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An Evaluation of the Industrial Research Assistance Program

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SUMMARY

The Industrial Research Assistance Program (IRAP) supports R&D performed by small and medium-sized enterprises (SMEs), financially assists not-for-profit organizations that provide innovation services to SMEs and participates in the Youth Employment and Skills Strategy. IRAP funding is approximately $400 million for the 2024–25 fiscal year. About 90 per cent of the funding supports R&D performed by SMEs, which is the focus of this paper.

IRAP support for R&D consists of non-repayable contributions and the provision of advice by industrial technology advisors (ITAs). Financial support for R&D is generous: over the seven years ending in 2022–23, excluding the pandemic year, financial assistance averaged almost 37 per cent of approved project costs. Almost all firms receiving IRAP assistance also benefit from federal and provincial tax incentives for R&D, bringing the total subsidy to almost 65 per cent of project costs.

IRAP provides financial support for numerous small projects, each of which requires a separate contribution agreement. In addition, IRAP provides intensive non-financial support in the form of technical and business advice to many firms. This approach results in high program delivery costs: in recent years, operating costs amounted to 17.5 per cent of financial assistance provided. Excluding advice provided by ITAs, which is another form of financial assistance to firms, the operating cost ratio was 15.5 per cent. In contrast, the operating cost ratio of the Strategic Innovation Fund, which supports large projects and offers a much lower level of client services, is around two per cent.

IRAP documentation states that the ultimate objective of supporting R&D is wealth creation in Canada. The two most recent evaluations of IRAP (National Research Council of Canada 2017, 2022) assess this objective using benefit-cost analysis, concluding that the program provides a net benefit to Canada. However, this analysis compares the private benefit (profits) of client firms with the subsidy's fiscal cost. It does not measure the program's net social benefit. An analysis of the social costs and benefits demonstrates that IRAP is not fulfilling its mandate.

Analyzed as a separate program IRAP fails a benefit-cost test because of a high subsidy rate and high operating costs. However, IRAP subsidies are essentially a top-up for selected firms receiving the Scientific Research and Experimental Development (SR&ED) tax credit, which also fails a benefit-cost test. Instead of excessively subsidizing R&D, IRAP funding would be more effectively deployed as repayable assistance for commercialization and scale-up in Canada.

