the case for the subsample stratified by the hybrid source (i.e. RADS, BOS or IR10), although there are noticeable differences, especially in the level differences: the differences are greater for RADS (about $1.1m lower on average) and IR10 ($3.8m – $3.9m lower), and actually positive (about $0.1m on average) for the BOS sourced sample. (The average log-differences appear more similar, ranging from -0.1 to -0.4 log-point differences.) Lower reported R&D expenditure in RDTI may reflect either greater care and accuracy of these reports due to the greater scrutiny and auditing they receive compared to the self-reported nature

[64] Not all external R&D expenditure is eligible for RDTI credits. Tax credits for external R&D expenditure carried out overseas are earned only for overseas R&D on supporting activities that accounts for 10% or less of a business' total eligible R&D expenditure. According to the 2023 R&D Survey, external R&D accounts for around 11.2% of total R&D expenditure (13.7% in 2022 and 8% in 2021), and around 5% of all external business R&D expenditure is external R&D carried out overseas (2.0% in 2022, and 4.0% in 2021). The number of firms reporting external overseas R&D is relatively small – around 100 firms out of the roughly 2,500 R&D-active firms. Overseas R&D accounted for more than 10% of total R&D expenditure for about 60 of the firms doing external overseas R&D. Furthermore, over 80% of the reported overseas R&D was done by these 60 or so 'high-overseas R&D' firms.

[65] There are many cases where reported IR10 R&D expenditure is zero or very small. We treat amounts of less than $5k as missing as they do not appear to be strongly related to the amount of R&D expenditure reported by firms that are also in RADS or BOS.

Appendix Table 5: Difference between RDTI and hybrid R&D expenditure measures

	R&D differences ($m)		Proportional differences	
	Total	Eligible	Total	Eligible
(1) All matched observations:				
No. observations	2,514	2,514	2,169	2,169
Average difference	-$0.84	-$0.88	-0.320	-0.336
	($11.3)	($11.3)	(1.07)	(1.07)
Fraction positive	0.37	0.36	0.32	0.32
(2) RADS-sourced R&D expenditure:				
No. observations	1,875	1,875	1,668	1,668
Average difference	-$1.07	-$1.10	-0.376	-0.392
	($12.8)	($12.9)	(0.92)	(0.92)
Fraction positive	0.33	0.33	0.30	0.29
(3) BOS-sourced R&D expenditure:				
No. observations	237	237	168	168
Average difference	$0.14	$0.08	-0.173	-0.182
	($5.9)	($5.7)	(1.60)	(1.60)
Fraction positive	0.53	0.53	0.41	0.39
(4) IR10-sourced R&D expenditure:				
No. observations	405	405	333	333
Average difference	-$3.76	-$3.89	-0.118	-0.137
	($1.6)	($1.7)	(1.36)	(1.37)
Fraction positive	0.40	0.40	0.38	0.38

Notes: The R&D differences are calculated for RDTI-firm year observations that have non-missing RDTI and hybrid R&D expenditures, as the difference between RDTI total (or eligible) R&D expenditure and hybrid R&D expenditure; the proportional differences are calculated as log(RDTI R&D expenditure/hybrid R&D expenditure). The panel (1) sample includes all firm-year observations; panels (2) – (4) consist of the subsamples for which the hybrid R&D expenditure measure is sourced from RADS, BOS and IR10 respectively. Standard deviations are in parentheses (under the average differences).

of the hybrid measure, or that firms believe they are involved in more R&D activity than is supported by the RDTI.

Second, there is substantial variation in the differences across firms. For example, compared to the average difference of less than $1m, the standard deviation of the measured differences is over $10m for the full sample, and ranges from about $1.6m for IR10-source differences to close to $13m for RADS-sourced differences. Similarly, the variation in the relative differences is also large compared to the average differences, ranging from 0.92 to 1.60 (92 – 160 log-points).

Third, although the RDTI-reported R&D expenditure is on average lower than the hybrid-measured, this is not the case for a substantial fraction of the sample. That is, in about one-third of observations (36-37% of level differences, and 32% of relative differences that exclude any zero reported R&D expenditures), the RDTI-reported (total or eligible) R&D expenditure is greater than the hybrid measure. Although the fractions are higher for the BOS and IR10-sourced subsamples, they are also large for the RADS-sourced sample: 33% of level differences, and 29-30% of log-differences (i.e. excluding zero reports).

B.1.6 Innovation measures from the Business Operations Survey

Innovation is one of the main outcomes we consider when evaluating the effects of R&D support. For this, we are restricted to using data only on firms that appear in BOS, which is the primary NZ

source of information on firms' innovation outcomes. BOS asks firms annually whether they have introduced new or significantly improved products, services or processes in the previous 12 months.[66] In addition, every two years, firms are asked whether they have introduced new products or services (separately from processes) in the previous 2 years, with additional questions on whether the innovations are new to the firm, or new to the world. Ideally, we would use a range of innovation measures, to identify the potential impacts of RDTI support on different forms of innovation.[67]

Unfortunately, the timing, frequency, and timeframe of the two-yearly question are problematic for use in evaluating outcomes of RDTI support. Post-support innovation measures are available in 2021 and 2023, making it difficult to disentangle pre-support from post-support innovation for most RDTI-supported firms. We are therefore constrained to use the more generic annual innovation measure, which still captures any effects on product or service innovation.

B.1.7 Multi-factor productivity (mfp)

Firm-level production data are available in the LBD as part of user-generated productivity tables (Fabling, 2024; Fabling & Maré, 2014, 2019). These data are restricted to private, for-profit firms in industries that produce for market (the 'measured sector'). We estimate *mfp* based on industry-level (Cobb-Douglas, gross-revenue, double deflated) production functions for each of 36 industry groups, controlling for inputs of labour, capital, and intermediate goods. Multifactor productivity is indexed relative to mean productivity within each industry.

B.2 Analytical approach

The main analytical objectives are to estimate the impact of RDTI support on R&D expenditure, on innovation, and on productivity. We use established econometric methods to generate these estimates, based on comparing outcomes of supported firms with estimates of what those outcomes would have been in the absence of support, constructed using information on patterns of outcome for a set of comparison firms. This section outlines the estimation approach and specifications for identifying comparison firms and estimating impacts.

B.2.1 A 'doubly-robust' approach

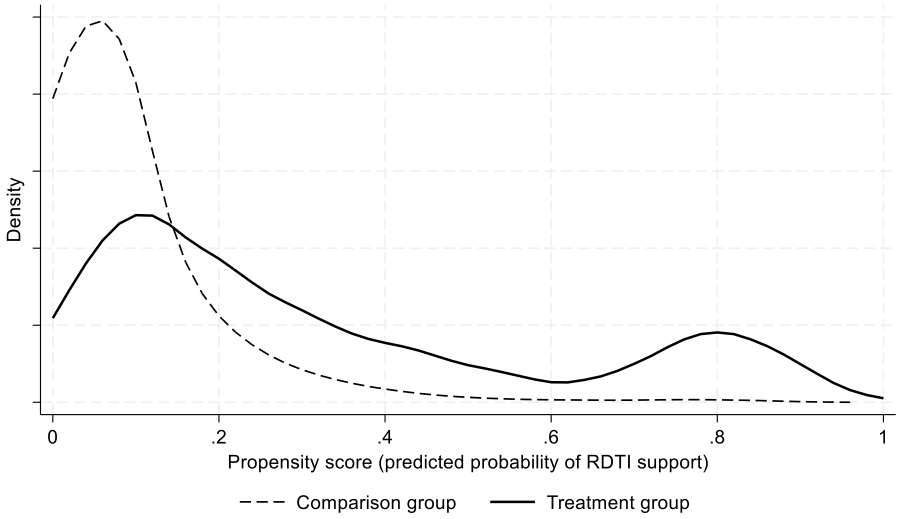
When comparing outcomes for treated and untreated firms, differences between the two groups can lead to misleading conclusions for two main reasons. First, the differences may be related to the likelihood ("propensity") that firms receive treatment. In this case, the outcomes for untreated firms do not provide a credible benchmark against which to judge the effect of the treatment because the outcome differences may just reflect the different characteristics. Second, the differences may be related to the outcome that is being judged, with treatment potentially also affecting the relationship between outcomes and characteristics.

We adopt a 'doubly-robust' approach to estimating the effect of R&D support (the treatment) on supported firms, following the approach of Hirano and Imbens (2001). This approach controls for the way that characteristics are related to who receives treatment (selection relationship) as well as for the way that characteristics are related to outcomes (outcomes relationship). The first component of this approach is a selection equation, which captures the relationship between observed characteristics (X_j^S for firm j in equation (2)) and the probability of being supported.

[66] Prior to 2023, the BOS question also explicitly mentioned 'marketing methods'. This was dropped in the 2023 questionnaire, with a substantial reduction in reported innovation rates.

[67] Impacts on innovations that are new to the firm could generate spillovers in the form of an improved ability to absorb innovations from elsewhere; impacts on new-to-the-world innovations could generate productive and knowledge spillovers to other firms. Genuine R&D is more likely to lead to 'new-to-the-world' innovations.

Appendix Figure 1: Predicted probability of receiving RDTI support (density)



Note: Figure shows kernel density measures with bandwidth of 0.05 and 51 evaluation points. Some values have been suppressed due to small numbers

Selection (propensity) equation

$$P[Firm\ j\ is\ supported] = P\left[T_j\right] = f(X_j^S) \quad (2)$$

Equation (2) summarises the selection into treatment, which is estimated using a probit regression model. We use the estimated model to derive each firm's predicted probability of receiving treatment, which is referred to as the 'propensity score', denoted $\hat{p}$. For illustration, Appendix Figure 1 shows the proportions of treated and comparison firms with different propensity scores. For untreated firms, there is a peak at low propensity scores, implying that many of the untreated firms look different from the sorts of firms that receive support. Conversely, there are relatively few untreated firms with a high predicted probability of receiving support.

The propensity score is used to select a sample of comparison firms that more closely resembles the treated firms. There are two main ways of achieving this – matching and weighting.[68] Matching involves choosing, for each treated firm, one (or more) comparison firms that have the same, or similar, propensity score. Matching could also be restricted to comparison firms that share a particular characteristic, such as being in the same industry. The weighting approach uses all untreated firms, but places greater weight on comparison firms with high propensity scores and less weight on comparison firms with low propensity scores. This is achieved by using a weight of $\hat{p}$/(1-$\hat{p}$) for each comparison firm, while each treated firm has a weight of 1. The effect is to ensure that the distribution of propensity scores, and therefore the distribution of characteristics, is the same for treatment and comparison groups. We use a weighting approach for our analysis, and gauge the effectiveness of propensity-weighted matching based on 'balancing statistics' (discussed below).

A key assumption of the propensity-weighting approach is conditional independence, meaning that, conditional on the propensity score, the treatment assignment is exogenous (or random). Accounting for the propensity score (probability of receiving treatment given observable

[68] Propensity score matching has been applied in several previous evaluations of government support for R&D (e.g., Benedictow et al. (2018); Sterlacchini & Venturini (2019); Yang et al. (2012)).

characteristics), the actual treatment status should not provide any additional information about the outcome. This implies that observable characteristics (matching variables) used to estimate the propensity score should be those that influence both the likelihood of receiving treatment and the outcome of interest (Caliendo & Kopeinig, 2008).

The outcomes relationship is estimated by a linear regression of outcomes on observed characteristics (X_j^O for firm *j* in equation (3)). Separate outcome equations are estimated (a) for the treatment group of (supported) firms, and (b) for the group of comparison firms. The outcome regression for the comparison firms is estimated as a weighted regression, using the propensity-based weights described above.

Outcome equations

$$Outcome_j = g_T(X_j^O) \quad (3)$$

Using the outcome regression estimated for treated firms, we obtain its predicted outcome with R&D support. Alternatively, using the estimated relationship (based on the weighted regression) between observed characteristics and outcomes for the comparison firms, we estimate the outcome that each treated firm would have experienced based on their own characteristics, and the relationship as estimated for comparison firms. This is the treated firm's estimated 'counterfactual outcome' (also referred to as their 'potential outcome') in the absence of receiving R&D support. The difference between the predicted outcomes with and without R&D support is referred to as the 'treatment effect' associated with receiving R&D support. Averaging the treatment effect across treated firms is our focal measure of policy effects.

Covariates

This section describes the variables that we include as characteristics (X_j^S or X_j^O) in the selection equation (2) and the two outcome equations (3). The list of variables is shown in Table 12 and includes industry, prior R&D support, prior R&D expenditure, prior Innovation outcomes, and prior size as measured by productive inputs. These are all variables that have been identified as relevant in previous evaluations of R&D support policies (Benedictow et al., 2018; Cappelen et al., 2012; Sterlacchini & Venturini, 2019; Yang et al., 2012). Most of the variables relate to the 3 years prior to the firm's first year of receiving a particular treatment (i.e., RDTI, Growth Grant, or Any main support). Observable characteristics should be captured prior to treatment assignment and not afterwards, as the latter creates the possibility that matching variables are influenced by the treatment status itself (Blundell & Dias, 2009).

While controlling for selection at the point of entry into support, we examine outcomes by year in the years following entry, and include some variables measured at the same time as outcomes. For instance, for firms entering into RDTI in 2020, we estimate the effect of RDTI support on their R&D expenditures in each of the 2020–2023 years, and include information about the other forms of support received and the source of the *RDExp* measure in each year (whether from RADS, BOS, or IR10).

Appendix Table 6: Balancing tests

	2020				2021				2022				2023			
	Std Diff		Var Ratio		Std Diff		Var Ratio		Std Diff		Var Ratio		Std Diff		Var Ratio	
	Raw	Wtd	Raw	Wtd	Raw	Wtd	Raw	Wtd	Raw	Wtd	Raw	Wtd	Raw	Wtd	Raw	Wtd
Recent ln(R&D Exp)	0.50	0.00	0.62	0.97	0.34	-0.01	0.91	1.03	0.73	0.02	0.59	0.90	0.23	-0.02	0.86	1.00
[Recent ln(R&D Exp)]^2	0.62	0.00	0.82	0.97	0.47	-0.01	1.16	1.02	1.00	0.01	0.88	0.92	0.30	-0.03	0.93	0.98
Recent R&D Exp growth	0.00	-0.02	1.07	1.34	0.16	-0.02	0.71	0.70	0.00	0.03	0.68	1.19	0.20	0.03	1.90	1.75
Recent innovation	0.03	0.01	1.04	1.01	-0.09	0.04	0.86	1.09	0.28	0.02	1.38	1.02	0.02	-0.04	1.04	0.95
Recent ln(Employment)	0.19	-0.01	1.47	1.14	0.05	0.00	1.68	1.49	0.36	0.03	0.78	0.76	0.11	0.00	1.17	0.99
Recent employment growth	0.18	0.03	1.89	1.28	0.07	0.01	2.14	1.64	0.20	0.05	1.24	1.04	0.28	0.01	2.57	0.84
Recent ln(Intermed Inputs)	0.23	0.01	0.81	0.99	0.11	-0.01	0.88	1.05	0.40	0.04	0.38	0.69	0.09	0.00	0.92	0.99
Recent intermediates growth	0.17	0.04	1.57	1.04	0.14	0.06	4.90	2.17	0.19	0.04	0.57	0.24	0.23	-0.01	0.41	0.66
Recent ln(Capital)	0.21	0.01	0.88	1.07	0.08	0.00	0.95	1.15	0.36	0.06	0.39	0.72	0.04	0.01	0.89	0.96
Recent Capital growth	0.04	0.03	0.56	0.23	0.14	0.05	3.10	1.44	0.14	-0.02	0.72	0.23	0.15	0.02	1.07	1.40
Recent *mfp*	-0.23	0.03	1.80	0.66	-0.17	0.01	1.62	0.91	-0.26	-0.06	2.47	1.01	-0.09	-0.03	0.98	0.99
Recent *mfp* growth	0.01	0.00	1.94	1.11	-0.04	0.04	0.32	0.11	0.05	-0.03	2.43	1.19	-0.16	0.00	0.59	1.41
Age <6 years	0.23	-0.01	1.40	0.99	0.17	-0.03	1.33	0.97	0.03	0.01	1.06	1.02	0.32	-0.02	1.69	0.98
Recent Growth Grant support	0.07	-0.01	1.32	0.98	0.56	-0.03	4.23	0.96	1.56	0.04	7.01	0.98	0.29	-0.05	3.22	0.88
Recent non-GG CAL support	0.37	0.04	1.39	1.02	0.50	-0.03	1.35	1.00	0.77	0.02	1.09	0.98	0.42	-0.03	1.33	0.99
Industry																
Food Product Mfrg (C11)	-0.01	-0.03	0.97	0.90	-0.13	0.01	0.57	1.03	-0.16	0.00	0.51	0.99	0.12	0.02	1.60	1.08
Manufacturing (C2*)	-0.01	0.02	0.98	1.04	-0.12	0.00	0.78	1.01	0.12	-0.11	1.22	0.87	0.09	-0.02	1.20	0.97
Wholesale Trade (F3*, exF34)	-0.06	-0.03	0.82	0.92	-0.02	0.01	0.95	1.05	-0.27	-0.01	0.32	0.93	-0.11	-0.01	0.68	0.96
Mach&Equip Wholesale (F34)	0.00	0.00	0.99	0.99	0.08	0.02	1.49	1.09	-0.04	0.00	0.83	1.00	-0.18	0.00	0.27	1.05
Info Media & Telecom (exJ60)	0.09	-0.02	1.55	0.91	0.05	0.00	1.34	0.99	0.15	0.09	2.05	1.43	0.19	0.01	2.26	1.02
ProfTechSciServ(Ex M691/M70)	0.00	0.01	1.00	1.03	0.20	-0.01	1.52	0.98	0.02	0.13	1.04	1.39	-0.12	0.01	0.74	1.03
Scient Research Serv (M691)	0.19	0.00	1.95	0.99	0.28	0.02	2.58	1.06	0.01	0.02	1.05	1.10	0.19	0.01	2.10	1.03
Computer Syst Design (M70)	0.16	0.00	1.39	1.00	0.19	-0.03	1.48	0.95	0.52	-0.03	2.36	0.98	0.34	-0.02	1.96	0.98
Other Service industries	-0.22	0.00	0.62	1.01	-0.30	0.00	0.48	0.99	-0.29	-0.04	0.46	0.86	-0.27	0.02	0.52	1.06
Other industries	-0.09	0.02	0.74	1.08	-0.17	0.00	0.58	1.01	-0.23	0.00	0.43	1.00	-0.14	0.00	0.69	1.00

Appendix Table 7: Impact of restrictions due to data (un)availability (by RDTI entry cohort)

	2020 entry cohort	2021 entry cohort	2022 entry cohort	2023 entry cohort	Pooled entry cohorts	
Distinct RDTI firms (2020-2024)					2,463	
Distinct RDTI firms (2020-2023)					2,349	
Receiving RDTI support	561	243	465	288	1,557	100%
Supported and linkable to LBD	555	237	456	285	1,533	98%
Ever has RDExp	492	204	402	207	1,302	84%
Has RDExp in prior 3 years	450	189	378	171	1,191	76%
Has RADS in prior 3 years	378	165	351	138	1,032	66%
Has RDExp in each of prior 3 years	303	111	258	75	747	48%

Notes: Counts have been randomly rounded to base 3. The 'Pooled entry cohorts' column reports the number of distinct firms.

Appendix Table 6 reports the results of statistical balancing tests that summarise the effectiveness of the propensity weighting for aligning the characteristics of treatment and control firms. For each RDTI entry cohort, the table shows the raw difference in mean characteristics (as a standardised difference – in units of standard deviations), and the difference when weighted. For instance, the top left entry shows that the 2020 entry cohort had higher recent R&D expenditure (by 0.5 standard deviations) than the potential comparison firms. When reweighted, the difference was 0.00. Weighted differences close to zero indicate a good statistical balance.

The table also shows the ratio of variance between treated and comparison firms before and after reweighting. Using recent R&D expenditure for the 2020 entry cohort as an example, prior to weighting, the variance for treated firms was 0.62 times as large as the variance for comparison firms. After weighting, the ratio was 0.97. Ratios close to one indicate good matching.

The balancing tests in Appendix Table 6 are based on the regression sample used for estimating the entry-year effect of RDTI support on R&D expenditure. A graphical summary of the concordance of propensity scores across the treated and (weighted) comparison groups is shown above (Appendix Figure 1). Similar results were generally found for other regressions.

Sample restrictions

The requirement that outcomes and key covariates are observed leads to the unavoidable dropping of some observations. Appendix Table 7 summarises some of the main reasons for sample loss. The unavailability of R&D expenditure data for 2024 limits our estimation to 2020-2023. Of the 2,463 firms that appear in RDTI administrative data (documented in Appendix Table 4), there are 2,349 in the 2020-2023 period. Of these, 1,557 are supported (compared with 1,752 for 2020-2024). The majority of these (1,533, or 98%) can be linked to the LBD but only 1,302 (84% of RDTI-supported firms) are *ever* linked to either the RADS or BOS. When we restrict attention to those for whom we can observe some R&D information in the 3 years prior to entry into the RDTI (a key measure used for identifying comparison firms), we are left with 1,191 supported firms (76% of all supported firms). It is this restriction that we apply for selecting the estimation sample as it provides a balance between coverage and data availability.

As documented below, the number of firms that can be used when estimating impacts is further restricted by missing data on other key outcome variables (positive R&D expenditure,

Appendix Table 8: Sample sizes for entry-year observations

	RDTI		GG		Any main	
	Unsupp	Supp	Unsupp	Supp	Unsupp	Supp
Outcomes						
log(RD expenditure)	5,814	771	7,923	261	8,655	843
Innovation	7,245	351	10,500	144	14,940	381
Productivity (mfp)	11,229	759	20,142	294	23,883	933

Note: Counts have been randomly rounded to base 3.

innovation outcomes, or *mfp*). Appendix Table 7 documents the impact of imperfect links and data availability only for RDTI-supported firms, although a similar pattern of restrictions also affects our analyses of other forms of government R&D support.

In addition to the sample restrictions imposed by the data limitations discussed above, we also limit our estimation to firms within the business sector. We apply the definition of the business sector used for the RADS (Statistics New Zealand, n.d.). This definition is based on institutional sector classifications combined with business type and ANZSIC industry.

Sample sizes vary not only by the R&D-support treatment (RDTI, Growth Grant, Any main support), but also across years. There are fewer observations for outcomes a year after entry than there are in the entry year. Post-entry outcomes are also restricted by data availability for more recent years: e.g., for RDTI support, outcomes 3 years after entry are observed only for the 2020 entry cohort due to the unavailability of outcome data beyond 2023. Where *mfp* is the outcome of interest, data are unavailable after 2022, which limits our ability to detect productivity effects on supported firms. We expect that where such effects occur, they are likely to emerge with a lag of several years.

Appendix Table 8 shows the number of supported and unsupported observations used in the estimation of entry-year treatment effects. For RDTI support, these are smaller than the counts shown in Appendix Table 7 mainly due to missing values for outcome variables in the entry year (zero *RDExp* results in a missing value for log(*RDExp*); innovation and *mfp* outcomes are not available for all firms). Some observations are also dropped where particular combinations of characteristics are observed only for treated or only for comparison firms.

Comparison firms are matched to supported firms in the year of entry. Firms that received support in other years are not included as comparison firms. For RDTI support, firms that appear in RDTI data but are not observed with non-zero support are excluded from both treatment and comparison groups. When estimating the treatment effect of RDTI support on log(*RDExp*), we estimate a different selection relationship for each entry cohort (2020, 2021, 2022, 2023). For all other estimates, we estimate a pooled selection equation with separate entry-cohort intercepts, due to the inability to identify all of the relevant cohort-specific parameters.

Identifying remaining bias

In order to assess possible bias in the estimation, we conduct 'placebo' tests and estimate treatment effects for each of the four years *prior* to firms' first receipt of support. For instance, we match firms that enter RDTI support in 2020 to comparison firms in 2018, based on characteristics observed for both sets of firms in the 3 years prior to 2018. We would expect there to be no treatment effect in 2018, as outcomes in 2018 should not be affected by support received in 2020. In practice, we observe significant treatment effects for some outcomes in some of these pre-

treatment years. We interpret this as remaining selection bias due to unobserved differences between treated and comparison firms.

We calculate bias-adjusted treatment effects for the years following support, adjusting by the difference that is estimated in the 2 years prior to entry into support. Thus, if expenditure growth in supported firms was on average estimated to be 5% higher prior to support than in comparison firms, we would reduce the estimated post-support treatment effects by 5%. This adjustment is appropriate if the size of the bias is stable over time and is unrelated to support. The assumed stability is an untestable condition that we impose on our estimates.

Estimation

Estimation was done using the *teffects* command within Stata® (StataCorp, 2023). We use the 'ipwra' option to estimate inverse-propensity-weighted and regression-adjusted treatment effects, as outlined in section B.2.1.

Robustness to choice of method

In addition to the 'doubly-robust' estimates that are used in this report, we considered a range of alternative specifications. The impacts of RDTI support on R&D expenditure were estimated using (a) inverse propensity weighting (i.e. without regression adjustment); (b) regression adjustment only (i.e. without inverse propensity weighting); and (c) nearest neighbour matching (Mahalanobis and propensity-score matching; 1 to 5 nearest neighbours). Regression adjustment alone was most sensitive to the choice of covariates, yielding a range of (sometimes implausible) estimates. The other methods produced estimates that were broadly similar to the doubly-robust estimates that we present, though generally with somewhat less precisely estimated treatment effects. We consider that the doubly-robust estimates provide the most reliable and representative set of estimates.

Appendix Table 9: Estimated treatment effects

Support indicator	Outcome	E-4	E-3	E-2	E-1	E=Entry year	E+1	E+2	E+3	E+4	E+5	E+6
RDTI Support	R&D expenditure	0.548***	0.346***	0.248***	0.350***	0.547***	0.623***	0.694***	0.654***			
		(0.0765)	(0.0610)	(0.0551)	(0.0486)	(0.0513)	(0.0591)	(0.0873)	(0.110)			
	Innovation	0.0602*	0.0528	0.0113	0.0675*	0.0501	0.0468	0.0856*	0.116*			
		(0.0275)	(0.0277)	(0.0261)	(0.0275)	(0.0285)	(0.0355)	(0.0422)	(0.0515)			
	Productivity (*mfp*)	0.151*	0.0392	-0.0174	-0.0352	-0.0990	-0.145	-0.122				
		(0.0711)	(0.0494)	(0.0437)	(0.0456)	(0.0553)	(0.0920)	(0.102)				
GG Support	R&D expenditure	0.467***	0.382***	0.540***	0.687***	0.604***	0.849***	0.765***	0.766***	0.772***	0.838***	0.707***
		(0.113)	(0.109)	(0.102)	(0.0843)	(0.0761)	(0.0806)	(0.0908)	(0.0802)	(0.0847)	(0.103)	(0.116)
	Innovation		0.0817	0.0486	0.0890*	0.0530	n/a	0.125***	0.121**	0.149***	0.115*	0.0965
			(0.0419)	(0.0449)	(0.0356)	(0.0353)	n/a	(0.0370)	(0.0381)	(0.0398)	(0.0493)	(0.0509)
	Productivity (*mfp*)	0.0220	-0.0864	-0.0789	0.0344	-0.0617	-0.0213	-0.0643	0.0717	0.0656	-0.0192	0.0106
		(0.0535)	(0.0696)	(0.0758)	(0.0597)	(0.0624)	(0.0490)	(0.0849)	(0.0848)	(0.0824)	(0.0693)	(0.0680)
Any main Support	R&D expenditure	0.383***	0.295***	0.311***	0.552***	0.542***	0.701***	0.633***	0.683***	0.740***	0.901***	0.912***
		(0.0889)	(0.0705)	(0.0710)	(0.0573)	(0.0514)	(0.0569)	(0.0645)	(0.0790)	(0.0817)	(0.0956)	(0.120)
	Innovation	0.0208	0.0333	0.0132	0.109***	0.0501*	0.084***	0.093***	0.105***	0.145***	0.113*	0.131**
		(0.0284)	(0.0272)	(0.0267)	(0.0240)	(0.0240)	(0.0246)	(0.0277)	(0.0303)	(0.0371)	(0.0453)	(0.0473)
	Productivity (*mfp*)	-0.0275	-0.00601	-0.0494	-0.127*	-0.126	-0.0587	-0.0226	-0.0488	-0.148*	-0.0632	0.0687
		(0.0345)	(0.0407)	(0.0449)	(0.0515)	(0.0648)	(0.0591)	(0.0534)	(0.0636)	(0.0730)	(0.0727)	(0.0670)

*Notes: Standard errors reported in brackets. Significance levels: * p<0.05, ** p<0.01, *** p<0.001*

Appendix C Supplementary qualitative evidence

C.1 Qualitative insights on impact

This subsection contains illustrative quotations that support the various qualitative findings regarding impact, discussed in Section 5.3. It includes illustrations of findings comparing the RDTI to Growth Grants, the impact of the tax incentive on R&D activity, attracting and retaining R&D activity in New Zealand, and business preference for stability. Quotations illustrating the impact of the RDTI on R&D activity are separated into two subsections to distinguish the positive (A) and more reserved (B) perspectives on the issue. The former (A) encompasses the view that heavier compliance costs associated with the RDTI were more than offset by the ability to access greater levels of R&D support, whereas the latter (B) encompasses a countervailing view that Growth Grants provided more proactive and substantial support.

C.1.1 Comparison of RDTI to Growth Grants (A)

- *"I mean, there's a lot of compliance. So the heavy calculation and, you know, we've tried to leverage our existing processes and layer things on top of that but when we look at the benefits that we get as a company, the payback is still quite large because of the size of our R&D spend. But it is heavy compliance compared to the previous regime, but I guess worth it."*
- *"We saw more money on the table with the R&D tax credit. We also saw more work to comply and that's proven to be the case…I mean, the administrative overhead and cost is at least an order of magnitude more, but probably two orders of magnitude more…,I guess we're getting more money from the new scheme than we did from the old scheme."*

  "There were some grants and programmes that we were doing, but it was nothing like we were getting now….you know, where this (RDTI) is, you're actually getting the reward for the work that you're doing and it's being recognised as that. So, yeah, we're getting far more uptake in this than anything else"

  "A couple of the differences that we like with the new incentive…if we do contract R&D for an offshore part of our group and we get paid to do that R&D. We get an R&D service fee doing work here in New Zealand for another part of our wider group…that spend can still qualify for the tax credit, whereas I think under the previous Growth Grant, it probably wouldn't have. Another difference, which is a good difference in our view, is that under the old scheme, if you capitalise some of your R&D for accounting, so you didn't expense it, that couldn't qualify for the grant. Whereas under the tax incentive, capitalising it for accounting doesn't exclude you. It's not linked to the accounting treatment. And I guess we do at times do both of those things in our group. So we do contract R&D for other parts of the group and we do capitalise some stuff and still claim the tax credit on it. So that's partly why we are eligible for more money under the new scheme. The mechanics are different. It's not just that the caps are different, it's the mechanics are different too. And we think those differences actually make sense for the scheme. If it's all about creating good R&D jobs in New Zealand, it doesn't make sense to do what the old scheme did and exclude that sort of stuff."
- *"It's been great for us from a financial perspective. It's provided us with additional funding that we previously couldn't access under a Callaghan Growth Grant. We previously used*

Callaghan Growth Grant. Major difference between the two was that this scheme doesn't distinguish between operational and capital expenditure. So we were doing some pretty major IT development and previously we couldn't access any R&D funding for that. We've had some pretty major, quite different types of IT projects during the last few years. And as well as that, there's the overheads and depreciation allocation. So that has also increased the level that we were able to claim."

- *"We are thankful for the mechanism, the way it's been set up and the cash out rather than just tax credits. So that's much appreciated. We did transition off the Callaghan Growth Grant. We were partaking in that, which was 20%, but that was 20% pre-tax. So the corporate tax rate of 28 cents, that's about, you know, 14.6 or something. So it was, you know, it's a slight improvement. I think the compliance efforts under this one have been a lot higher than what it was under Callaghan. I guess that's internal time, but also the amount that we are spending with external advisors. But at the same time, because it's a, I guess, a policy setting that's available for all companies that qualify as opposed to the Callaghan Growth Grant, which you had to apply and be approved or selected, and you had to be of a certain size and substance. While there was no real change for XXX, I do endorse the fact that it's not a picking a winner anymore. It's a policy setting that's available for all companies equally."*

  "I think we can identify more opportunities with the RDTI. This year, we're thinking about going for the General Approval path for some of our other projects that are not necessarily part of the framework. It's just not part of our usual development… R&D program. We may be able to claim even more than just what we had with Callaghan Growth Grant."

C.1.2 Comparison of RDTI to Growth Grants (B)

- *"As far as R&D building products that will build wealth…I think we could, we should go back to doing the Growth Grants, you know, we should be a much more proactive…I think the 'I will give you 15% of whatever has been previously approved' just doesn't cut it…15% rebates just don't cut it."*
- *"For all the extra work we do and all the extra compliance and all the extra fees we pay our advisor, I don't think …our claim is much different than what it was under Callaghan Growth. I think there's a huge amount of work. We pay probably 10x fees to our advisor. With a huge amount more compliance in order to basically submit for the same amount. You know, with the company hat on, it's a bit of a pain in the butt for little benefit."*
- *"If I compared them…the RDTI sucks up a lot of time and causes a lot of frustration. Okay, it's not necessarily distracting us from doing R&D, but there are key people that do get caught up and it does distract them for a period of time. The R&D Growth Grant was really easy to do, didn't tie up those people, so that was useful."*
- *"Our experience has probably not been great and it's probably a number of reasons. One is just the level of effort that we've put into it has been too great for us, given the projects that we do. When we moved on to it from the Callaghan grant and the grant was good because it looked at basically at all of our R&D and gave us sort of a percentage back. It was one return a year, really, in terms of what we did. So far easier. In terms of the current RDTI, for it to be really worthwhile for us to actually do it, given you have to make a return in a submission for each project, it was only on our bigger projects."*

  "We used to be able to basically get a percentage of that team and a percentage of our

overhead costs for that team for all the things they used to do. But instead, it moved to the RDTI where it became much more complicated for us in terms of being able to prove the uncertainty, given the size of the projects and things like that. Our other big project that we've got is an IT project that and that's actually an internal software piece that hopefully one day we will be able to sell, but it's a big long-term project. I guess for us, we went from something that was pretty easy, was giving us something like $3-400k a year. And since then, we've only been averaging about $70k of tax incentive since then."

- *"In comparison to the Callaghan Innovation (Growth) grant that we have, from a financial perspective, the admin is quite onerous. Even though we are on this significant performance game…. But because of the complexity and the number of details that the IRD now requires, we just have to go and prove everything. Even though in terms of the amount that we claim, it's so immaterial. The difference is almost no difference between what we used to do and what we now have to do. And so, yeah, we've had to add in extra resource and that's just from the finance side."*

  "In terms of getting like-for-like on your R&D investment. And yes, for us, it's no different because initially there were talks around, 'oh, you might be able to claim more', but we haven't really found that. It's essentially the same. There's pretty much no difference. The only thing is the onerous pieces on the admin side."

  "I think the Callaghan Innovation model was high trust, like we submitted it and we didn't get audited on it often. You know, they might come back with a couple of questions at year end, but it was also like you're putting it in yourself, you're submitting it and they trusted what we had put in. Whereas with this scheme, it feels like okay, we need to put it in and then we need to justify every single line item, every single invoice. Is it eligible versus ineligible? Are there parts on that invoice that's not eligible versus ineligible? It's just the matrix and the depth of the information that we need to prove to the IRD. Whereas with Callaghan, it was, we submitted it and they trusted us and, you know, we can prove it. Our company grows like 20% year on year and it's not because we're standing still."

C.1.3 Impact of RDTI on R&D activity (A)

- *"We would still do it (R&D) however the pace of progress would be slower. The ability to follow through would be lessened. It's a boost I would say…. when developing a product. And when researching the concepts that are required. You can't anticipate failures. I mean, you do anticipate failures, but you don't know what will fail. That's the whole point of doing this. Let's say we kind of gaze into our crystal ball and come up with an idea that 50% of our trials will fail and we'll have to pivot and try something different to solve this. You know, if 60% of our trials fail well, that means that we're not…we have to fund that somehow. So that's where having that extra boost really, really helps."*

  "We are an R&D-centric firm and always were. We have stepped it up a lot. I think the funding that comes in probably helps us maintain R&D to a higher level than what we may otherwise be able to afford, given that we're in a cash burn position. So we're reliant on the shareholder to put funds in at the moment and have been in that position for the last four or five years to effectively carry on R&D at the level it is. So the extent that RDTI cash is coming in does provide a buffer."

- *"We probably start in the three to fours (i.e., TRL). We don't start with I wake up in the night with a great idea. Here's a TRL level minus three. We're not that kind of company.*

So, we probably start off with threes and fours. We try not to bid anything that's less than a six or a seven…the RDTI gives room to move in that lower TRL. There is uncertainty as we would take a TRL (up to) five and six and get ourselves up to we've fielded it now (i.e., tendered).”

- *“I can almost guarantee there'll be some projects we wouldn't do. We have a resource group of engineers whose sole job is to look at blue sky. So there's no business case. There's no market, but blue sky, what's next? RTDI plays into that space in our minds….we definitely consider RTDI as a driver for what, for how much flexibility they get to play in….*

  …for us in engineering, we're going RTDI is a key driver for that. If we didn't have it, we'd think twice about these things. There's no doubt about it.

  We're a multi-million dollar company. So, you know, we wouldn't go broke if RTDI didn't exist, but I think it's an enabler for that blue sky resourcing…and the other thing I would add is we're able to publish that we support blue sky engineering. And there has been real instances where we've recruited people and they've been attracted to us because of that. So it's impossible to say that RTDI did not have an influence on that. Without RTDI, we wouldn't be doing as much blue sky.”

- *“We wouldn't be doing R&D to the same level if we didn't have the (RDTI) because ultimately there's a safe zone within an organisation that you want to be. We can't just throw so much money at R&D and the organisation not be sustainable …if we didn't get (it) we wouldn't be able to accelerate our R&D….it also means that we can have the opportunity to look at more areas. And rather than just penny pinching and, ‘oh, we'll only do one or two things,’ it gives them a bit of freedom to actually go, ‘hey, this is actually a really cool idea. Why don't we give it a shot? It's within our budget, let's try’.”*

- *“It doesn't change what we're doing. However, if we weren't receiving it overall, we probably couldn't spend as much as we are. Does that make sense? Because it's four and a half million dollars for us, we would definitely have to peg things back a bit if we didn't have that in our bottom line. We're not choosing to go and do something because we get RDTI….but absolutely, we would definitely have to scale back some of our project work if we didn't have it”*

- *“(It) enables us to do more R&D than we would otherwise do. It really is just a question of scale, (it) simply enables us to do more. Also, of course, in a more philosophical level playing field thing, we are competing against imported products where their governments are subsidising their R&D efforts. It's rather tough to be competing on a non-level playing field. From a philosophical point of view, regarding R&D, it enables us to operate on a relatively level playing field”*

- *“We’d already greenlit the entire project and some of the approaches to start with, independent of knowing whether we had the RDTI. But then certainly once it was granted, it then just improved our risk profile across the whole project. Just when you're doing a software startup, every few hundred thousand dollars buys you a few more months of runway, just gives you more confidence across the whole project. I think because it wasn't guaranteed, we never relied on it in our plans….but it certainly made a difference once it did….we did kind of double down. We did increase our investment in that particular project as the project went on.”*

  “I'm confident saying that the incentive contributed to that because without that, we would have had the pressure to do things faster and cut corners and not fully implement

and not fully exploit that R&D work. Particularly when it's R&D that lasts over 12 months or longer."

- *"A lot of the type of work that we're doing, we would still do. It would be as innovative, it would be the same type of work, because we have to do it, that's our business. But this RDTI allows us to do more of it, and to take a little bit more risk in certain areas, be more innovative, because we can. If we didn't have it, we'd have to really lean down the ship."*

  "Essentially, it's just allowing us to employ more people, to take on more students from university, or tertiary institutions, to give them their start. So, we're able to explore more avenues within New Zealand to do that type of work. If we didn't get it (RDTI), we would be under more stress in financing some of the things we do."

- *"End of the day, even though it's a tax credit, it means that bottom line, our R&D team, our department can get through more than it would without the extra funding. Obviously, we have a strategic budget, but at the same time, that part of the budget is subsidised by the RDTI and without that, we would probably pull back because we are still a homegrown company. And there are expectations around, you know, not seeking external investment VC and things like that."*

- *"What it does is it amplifies what we can do. So it essentially allows us to do more, more quickly, bigger, faster, better, you know, I think. That's really the key aspect, because, like, for example, if you take into account our XXX project, that has been a crazy investment over a very long time. No kind of ROI in the early days would have made that look like a viable project in the beginning. But, you know, now it's, it's really starting to grow, and we've got really huge opportunities overseas, which we've now got contracts."*
  "It gives you that fuel of that additional cash flow to, or cash to continue to reinvest, because you don't often see the returns from it immediately. But over time, it becomes incremental, and it does become your point of difference."

  "It's certainly given us the ability to invest in additional resource to do more. And, like, for example, with that project, we've probably got another 20 or 30 spinoff projects that we want to be able to invest in if we had the resources and time to commit to those."

- *"In a nutshell, I would say that the RDTI has been fundamental in our growth of our business. Yeah, without hesitation….*

  … It's probably more from a case of just survival, essentially. I know the brains behind R&D might've thought it'd be a bit of a boost, a bit of icing on the cake to accelerate, but it's more cashflow to survive. Without it, we probably wouldn't have survived… .

  … Cash investors, they were always wanting to see a finished product before investing. If we had had to rely on solely cash coming in from share capital, no, we probably wouldn't have made it….

  … It's given us time to develop where we need to get to before the cash investors kick in…XXX would not exist without RTDI."

- *"It wasn't until we got very clear understanding on what they wanted, then we started to progress. We knew what the bar was. We knew what (was) required. …It gave us the ability to look at the different business units, in particular our manufacturing and engineering groups, to say, you know, 'hey, look, this is what these guys do in R&D. If you want to have less administration and, you know, incrementally better results out of what*

you're doing…then let's get you guys in the same boat, get you aligned on the same process.' And 2024 is the first year we've done that for them. So, not only have we seen benefits out of the initial stage, we've actually grown our claims in the last four years because we've brought the different business units into them."

"We spent three years putting some GAs through with them, getting them an understanding of what they're doing and an education base on what you can and can't claim against…fundamentally, the biggest hurdle we had at the start, and everybody wanted to know, what's R&D? In your view, what's R&D? In a scientific and lab point of view, from the R&D centre, it was a little bit easier. From an engineering manufacturing point of view, there was a lot more ambiguity. And when we asked for, 'hey, would this meet the criteria?,' there was a lot of, ,well, we can't tell you an answer to that one., So that first three years was really just testing the boundaries on what you couldn't claim against. And then from there, providing a lot more education pieces out to the wider businesses. So, 'yes, what you do does qualify. If we do think that there's a lot that we can claim against, then let's align you with the R&D process that we have at our R&D centre.' And it's working really well lately….So the R&D centres probably plateaued on their eligible expenditure. The incremental cost and expenses come from outside of the R&D centre. So that's a huge success story for us."

C.1.4 Impact of RDTI on R&D activity (B)

- *"It is more of a nice to have than a must have. We're not only doing the R&D because we can get funding to do that activity….I think the ambition is there to do this anyway. It's just good that we can apply to get the funding to do it. So the company would have done R&D in the past and wouldn't have looked at the tax credits. I think it's more that we're going to be doing the projects anyway. And so we need to be applying for this money, because it's available for the type of work that we do."*
- *"We were just doing what we're doing. Obviously, you can't bank on anything, any cash coming in, so you just kind of start the process and then maybe hope it comes in. It didn't shape or inform any of our decisions. It would have been a nice to have it. You just kind of get on and do."*
- *"Our R&D spend is somewhat set by the revenue and the turnover of the business….(it) is also set by product line objectives, which feed into our major procurements. We don't do consumer goods. We do systems that the government buys that run for 10 to 15 years. And it's a high-stake tendering process. A lot of our customers, we can predict when they're going to go to market to buy again. And we will do targeted R&D to be ready for a big customer procurement. We don't do whiteware like Fisher & Paykel - I make it, someone buys it. If we spend five or six years chasing a market, that would not be unusual."*
- *"Essentially, I would say the RDTI, it's just a windfall. So we just treat it as part of the normal accounting stuff you have to do, as if it was like paying your tax, you do this as well and you get some money. We don't really, it doesn't guide or push or enable us particularly to do much more than that at the scale of RDTI."*
- *"It's a support mechanism, really. We're not looking at what we're doing and going, yes, we get 15% back if we do this or anything like that. We would still do a lot of the projects that we're doing, because we see commercial incentive to do it."*

"As a privately owned company, we don't do a lot of R&D that we aren't confident that

we can actually do it. While there is still that level of, 'yes, we know that we won't succeed all the time.' We don't want to enter into projects where there is a massive degree of failure, because that's a risk for us. The projects we do, we do them because we can see that there is a commercial need for it, or there is some sort of outcome at the end of it that will be positive for the business. We have to have a level of confidence that we can actually succeed in it as well. For us, I don't think the R&D incentive has really helped us to take risks or anything like that in terms of that R&D."

- *"We would complain bitterly if we didn't have it. You'd complain because there's an amount of dollars that we're not getting….But none of it incentivises us…..I can see it might provide some of that sort of mentality for a newer firm. It's just the scale of what we're doing, I think it's the wrong scheme."*

  "If you loosen it up, it'd probably make it easier for us, or we could claim more dollars or whatever. So there used to be benefits out of it, but it's only the less hassle rather than actually the incentive side of it."

  "I think it's really important because it is a government thing, it is out there to try and build the economy, and obviously incentivise companies to grow, to do the riskier things, to come up with the better products. And it's not doing that."

- *"It's not a big enough incentive. It's a little bonus…. it's not enough that I would, well, put it this way, I would never shape a project around RDTI. You know, I'd never say, man, there's an opportunity there. I can get RDTI. I'm going to go and hire five guys, you know, and what I get back from RDTI would make all the difference"*

C.1.5 Attracting and retaining R&D activity in New Zealand

- *"XXX has R&D centres in various parts of the world. Everywhere else there's R&D, there are also incentives. So it's quite a competitive space. So we need something sensible and significant to be able to retain the R&D we've got.*

  ….we have really good data about the other incentive programs that other countries are given, and we're kind of measured against that as well. So we're very acutely aware of that…without the RDTI or something, yeah, there'd be a serious question about the long term future of us doing R&D in New Zealand."

- *"The RDTI certainly improves the effective bang for the buck, and it improves why you might bring work to New Zealand versus, you know, (some) other locations around the world (that) are more expensive than New Zealand. It's another incentive why to bring work here"*

- *"Every chance (we) get, if somebody from corporate is coming to New Zealand, we make sure we sit down and talk to them about RDTI so that if they're thinking about expanding. Because we're not the only R&D service centre, there's lots in other countries…we try to give them a sales pitch on 'if you want to hire somebody, hire them in New Zealand and here's why.' And it can't just be any type of R&D work that it has to be RDTI eligible and be related to a core activity that's happening here in New Zealand. So even how they are positioning their R&D work, you know, they give us all the supporting, but not the core. Then that doesn't count. So just trying to educate them as well."*

  "It's making them think twice when they want to have a R&D new hire is New Zealand the best place to be? I think that there's been some behaviour change just in where they hire

people. But, yeah, there could be even more because if we start to get good teams here, then just because of the calibre, then it becomes more and more in New Zealand. Right. Because that's where the managers are and things like that."

- *"We set up a laboratory in XXX. We had XXX staff there. But when we were looking to rationalize our R&D spend…RDTI availability in New Zealand, it was a factor in deciding to retrench our laboratory. We effectively closed it, retrenched XXX people, and brought the spend and activities back to New Zealand. So that tax credit had a direct bearing on that decision."*
- *"The money or the tax relief we get from the scheme today, does that affect how much we do in New Zealand? Yes, it does….do we employ more people in the R&D space and do more in New Zealand? Then the simple answer is yes. I mean, if the scheme was to disappear and not be replaced by something, then that would put in jeopardy us continuing to do R&D in New Zealand. If the scheme were to reduce, then that would probably affect the amount of R&D people that we have in New Zealand. Subsequently, if the scheme increases, then we'll almost certainly employ more R&D people and do more R&D in New Zealand."*
- *"And there's so much that actually plays into that. But the R&D tax credit does help with that. Like it does. It is a component of that. But so is the company tax rate. So is, you know, do we have good access to the people that we need here? For us, it's 'do we have good access to, you know, a decent hospital system close to where we're doing R&D?' So there's a lot of stuff that actually plays into that. But the R&D tax credit is an important part of that. And I think as a result of it, we do more R&D than we otherwise might be doing right now. And second, we're making the decision to keep on doing more R&D in New Zealand as well….the R&D tax credit plays into that. It's not the only factor, but it is an important factor. And maybe the way I should actually frame that, it's not actually the R&D tax credit. It is the incentives that we get to do R&D in New Zealand…. New Zealand's not a bad place but it's also probably not the best place to be doing R&D. We're kind of middle of the road, really."*
- *"15 percent returned on eligible R&D after you've spent it. That's a pretty sort of low bar. Sort of almost a minimum requirement when we look at what other jurisdictions are getting within our own wider group. That they can range anywhere from a few percent more than that and depending on what it is and what's eligible and what's not, you know, up to 25, 30 percent. But we understand the New Zealand climate and its affordability at the moment. So we're not walking around putting our hand out. But certainly, I think it's probably something that needs to be looked at going forward."*

  "Our product development, say an engineer, product development, research and development engineer in New Zealand. We have very good costs and metrics on the cost of that offshore in different jurisdictions. We even weight that with the productivity, how many hours work, because that's different in different jurisdictions and the capability ratio, like how capable those people are. At the moment, New Zealand stacks up pretty competitively globally at that level. But that gets very much balanced out against the overall incentives. I think XXX (corporate) would actually like to see more product development done in New Zealand but that somewhat gets watered down by the fact that the overall incentive is quite low. It's keeping it here at the moment, but it's not incentivising us to do more or (more) in New Zealand."

  "And then just the final thing, you know, the world's got a lot smaller place. We're competing globally. You know, a lot of people, when I talk to them, they get very myopic

about New Zealand. And it's like, you know, you're competing globally. So you've got to consider what the global competition and playing field's like. And at the very least, what we want is, at the very least, we need a level playing field in this space or it's not going to happen here. If you want to…if the government at the right time, when fiscal time's right, if they want to push the lever forward, you know, to pull more R&D into New Zealand, then they're going to have to increase the incentive."

C.1.6 Business preference for stability

- *"I would say that (for) research and development companies, or any company that has a research and development aspect to it, it is a multi-year complex landscape to navigate. If the rules disappear one year and then reappear the next year, programs disappear, programs reappear, it makes it just a terrible, terrible nightmare."*

  "If they could provide certainty that the New Zealand government is committed to innovation. And this (RDTI) program is here to stay. I think that would give people a lot more peace of mind and it would allow us to kind of plan our research in a much more realistic way."

- *"We did transition payments as we came off the Growth Grant and we went into RDTI, which I think was good. Part of that was we were still in the uncertainty of I don't know what RDTI is….. I used the word uncertainty. If there's one word that I think is really important for business, it's certainty"….*

  …."Within reason we don't care what's going on as long as it's consistent. So, as we came off the growth grants into RDTI, we certainly went through a 'not-so-sure here' (phase). And therefore, how does the business plan?...If there's uncertainty in the business, we'll potentially go conservative on some of the decision making."

  "I think the government, in my personal opinion is doing good things to bring efficiencies. And that does require change. As we transition from Growth Grant to RDTI, fixing things that aren't broken does cause uncertainty in turn and inefficiency. So, if you deem it not broken, I would hesitate to try and fix it."

- *"For any business in New Zealand, changing of schemes is expensive. That's the one thing that businesses don't want. We know we've been in New Zealand for X years. Most of the other major corporates or larger organisations or companies that have been around for a while that you'll talk to, I would imagine you'd get the same feedback, going from one scheme to another is expensive. You know, re-doing that, embedding it in at a high level is the most expensive thing."*

  "For a scheme to actually work as it's intended, it needs to be certain enough that taxpayers or companies will take into account the incentive at the time they're making decisions around where they're going to do things and how much they're going to do. So whenever you change to something new, you're in an uncertain environment and it takes years for something new to bed in and to get taxpayers, companies confident enough to understand how it works to kind of bake in the fact that they're probably going to get an incentive for this sort of project or this sort of activity."

- *"You could choose a different mechanism….you could have gone down the Growth Grant way and changed that scheme instead, it may not make that much difference. I guess what I would say right now is that any change is a pain for us. We'd much rather keep on going with the R&D tax credit, basically because it is the system that is there, and anything*

else is just a whole lot of work. There's no point in changing it as far as I can see. Not for a firm like us."

- *"In terms of moving R&D at the exec level, you can move stuff around like a chessboard. In reality, we have centres of excellence and yes, I can take it from here to there. It reads really well as an accountant's kind of PowerPoint slide (but) it doesn't fly so well. I think you need at business level and government level, you need to build centres of excellence and businesses will move because of those kind of 15%s. But there's a barrier to moving as well, which is where the certainty (is important), if it changes all the time, that unsettles people."*

C.2 Qualitative mini-cases: RDTI compliance costs experienced at different levels of eligible R&D expenditure

In the remainder of Appendix C, insights are provided on the appropriateness of compliance costs for supported firms we interviewed. We present these in the format of 38 mini-cases (one firm is not included), with each bullet reflecting the compliance experiences of a single firm. To unpack and better understand compliance costs relative to annual R&D expenditure, we grouped the 38 supported firms into five categories. When we say that firms are "mostly" within a given R&D expenditure band, this acknowledges that their annual R&D expenditure may have varied somewhat from year-to-year.

Appendix Table 10: Summary of qualitative mini-cases

R&D Expenditure band	Broadly positive	Broadly neutral	Broadly critical
Firms with >$5m	7	1	1
Firms with mostly $1m-5m	6		3
Firms with mostly $300k-$1m	3		3
Firms with mostly $100k-$300k	2	2	3
Firms with mostly <$100k	2		6
Total	20	3	16

On balance, a slight majority of firms interviewed said compliance costs were appropriate in the context of the policy intent. Of the 39 supported firms interviewed, twenty were broadly positive on the appropriateness of the compliance costs to the benefit received. Sixteen were broadly critical, saying the compliance costs were excessive relative to the incentive. Three firms were broadly neutral, and did not hold a clearly distinguishable view on the issue of compliance costs.

C.2.1 Firms with >$5m in R&D expenditure

Seven firms were broadly positive:

- One CAM firm said the scheme involved less administration than previous grants schemes. After a steep learning curve, they said the scheme was of significant financial benefit. The firm particularly welcomes how businesses get rewarded for the wide R&D work they are doing. The firm described how it had built on existing R&D practices to develop capabilities and processes that were aligned with the scheme and embedded these as normal business practice. The firm explained how it was outsourcing less RDTI compliance work to professional service firms as they had effective capabilities and processes in place internally. Compliance costs were now regarded to be relatively

straightforward - *"it's just normal, we hold a monthly eligibility committee meeting. As far as the required documents for the RDTI programme, we keep that on a centralised system. It's no different than any other sort of business activity that we do. It's pretty easy"*. The firm estimated that, in addition to routine administrative work on top of their newly embedded RDTI processes, *"we are spending about $50k a year to support us in our CAM reviews, (and) we are getting $X million back."* Summarising how the approach was embedded within their R&D teams, the firm commented *"I think in reality most of the things that they're talking about is usually part of their business case anyway. What is the problem statement? What are you trying to overcome? What is the general hypothesis (as) to what you're trying to learn from these trials? When you actually sit down and talk with them, most of them said, well, I've actually just drafted this in my business case anyway. It's a copy and paste and then a very high-level systematic approach to what you're trying to do. That's an upfront admin at the start of the project. And then we do a six month check in."*

- One firm had a practice whereby they only included projects that required 20+ weeks of work. For such projects, the firm said compliance costs were worthwhile, and it was relatively easy to integrate RDTI administration with their existing processes and capabilities – *"once you have all that (existing processes), with some time and effort it is relatively easy to use that process and documentation to apply it to RDTI process."* For projects that they anticipated would be less than 20 weeks, the firm said it was cost prohibitive to apply the same systematic project processes, even though typically there was clear technical uncertainty associated with this work – *"at a certain level you lose a bunch of stuff."* The firm estimated that across their 205 researchers and developers, approximately 30% of their time is in this category of work (i.e., <20 weeks of time) that is deliberately overlooked. In addition, to professional service fees, it was estimated that compliance costs amounted to approximately 12-15 weeks of work (i.e., 450-560 hours) per year and the workload was primarily the responsibility of project managers, technical leads and the Head of Technology and Research.

- One firm held said the scheme was *"definitely worth it"* in terms of compliance costs, with "definite net benefits and net positives". The firm said the scheme was more overhead intensive than the previous grant scheme, but that the *"system itself, what it's trying to achieve, delivers on for us."* This firm did not estimate a dollar amount or time allocation to engage with the scheme, however, they explained that in addition to professional service firm fees, compliance costs principally involved contributions from the CTO and CFO as well as more detailed involvement from members of the general management and accounting teams to create the cases and manage the itemisation, attribution, reporting and other relevant calculations. The firm said they kept compliance costs down by doing most of the administration in-house and only used a professional service firm *"as a sounding board"* to validate their work and to manage the submission through IR. A key area issue that increased the firm's compliance costs was navigating the ambiguity around software eligibility. The firm said the scheme and its wording *"doesn't quite feel like it is a natural fit for how the software world works".* In particular, the firm said the issue of technical uncertainty was problematic for them as it was open to wide interpretation. The firm said the uncertainty software firms were most often dealing with was the *"possible but complex"*, for instance the non-trivial challenge and unpredictability of integrating (perhaps existing) technology or code with other complex systems, features and workflows which invariably led to unforeseen new implementation problems and constraints (e.g., bugs) that needed further attention. The firm stated - *"I do think that they should look at the RDTI and review it from a software lens, have a better understanding of the software industry and the (agile) methodology….make it so that the*

key component of being able to claim is much more suited to the majority of the work that software businesses are trying to accomplish, without taking away from what they're trying to incentivise."

- One CAM firm said the scheme was *"quite resource consuming"* with significant advisor fees, and a lot of engagement time between the firm's internal people and advisors. This firm estimated that a typical half-year process involved 500 hours of everyone's time and that would include meetings - *"there might be 50 or 60 meetings in which two or three projects get talked about"*, meeting preparation (e.g., extracting documentation and time tracking data on projects) and engagement with advisors. The firm said the CAM process was providing greater certainty however, they questioned whether the associated compliance costs (e.g., CAM renewals, preparation, in-year reviews) were any more favourable that the GA process – *"IRD and Callaghan will come out to see us and they'll do their reviews. And I think the mindset of those people is not what can we do to reduce compliance costs. It's almost what extra things should we be asking them to do this time that they're not doing already? And maybe they feel like, well, if we ask them to do extra things and dot more i's and cross more t's, then it'll all be more robust, which is sort of true."* While the firm said they were incurring higher compliance costs than they were for Growth Grants – *"the administrative overhead and cost is at least an order of magnitude more, probably two orders of magnitude more."*, overall, they were satisfied as they were getting more money through the RDTI. They were far exceeding the previous regime's caps and also appreciated the ability to do contract R&D for offshore parts of their organisation and how capitalising R&D for accounting did not exclude it from the tax credit.

- One CAM firm estimated that their compliance costs comprised of 2 FTE Innovation Revenue Advisors, time contributions from the CFO and company-wide R&D ambassadors (i.e., engineers and consultants) as well as fees to external advisors. The firm said their professional service firm fees were originally in the order of $300k per year but have since reduced to approximately $150k per year since the firm moved into the Significant Performer regime. The firm said their compliance costs, which they regarded as *"substantial"*, were primarily directed at education, training and creating awareness across the business – approximately 3,000 people across 4,500 projects - about how the RDTI scheme worked and applied to their business. The firm explained - *"one of the challenges we have is we're dealing with consultants and engineers, the nature of their role is problem solvers. To one engineer, it may be, I'm just doing my job. And we're trying to frame it, as part of your job, you're solving something that's scientifically or technologically challenging that no one else has done before. So, there's that education piece (meaning) you're not just doing your job, you're actually doing a bit more. That is always a big challenge with the scale of what we're dealing with. That's why the more we can do around education, the better it is to surface potential leads."* Overall, the firm were satisfied with the scheme, however, they acknowledged that their compliance costs benefitted from the scale of their business and the ability to set up and leverage internal teams and processes, and to pay for external advisors, all of which helped them to navigate the scheme.

- One CAM firm said they were satisfied with how the scheme was working, stating that *"the payback is quite large because of the size of our R&D spend"*. Despite strong efforts to leverage and build on existing processes, compliance costs were viewed as heavy compared to the previous regime, or how they would normally prepare and track R&D activities, but also reasonable given they were now receiving three times more financial benefit. The firm estimated that compliance costs amounted to approximately 1 FTE per

year. This estimation accounted for technical assistance from the professional advisory firm, and administration and meetings done internally by various R&D, finance and tax personnel to coordinate the process, i.e., complete the necessary documentation, assessments and calculations. The firm said a change in scheme would completely erode the significant compliance costs they and other firms to set up and administer the scheme – *"stopping and changing is a real pain"*.

- One CAM firm said the scheme had higher compliance costs than the previous grant scheme, but from a financial perspective, it was very worthwhile. The firm said a key reason for the additional funding was that the RDTI did not distinguish between operational and capital expenditure, which enabled them to include major IT development projects. The firm said they initially spent hundreds of thousands of dollars on professional service fees to get their CAM framework and processes set up. Now, they have one 0.5 FTE wholly dedicated to the RDTI, they pay approximately $20k for the external auditor review, and they estimate they will soon pay another $50k-100k on professional service fees to help re-establish their CAM framework for another three years. Commenting on their compliance costs, the firm said - *"the additional expenses (are) more than covered by the additional funds we've had through, from RDTI"*

One firm was broadly neutral:

- One CAM firm said that although they could identify more opportunities within RDTI than they could within previous grant schemes (e.g., submitting GAs outside of their CAM framework), compliance costs in terms of their own effort and time/fees with advisors were much higher, but their claim was not much different - *"our claim, I don't think it's much different than what it was under Callaghan. I think there's a huge amount of work. We pay probably 10x fees to our advisor. With a huge amount more compliance in order to basically submit the same thing for the same amount. So that's with my company hat on... it's a bit of a pain in the butt for little benefit."* A key compliance cost was learning to navigate the perceived inflexibility within the CAM framework, in particular the necessity of justifying all changes and updates. Another was the lengthy approval process and questions related to exceptions in the framework. There was a sense that the approval process was inefficient, with certain questions repeated across multiple agents including their finance team, advisors, certifiers, Callaghan Innovation and IR – *"I felt the very first time that so many people asked me the same questions all the time …I felt like (I was) always repeating myself… I could just record myself and send the recording each time."* Alongside these general frustrations with compliance costs, the firm viewed the scheme as a "really good policy setting" in that it was open to all, had a lot more robustness and control, and funding was not capped in the same way but had higher levels of scrutiny.

One firm was broadly critical:

- One CAM firm said the compliance costs were too onerous and probably not worth it They estimated that the scheme cost the firm approximately $300k-500k per year. The main costs within this were the employment of a 1 FTE business partner dedicated to RDTI coordination, additional administrative support for timesheets and record keeping, contributions from the CFO, project managers and product owners, professional service fees, which were estimated to be $100k in a CAM review year, and audit fees of approximately $30k. A key compliance cost frustration was the level of administration and meetings and the resourcing this consumed, sometimes twenty people would be present at an RDTI meeting who would otherwise be working on product development. The firm said the additional compliance costs were not proving financially worthwhile.

Despite expectations that they could claim more, they have not found that to be the case – *"we haven't really found that, it's essentially the same. There's pretty much no difference."* They further state *"the complexity and detail that the IRD now requires, we just have to prove everything. Even though in terms of the amount that we claim, it's so immaterial…and we've had to add in extra resource."* A particular compliance pain point was the need to explain and justify to product engineers the time-consuming administrative task of separating out core and supporting activities within the same projects when all of the activities were eligible and taking place in departments wholly focused on R&D. Finally, the firm said the time dedicated to trying to figure out the eligibility of software related activities was frustrating, particularly as their product portfolio was becoming more software based. They said the more linear view of R&D with reasonably clear start and end dates was not aligned with the continuous and iterative nature of software-based R&D that delivered regular product enhancements and new features – *"software development is a lot more circular than just kind of a traditional linear hardware project."*

C.2.2 Firms with mostly $1m-5m in R&D expenditure

Five firms were broadly positive:

- One CAM firm said that after a steep learning curve within the firm — *"the approach and the scheme that works well for XXX (given) how many projects (and) the size of our entity"*. The firm mostly administer the scheme internally but consult a professional service firm for complex issues and CAM certification. In addition to advisory firm fees, the firm estimated that compliance costs for assessments, documentation and review meetings amounted to approximately 1 FTE of engineering time and 0.5 FTE from the tax lead including further contributions from the CFO, General Manager and R&D leader. The firm said they now had more streamlined processes, and they expected these compliance costs to decrease. A persistent compliance cost for the firm was helping engineers recognise the technical uncertainty associated with many aspects of their work - *"the engineers are really reluctant to say that they are working on things of technical uncertainty and reluctant to put hours forward because they think what they're doing might be easy for them or they might think it probably won't take me very long. But we really are trying to point out to them, 'well, when you tried it, did you get it right first time around?'"* The firm said another reason engineers adopt a conservative stance is that they are apprehensive about tax authorities reviewing their recording of eligible activities. The firm estimate that, partially because of this reluctance, despite being an R&D intensive site, they only claim approximately 50% of the R&D that they undertake.
- One CAM firm said there was a difficult and costly initially learning curve and that they continue to struggle with the language around scientific and technical uncertainty and how it applies to their commercial priorities. The firm, who largely administer the scheme internally without professional service firm assistance, estimate that compliance costs are approximately 350 hours of work per year (primarily across a three-person team) and $20k for the CAM audit fee. The firm said these compliance costs were worthwhile for the return received – "*we made a claim of just under 7 mil or something like that. So, the return is pretty good."* The firm said that compliance costs would likely remain the same in future years even though their claim will reduce, potentially by half. Contributing to these compliance costs was the need to offload responsibility for the scheme to others in the firm who would need education and training, but who would still likely be less efficient. Overall, the firm said the scheme is worthwhile – *"it's still worth doing. I'm glad we signed on. Yes, I did sort of grumble a little bit about the uncertainty at the start. But*

I think it's a scheme that for us is working well. The compliance costs, you know, two months out of someone's 12 months a year. It's probably not unreasonable."

- One firm estimated that of the 30 people they had working on R&D, approximately 20 FTEs were working on RDTI applicable activities. In terms of compliance costs, the firm estimated that it takes three weeks of time, primarily across three people – the CEO, the CFO and a financial assistant – although they also engage the R&D management team in the process. For an approximate $4m claim and a $500k return, the company said the compliance costs were worthwhile. The firm said their compliance costs were likely lower than normal as they had significant experience and established templates and processes for managing R&D projects that they modified for RDTI requirements – *"for someone like us, the paperwork side of things and developing and knowing the sort of questions that were likely to be asked might have been a little bit simpler than for someone who's fresh off the boat. We're happy. We've read the rules and we're in a pretty good position to define what is genuine R&D versus business as usual."* While the firm were broadly supportive of the scheme, they preferred the R&D definitions and wording of the Growth Grants scheme as, due to some difficulty dealing with the issue of uncertainty, they were only claiming approximately 80% of what they claimed under that previous scheme.
- One firm said the scheme compliance costs were high, but worthwhile for the benefit received. The firm said they were reliant on the expertise of a professional service firm to administer the scheme as they did not always have capacity within relevant teams to lead scheme compliance internally. The firm said the incentive helped the business to plan and accelerate R&D activities, but they had a marginal preference for the Growth Grant scheme as it was more straightforward and less complex to administer.
- One CAM firm estimated that their compliance costs were approximately seven weeks of work a year plus professional service fees, and that these costs would increase slightly in a review year. Internal administration of the scheme was primarily spread across eight people in the finance and engineering teams. This firm said compliance costs were not a major hinderance and worthwhile for the return received, although the firm acknowledged they were fortunate that RDTI administration largely complemented R&D processes the firm already had in place. The firm also claimed that their RDTI processes were capability enhancing and had become part of the ethos of the firm – *"it's actually an added diligence that we have grown and adopted into our ethos. As I said, if RTDI doesn't ring strong, a red flag goes up because it's very likely that it's not going to align with our strategy.*

Four firms were broadly critical:

- One CAM firm said that they built on and extended their existing R&D processes to comply with the RDTI requirements. The firm estimated that their compliance costs amounted to 2 FTEs across five people, plus professional service fees. The firm said that they also needed to have more than 40 people in engineering understand the RDTI in order to undertake the assessments. The firm said these assessments were distracting for their technical leads – *"the technical leads who are doing this assessment, it's quite different from their normal business-as-usual technical work. And I think it's not actually providing them or the project a significant benefit to do the assessment"*. Overall, the firm said scheme compliance costs were too high for the benefit received – *"I'd like my engineers to be doing engineering. And whenever they're having to think about doing an RDTI assessment, I'm taking their brains away from the thing that I really want them to be doing. So, the overhead of the process is more onerous than I would ideally like it to*

be. Now, I completely understand that if there's an external entity that's going to give me some money, they might want to ask some questions about why they're giving me money and therefore, there'll be some expectation of assessment if what you are claiming is truly claimable. But at the moment, it feels like we're doing too much work to claim."

- One firm said the compliance costs were not worth the return received – *"the biggest issue is just the amount of work required to get us across the line. Compared to the amount of money you can actually get at the end of it."* The firm estimated the scheme required approximately four weeks of effort from one RDTI-dedicated person, but this time and cost did not include regular engagements with project managers, technical leads, financial personal and fees to a professional service firm. The firm said they preferred the previous Growth Grants scheme which they claimed had broader eligibility criteria, was administratively less complex, and did not tie up as many key people within the business. The firm said that through the RDTI *"we're losing about half of what we could get as a result of the scope having been narrowed (from previous scheme)."* The firm said that loosening up the criteria would possibly enable them to claim more dollars and it would be less administration. However, overall, they felt that the RDTI was the wrong scheme as it did not incentivise R&D or influence what they were doing.
- One CAM firm described the scheme as complex and time consuming. The firm said that there was a steep learning curve, but overall, the approval process was relatively smooth and now worked well for the firm. The firm estimated that their CAM compliance costs amounted to approximately 20% of their overall claim, 10% on professional service firms and certification fees, and the other 10% on internal administration by finance and engineering personnel. The firm said that they were considering moving from CAM to GAs as the certification fees were not justified by the size of their R&D programme and spend. The firm also said that they were intending to reduce their reliance and spend on professional service fees within these GAs as they had developed greater confidence in their knowledge and capabilities – *"I think we could do more internally. It's just building up that knowledge and feeling secure in making those assessments. I think as we've gone through a couple of claims, we are more confident in those assessments than we perhaps were…we have a much better idea of how it all works now. We've got a much better idea of cost and time commitments, both from our finance team and our R&D team."*
- One firm noted that their compliance costs were high, especially as a dynamic, pre-profit company. RDTI support was important in keeping their business alive, as they don't currently have a commercial arm. As a smaller firm they do not use timesheets, and thus carefully recording time spent by employees on eligible and ineligible expenditure was challenging - *"They should probably understand by the nature of the fact we are pre-profit, we are a small business...look you wouldn't expect that company to have [timesheets]*. The firm has reported that they had been waiting almost 9 months for IR to process their Supplementary Return, causing significant cash flow ramifications. Finally, because their R&D was too complex for an advisory firm to write-up, they completed the necessary paperwork in house but noted that as a *"small company...any time taken away onto administrative things isn't useful."*

C.2.3 Firms with mostly $300k-$1m in R&D expenditure

Three firms were broadly positive:

- One firm, although strongly of the view that the RDTI eligibility criteria remained too restrictive and narrowly focused on technology stretch which was not fit for purpose for software development, said the compliance costs, while significant, were relatively

straightforward. The firm said that management needed a brief discussion – *"I don't think that conversation actually took that long"* – to reframe their language around technology uncertainties and scientific hypotheses but after that, they were able to leverage firm knowledge and capabilities to good effect – *"there would have been a period of just talking through with the CTO and the senior developers to kind of say, okay, we know what we're doing here is new… We definitely had hypotheses. So that's a bit of language change. But everyone in the company, they've got university qualifications, you understand what the scientific method is and what hypotheses are and how to test them. So that wasn't too difficult."* The firm said they did not use a professional service firm and – between the CTO, CFO, COO, developers and administrators – were able to manage the process in a cost-effective way – *"(it) is worth the effort of the administration because the work we (did) generally was work we were already doing. I don't think we had to introduce any new processes internally in order to account for the work we had done."* The firm added - *"we didn't have anything declined. But I think we did do a good job of playing the game and only putting forward things that we were confident were eligible."* On the issue of software, the firm said the scheme needed to do more to cater to design-led innovation (not late-stage product design) as there was currently a disconnect between the scheme's restrictive definition of R&D and how innovation is achieved. The firm said that in the software industry, design was recognised as a value creating activity, but within the current scheme such design activities could most often only be included as support activities that were linked to core R&D activity. This was something the firm wanted revisited.

- One firm that administered the scheme internally without the assistance of a professional service firm said the compliance costs were not *"massively onerous"* or *"overly tricky"* and that the scheme offered a simpler, less *"painful"* process to the previous grant regime. The firm estimated that compliance costs amounted to approximately one week of total effort, and the responsibilities were shared between the finance manager and technology lead(s) who collaborated closely on the scheme. The firm said there was a relatively steep learning curve and that the initial GA and SRs were more time consuming, but that things had become *"more seamless"* as they developed more knowledge about the scheme. The firm said their compliance costs were relatively low as their R&D expenditure was not that large, they had moderate staff numbers most, of whose roles were *"100% R&D"*, and they had placed an early emphasis on learning how to engage with the scheme (partially from free informal interactions with a professional service firm). The firm stated - *"once you develop that knowledge and how to do it, you may as well just keep doing it…the level of understanding we have is proving to be enough for what we're using the RDTI for."* The firm said an enhanced knowledge of the scheme had also helped them to be less conservative in terms of what they claimed for – *"I think in earlier years, the claims could have been a higher value, but I erred on the side of (caution)… In more recent (years) I've increased or I've known that I could include more."* The firm said that one area that did increase compliance costs and which needed clarification was how software was treated in the scheme – *"the software part I always find a little bit murky in terms of what is included being novel and what is not….it is hard to decipher what we should include and what we shouldn't."*

- One firm estimated their compliance costs amounted to approximately three weeks of time from the finance and innovation teams, as well as fees to a professional services firm. The firm said their compliance costs were appropriate for the benefit they received however, they were fortunate to have the resources and capabilities in place that allowed them to structure their assessments and claims. For instance, the Head of Finance had developed his own R&D activity tracking model in a previous role and

implemented that within this firm for their engagement with the RDTI – *"I applied the approach that I'd worked out (at previous firm) and we seemed to get the tax incentive claim going quite well."* The firm also said they had the resources to engage a professional service firm whose expertise helped to consolidate the firm's efforts and expediate the overall process – *"they're very good at (the process), we'll have a meeting for an hour or two, and we might do a couple of them and they get it, rather than wondering about is this the type of thing that we can start claiming for, they already know. So, I just talk, they take notes, and away they go."*

Three firms were broadly critical:

- One firm said they preferred the previous grant scheme as there was a simplicity to it in terms of planning, approval and reporting. In contrast, the firm said the RDTI scheme was more costly and time consuming for staff. The firm mostly administered the scheme internally through the CTO, with assistance from the CEO and CFO, assessing, documenting and recording R&D activities. The firm also paid an accountancy firm a fee of approximately $4k to help with calculations and filing the expenditure claim. The firm said the main compliance costs related to the ambiguity around software eligibility and how the criteria did not sufficiently align with the iterative and agile nature of software R&D – *"it's impossible to separate out pure R&D from just the natures of running a software company where it is very iterative."* The firm said they were frustrated at how activities were seemingly ineligible once you went from beta to launch – *"(the RDTI) has these rules in there around once something has gone from beta to launch, that nothing else included is essentially eligible"* - even though engineers had to respond to feedback and work on unforeseen bugs and constraints. The software ambiguity increased compliance costs as the firm put extra resourcing into trying to show how they were doing R&D within software projects. The firm also said that, as a result of this software ambiguity, the expenditure approval process created significant uncertainty and stress for the business – *"this payment, if we have issues and they don't agree with what we've done as R&D, it will be quite scary, like wholesale redundancies, because we've already done the work and we did it last year in the anticipation that the funds will come through… We've done R&D and kept records as best we can, but it's kind of scary to think that we're operating in such uncertainty"*. Overall, the firm said it was beneficial for their business when the funds did arrive, however, things should be *"smoother and faster"* and less *"pernickety"* as this prevents the firm from moving as fast as they would like – *"we could go so much faster if we had the funding earlier and more certain."*
- One firm said they initially envisaged having a lot of eligible activities but after a lot of upfront work realised the eligibility criteria was less applied and more science-based, which they said was less relevant to the bulk (75%) of activities in their innovation portfolio. The firm said *"when you got into the nitty gritty, the specifics about what actually qualified to get the rebate was so small compared to the scope of what we're trying to do as an organisation that (it) just becomes really difficult to bother kind of caring about it and seeing it as any use in terms of driving through the R&D."* The firm also said the compliance costs went *"way too over the top"* and were simply *"too hard"*. They described the complications of picking apart eligible components of multidisciplinary projects involving multiple work streams, how they had four or five people working internally for several weeks on their application, and how they had *"two or three rounds of interviews with Callahan or IRD people"*. The firm said this level of compliance was not worth the return – *"I guess my criticism is the amount of admin required… It's just not worth it. You've got half a dozen people over many weeks getting through the application process, the review process, and it just doesn't make any sense."*

The firm continued *"when you boil it all down and get through the various reviews, (for us) it's only 150K or 200K a year...it was just the admin burden and hoops to jump through for what benefit?"*

- One firm said their funding had reduced from $400k to $70k per year since transitioning from the previous Growth Grants, which they said were more straightforward in terms of administration and in capturing their R&D activities. The firm said many of their projects were small (e.g., 40-80 hours) and it was too complicated and an administrative burden to identify eligible activities within these and prove the technological uncertainty. The firm had recently put more effort into developing the necessary processes to include more projects, but as a family run firm without a dedicated R&D team, they said they had limited capacity (i.e. people stretched across multiple duties not just R&D) or systems in place (e.g., tracking activities within projects) to implement this effectively. The firm also said that the level of uncertainty required for eligible activities was not practical for them as they could not take on too much risk as a privately owned family business. Overall, the firm said the incentive of 15% was not enough to justify the scheme's cost of compliance.

C.2.4 Firms with mostly $100k-$300k in R&D expenditure

Two firms were broadly positive:

- One firm, who administered everything internally without the assistance of a professional service firm, said the process was *"reasonably easy"* and *"fairly light touch"*. The founder, who had three firms in the RDTI, acknowledged that his firm were fortunate he had significant experience and capability in engineering, finance and accounting. For compliance, the firm was also able to build on existing processes and systems they had in place for managing R&D activities. The firm said the eligibility criteria were slightly frustrating and unclear, but appropriate as long as the assessors *"are helpful and actually can help you through that."* One area that increased compliance costs for the firm was software. The firm said they *"really struggled"* to fit their software R&D within the scheme as it was a grey area with ambiguous wording. Referring to the iterative complexity associated with software development, the firm commented – *"you come back the software process, our biggest challenge at the moment is refining the software and software bugs and getting it running."*
- One firm described the scheme as a beneficial *"nice to have"* and the compliance costs as relatively straightforward. The firm estimated that their compliance costs amounted to approximately $6000 for the GA stage, which was led by the Head of Innovation in collaboration with members of the R&D team, plus the time put in by the finance manager, which was not costed, in leading the SR claim. The firm said the compliance costs were worthwhile for the benefit received, and had helped to build effective processes within the firm related to R&D.

Two firms were broadly neutral:

- One firm said the scheme was a windfall but not something that influenced their R&D activity – *"we would continue to do the R&D regardless of support."* Responsibility for compliance was across five people and primarily involved document writing and implementing appropriate record keeping and timesheet practices. The firm said this administration was *"not too onerous"*. The firm also paid a professional service firm for assistance with accounting and expenditure items. While the fee for this service was *"acceptable"*, the firm said they were highly reliant on the external advice and without it they would likely struggle to engage with the scheme or understand what you needed to do – *"I think the workload's reasonable, but only because someone's telling us what we*

need to do. If we had to go and work out what do we have to record? What is the difference between supporting and something else? What is the percentage of (or) total salaries that are allowed to be claimed? It's hard enough to understand when someone's drip feeding it to you… it's just a bit of a grind and it's not something we do anyway. It's not producing anything else for us except an application." The firm said they were very fortunate that they could afford a professional service firm and *"live with the lag between doing all this work and actually getting the money"*. The firm said if they were a smaller or less mature firm, the scheme might not be worthwhile– *"it's okay for us at the stage we're at, it's worth doing. But if we wind back five years or something, maybe we'd be saying something quite different."*

- One firm said they engaged a professional service firm in the initial few years to learn about the scheme and to *"bounce ideas off"* the experts. Since then, then firm have developed capabilities and the necessary processes for managing the scheme internally, primarily through the Head of Finance and the R&D product team. This firm said that having in-house capabilities aligned with the scheme was fundamental to being able to engage with the scheme without assistance from professional service firms. Overall, the firm said their compliance costs were just about inappropriate for the 15% received, although they feel the cost-benefit is marginal and the incentive should be increased to reflect the complexity of the scheme.

Three firms were broadly critical:

- One firm said the scheme was in a better place with significant improvements in both firm capability and scheme administration, but they remained frustrated that the compliance costs were too high. The firm had developed new tracking and documentation processes within their R&D and finance teams however, they struggled with the need to monitor things so closely and to account for every little change. The firm said it was difficult to effectively articulate a systematic approach for their R&D work given how uncertain the development path was, and this was particularly true for their software development work. Overall, the firm said that the scheme felt 'low trust' for established firms with a long track record of R&D.

- One firm said the scheme was more complicated than it needed to be and that a significant proportion of the funding they received went on compliance costs. Specifically, the firm estimated that approximately 40% of their RDTI claims went on compliance costs, including the fee to a professional service firm. The firm said, after discussions with both administrative agencies (Callaghan Innovation and IR), there remained an unhelpful lack of clarity on what was eligible in some of their micro projects, or a readily accessible framework for how to present these micro-activities, and that this created uncertainty for the firm as to whether it was worth their time and energy making the claim - *"We had a representative from Callaghan and IRD, and that was when we were talking through whether the kind of bespoke research and development that we were doing was eligible or not. That's where it became quite complex around essentially them saying there wasn't really an easy or an established framework for how we could make that work. So we started to look into it and they were open to that, but then they wouldn't guarantee that this would get approved. So here we were about to analyse a year's worth of work and go through every single project, which would be weeks' worth of work without any level of certainty that it would be approved."* The firm said the result of this lack of clarity was that *"there's always an apprehension in your mind (about) what you believe is R&D versus what IRD believes is R&D."* Overall, the firm said that the scheme's current set up felt like it catered more to larger firms.

- One firm said that after a prolonged period of engagement with IR at the SR stage, which proved costly and time-consuming, they gave up. Between ongoing efforts to address IRD queries, a gradual reduction in the value of the claim, and no resolution in sight, the firm decided to move on to other things as they did not see the logic in continuing – *"It almost felt like they were making it too hard. I know they're not going to give out free money, but it was almost like every hurdle you jump through and then you get another roadblock. So you've got to jump that roadblock and then you get another hurdle. So you jump that hurdle. At what point do they just go, 'okay, you've justified it'?"* The firm said they would submit a new GA, but questioned whether the scheme could do more to help smaller firms understand at the outset the effort involved before committing to the scheme – *"expectations upfront might help, instead of spinning wheels and getting 12 months down the track"*. Also, based on their experience, the firm questioned whether the scheme, although very much needed by smaller firms, was set up in a way that was more suitable for more established firms with R&D systems processes already in place

C.2.5 Firms with mostly <$100k in R&D expenditure

Two firms were broadly positive:

- One firm who did everything inhouse without advisor assistance described the compliance costs as *"pretty easy"* although noted the overall process took considerable time. The firm also said they were having difficulty accessing their claim due to a complication with their company structure. The firm made an application under their original company name, but the owner has since spun out a new firm with a new name to develop the product from the R&D activity that was approved for three years. The firm claim the new firm cannot use the funds (*"That money is useless to me"*) because the funds are tied to the IRD account of the original firm, which no longer has any income and is in the process of being wound down. The firm said that trying to rectify this issue was their main compliance cost in the scheme.
- One firm, who managed the process without advisor assistance said overall, the application, record keeping and filling requirements were acceptable *"the costs for us were not terribly onerous. I think this was actually a pretty easy thing to do for us."* The firm explained that their compliance costs were appropriate for their R&D expenditure levels, which ranged between $80k-100k, but noted *"If we were to do projects on the order of $10-20k dollars, that might not be worth it."*

Six firms were broadly critical:

- One firm said that 15% *"doesn't cut it"* for the level of compliance required. The firm said that the majority of their compliance costs were incurred upfront in the early scoping and assessment of activities for the GA. The firm estimated that their compliance costs were approximately $24k, made up of 3-5 weeks of work (or $20k) for the GA and a further $4000 in external accounting fees to assist with filling the SR. The firm said they favoured a return to the more proactive and relationship-based R&D grants system that offered more substantial levels of financial and business support.
- One firm said the compliance costs were excessive and labour intensive for a 15% rebate. The firm described the compliance work, which was done internally, as a hidden frictional cost. They said it was distracting and occupied too much time and effort from the CEO, finance manager and engineering team. The firm described the overall process as an *"elaborate triage"* system that was difficult to navigate. The eligibility criteria were viewed as generic and vague and as a consequence, created uncertainty and additional compliance costs for firms and reviewers – *"the higher the level of vagueness, (the) more*

effort you have to put into dealing with it." The firm also said the eligibility criteria prioritised newness over iteration, and how iterative approaches were essential to de-risking R&D and increasing the chances of achieving innovation. The firm described the credit as a nice to have but have decided not to engage with the scheme again as their efforts would likely create more value if directed elsewhere - *"it's sort of nice to have, but nothing turns on it. Management time is better invested in chasing more business or making improvements in production process...the reward effort ratio just doesn't work for us. I mean, there may be wealthy organisations for whom it does work."* The firm further explained *"we did reach the conclusion after the last one that, you know, this is so time intensive that it's actually not worth our while doing it. You get a 15 percent kickback, but you've got to go through hoops of fire to get it."*

- One firm said the compliance costs were excessive. The firm described the process as distracting and a waste of management and staff time. The firm said that their internal administration costs exceeded the 15% received in their first year of the scheme. They now only consider the RDTI for their largest projects, which must exceed $75k, otherwise they will *"blow all of the money you get back on administration, there's no value in it."* The firm said that their main pain point was the sense that everyone knows that certain activities are R&D, but the system demands that they spend considerable effort converting normal business R&D presentation of projects into the format demanded - *"if you sit down with Callaghan Innovation, they would read through a project and say, 'yep, that's R&D. That that's going to qualify.' But then the bureaucracy begins, because you need to rephrase that and using specific guidelines to put it in speak, which can be entered into a portal, which then will be successful…so, you're basically having to rewrite everything absolutely needlessly into a different format and do the budgetary stuff around it to comply with this perception of how it needs to read. I had this repeated to me several times Oh, yes, this is R&D we've just got to completely rewrite this so that it complies."* Summarising their critical take on the scheme, the firm commented *"you have a system, which I can categorically say would not impact whether we went ahead with R&D or not, it just gives us a little fill up that we're catching if we can be (bothered) doing the administration. That is absolutely a very succinct summary of the value of RDTI."* The firm continue to engage in the scheme as they say that they have to avail of available funding to remain competitive against international competitors. However, they would prefer a grants system with higher levels of support as this previously encouraged them to take chances and to move faster.

- One firm, who managed the process internally without the assistance of a professional service firm, estimated that their compliance costs amounted *"to a week"* of effort and this was marginally worthwhile given the credit received. The firm had some significant frustration as they felt they should be claiming a lot more through the scheme. However, due to a company structure issue they were somewhat restricted. Specifically, the firm said (under professional advice) they set their company up across two firms, one product-based holding the core IP and the other as the main trading vehicle of the company. The firm say this arrangement has meant that when the IP entity make an RDTI claim it limits what the overall company can claim as the supporting costs for the same R&D activity incurred by the trading company are omitted – *"if we didn't have this model of XXX, our RDTI would actually be higher because it'd be much easier for us to actually claim those supporting costs, but because XXX doesn't bear those costs, it's difficult for us to actually claim it. So that is kind of one hurdle that we have at the moment."* Another area of compliance cost for the firm related to how software development processes fitted the scheme. The firm said the terminology and criteria around hypotheses testing was misaligned with the iterative nature of software development. The firm said that

trying to capture everything they were doing would increase compliance costs substantially and as a result they don't try to – *"it just came down to that if we tried to really drill into everything that we possibly could claim, the compliance costs would have been huge because it would have had to unpack everything, have constant conversations with Callaghan and IRDs to go, 'hey, does this work? How do we need to change the submission?' And that's part of it as well. It's not just that we're doing the activity and the activity is wrong. We're doing the activity and our submission is wrong, right?... this is why we pivoted and have now just focused on the part that we know and can more easily track and outline."*

- One firm claimed that the scheme was too complex to navigate for a resource constrained start-up. The firm said that founders had to wear several hats and had many pressing responsibilities, and therefore it was difficult for them to give the scheme the attention and level of detail it required. The firm said they underestimated the level of work needed to understand and engage in the scheme. The firm's accountant also struggled with the SR claim. The firm eventually had to pay additional fees to a professional service firm to resolve their claim (*"they just fixed it"*). The firm said the scheme cost more than they expected, and they are unsure if they benefitted overall.
- One firm said that engaging with the scheme is not easy and they were fortunate to have accounting and technology skills within the firm to manage the scheme in-house, something they say was not typical in a start-up. The firm initially spoke to advisory firms to get assistance but quickly established that the fees involved for their claim would largely outweigh the incentive. The firm said engaging in the scheme was something they had to do as it helped them pursue their passions and backboned their R&D activity, but overall, despite getting easier over time, the compliance costs were not worthwhile for the return received.

Appendix D Appendix tables and figures

Appendix Table 11: Costs of smoothing the policy transition to the RDTI

Year	Nominal $ m	Real $ m	Inc. 20% Deadwt Tax Cost $ m	Present Value (8% Disc.) $ m	Sensit 1: (15% Disc.) $ m	Sensit 2: (2% Disc.) $ m	Sensit 3: Ex Deadwt Tax Cost $ m
Transitional Support Payments Provided to Growth Grant Recipients							
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2023	8.34	8.57	10.28	11.11	11.83	10.49	9.26
2024	12.72	12.74	15.29	15.29	15.29	15.29	12.74
Total	21.05	21.31	25.57	26.40	27.12	25.78	22.00
Administration of Transitional Support Payments							
2022	1.17	1.27	1.52	1.78	2.01	1.58	1.48
2023	2.29	2.35	2.82	3.05	3.25	2.88	2.54
2024	2.29	2.29	2.75	2.75	2.75	2.75	2.29
Total	5.75	5.92	7.10	7.58	8.01	7.22	6.32
Administration of RDTI In-Year Payments							
2023	0.62	0.64	0.77	0.83	0.88	0.78	0.69
2024	2.07	2.07	2.49	2.49	2.49	2.49	2.07
Total	2.69	2.71	3.26	3.32	3.37	3.27	2.77
Write-Down of Capital for RDTI In-Year Payments							
2024	13.64	13.67	16.41	16.41	16.41	16.41	13.67
Total	13.64	13.67	16.41	16.41	16.41	16.41	13.67

Notes: Nominals are converted to real values using the Producer Price Index (inputs) averaged across the full year (March 2024 Quarter=1000). Present values are discounted to the end of the 2024 financial year (30 June).

Costs for TSP support, and the Administration of In-Year Payments (Departmental and Non-Departmental), are sourced from MBIE's Annual Financial Statements. Before firms can submit their TSP applications to Callaghan Innovation, they require eligibility confirmation letters from Inland Revenue. The timing of these letters means that not all TSP applications had been received or processed at the end of the 2024 year (see Callaghan Innovation, 2024; p. 128). As a result, these calculations to the end of financial year 2024 are likely understating the full costs of TSPs.

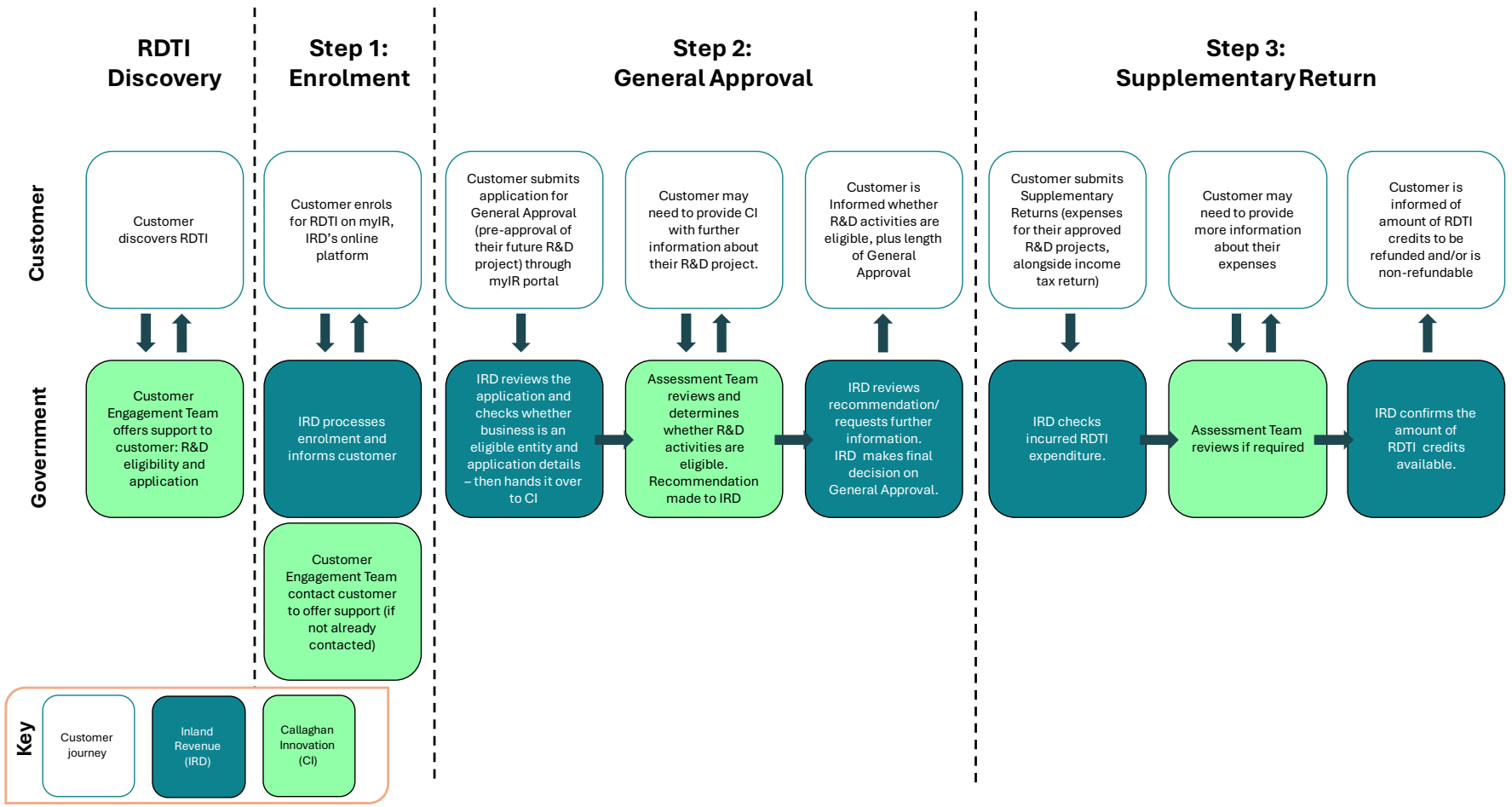
In the absence of disaggregated cost information for the administration of TSPs (contained within the multi-category "Building Business Innovation" appropriation), we use information from Callaghan Innovation regarding the funds appropriated specifically for this purpose.

The Projected Impairment/Write Down of In-Year Payment Loan Capital draws from MBIE's Annual Financial Statements and Cabinet Briefing documents. Final figures for the loan capital are $42.636M. This is made up of $2.309M of loans in 2023 and $40.327M of loans in 2024. Impairment of the capital has been estimated using projections from the in-year payments cabinet briefing document (#52): "The fair value write-down comes to around 32% of the capital expenditure, comprising a 10% expected default rate on the loans, 12% concessionary expense, and 10% subsequent impairment."

Appendix Table 12: Industry grouping used in impact analysis

ANZSIC	Grouping	Description
A	OTHER	Agriculture, Forestry and Fishing
B	OTHER	Mining
C11	C11	Food Product Manufacturing
C12	C1	Beverage and Tobacco Product Manufacturing
C13	C1	Textile, Leather, Clothing and Footwear Manufacturing
C14	C1	Wood Product Manufacturing
C15	C1	Pulp, Paper and Converted Paper Product Manufacturing
C16	C1	Printing
C17	C1	Petroleum and Coal Product Manufacturing
C18	C1	Basic Chemical and Chemical Product Manufacturing
C19	C1	Polymer Product and Rubber Product Manufacturing
C20	C2	Non-Metallic Mineral Product Manufacturing
C21	C2	Primary Metal and Metal Product Manufacturing
C22	C2	Fabricated Metal Product Manufacturing
C23	C2	Transport Equipment Manufacturing
C24	C2	Machinery and Equipment Manufacturing
C25	C2	Furniture and Other Manufacturing
D	OTHER	Electricity, Gas, Water and Waste Services
E	OTHER	Construction
F	F3	Wholesale Trade (except for F34)
F34	F34	Machinery and Equipment Wholesaling
G	OSERV	Retail Trade
H	OSERV	Accommodation and Food Services
I	OSERV	Transport, Postal and Warehousing
J	J5	Information Media and Telecommunications (except J60)
J60	OSERV	Library & Information services
K	OSERV	Financial and Insurance Services
L	OSERV	Rental, Hiring and Real Estate Services
M	M69	Professional, Scientific and Technical Services (M691 & M70)
M6910	M6910	Scientific Research Services
M70	M7000	Computer Systems Design and Related Services
N	OTHER	Administrative and Support Services
O	OTHER	Public Administration and Safety
P	OTHER	Education and Training
Q	OTHER	Health Care and Social Assistance
R	OTHER	Arts and Recreation Services
S	OTHER	Other Services
T	OTHER	Not Elsewhere Included

Appendix Figure 2: Administrative flow of the RDTI – General Approval (GA) pathway



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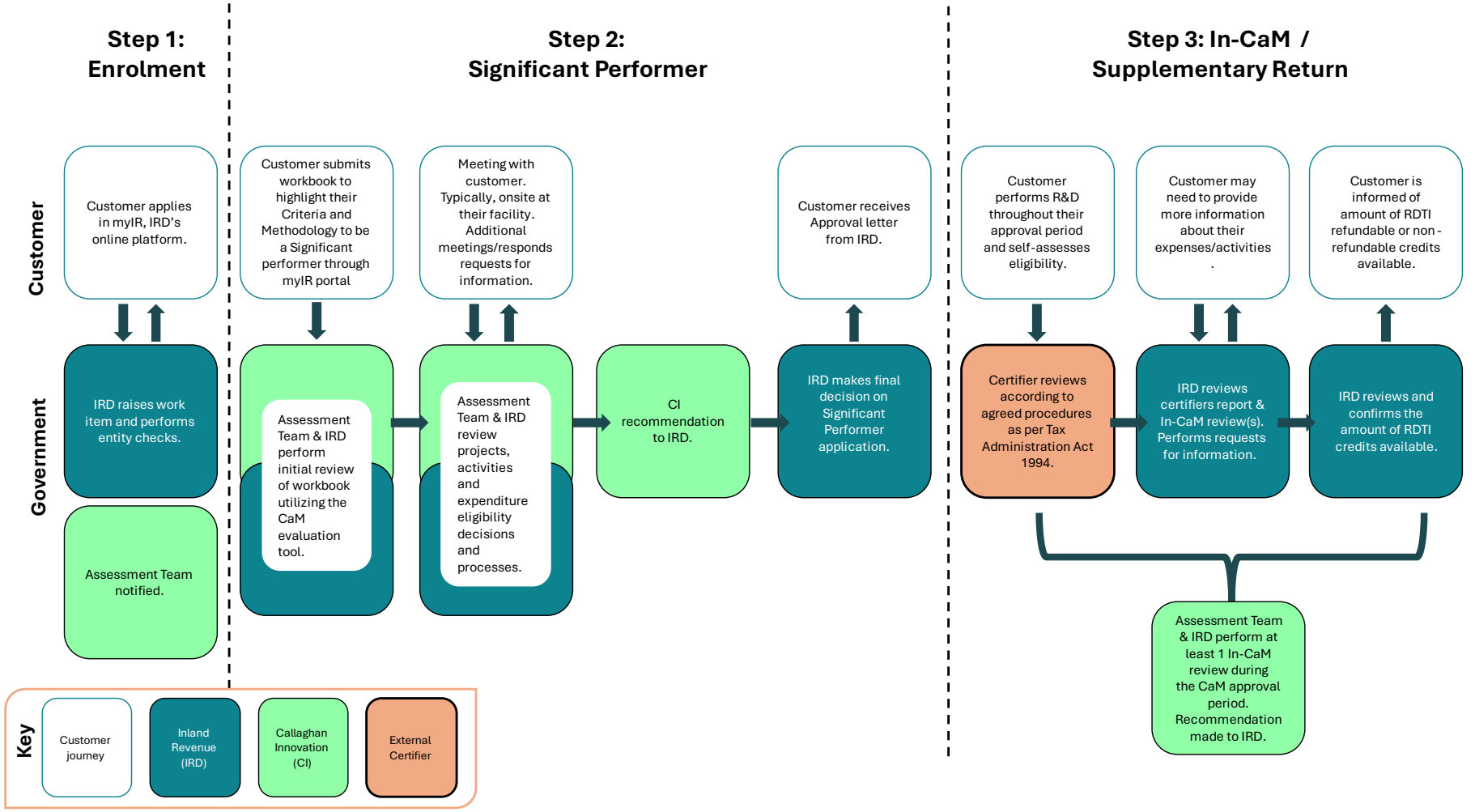
Appendix Figure 3: Administrative flow of the RDTI – Criteria and Methodologies (CAM) pathway



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