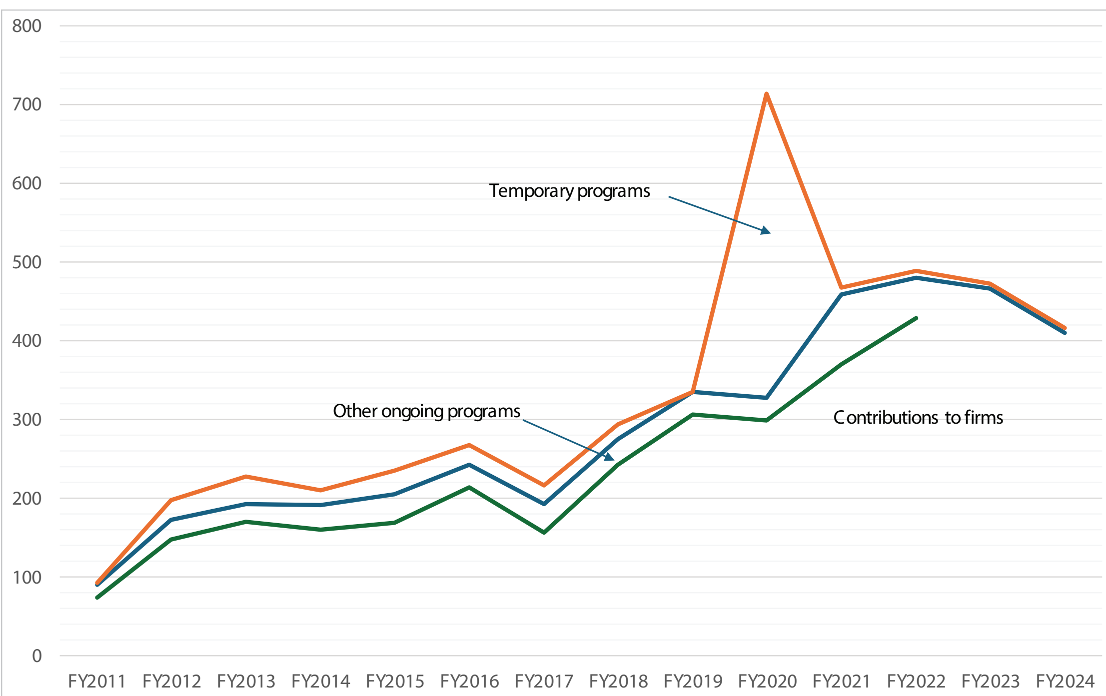
PROGRAM DESCRIPTION

IRAP has three ongoing program streams: contributions to firms with fewer than 500 employees to support R&D, contributions to not-for-profit organizations that provide innovation services to SMEs and the Youth Employment Program, which subsidizes the cost of hiring young graduates working on the development of new products and processes. IRAP also delivers temporary programs for the federal government and participates in ongoing programs led by other departments, such as Innovation Solutions Canada.

This paper is focused on IRAP support for R&D through contributions to firms and the provision of technical advice. Assistance provided to support R&D is non-repayable. According to IRAP's most recent terms and conditions,[1] repayable assistance is also available for commercialization and marketing costs, for the acquisition of intellectual property and for the acquisition of other assets, including other companies' shares. However, repayable contributions have not been offered since at least 2018.

Financial assistance to firms is provided for specific projects. The subsidy rate for the project is determined when the project is approved. Contributions in a given year are based on the approved subsidy rate and actual disbursements in the year. Contributions to firms have grown substantially in recent years. From 2012 to 2017, contributions averaged about $170 million a year, but advanced steadily starting in 2018 to reach $470 million in fiscal year 2022–23, the latest year detailed data are available (Figure 1).

Figure 1: IRAP Contributions for Ongoing and Temporary Programs ($ Millions)



Sources: Access to Information request to IRAP and 2024/25 National Research Council Departmental Plan

1 The 2023 terms and conditions for IRAP contributions were obtained through an access-to-information request.

IRAP's financial support for R&D is generous. From 2016 to 2022, excluding the 2020 pandemic year, contributions represented 36.6 per cent of approved project costs. IRAP also provides advice to funded firms and other firms on business and technical issues through ITAs. This advice amounts to an R&D subsidy since it allows firms to forgo hiring technical experts or setting up consulting contracts to obtain technical information. However, given the limited amount of time ITAs have to spend providing advice, the implicit subsidy rate is quite low, just above one per cent (Box 1).

Box 1: The R&D Subsidy Provided by Industrial Technology Advisors (ITAs)

The value of the subsidy provided by ITAs can be approximated by the cost of providing business and technical advice to funded firms. Data on the cost of providing advice is not publicly available, but it can be estimated using some dated information on how ITAs allocate their time (National Research Council 2007, 66), and information on ITA compensation. The survey data indicate that ITAs spent 18 per cent of their time providing business and technical advice in 2006.[1] Since then, client engagement advisors have been hired to identify promising clients, thereby allowing ITAs to spend more time providing advice. This information suggests that the provision of technical advice was equivalent to a 1.2 per cent subsidy on R&D spending over the seven years ending in 2022-23, excluding the pandemic year.

1 ITAs spent 18 per cent of their time providing advice, 34 per cent developing funding and managing contribution agreements, 12 per cent developing networks and other linkages for clients and 36 per cent of their time on administrative duties.

For almost all projects, the IRAP subsidy is in addition to the assistance provided through the federal and provincial SR&ED investment tax credits. Taking account of the exclusion of capital costs from the base for the investment tax credits and the fact that the base for the federal credit is reduced by other assistance received, the combined average subsidy rate for an R&D project is 64.9 per cent (Table 1).[2]

Table 1: Subsidy Rates for R&D Projects Undertaken by Small Firms (%)

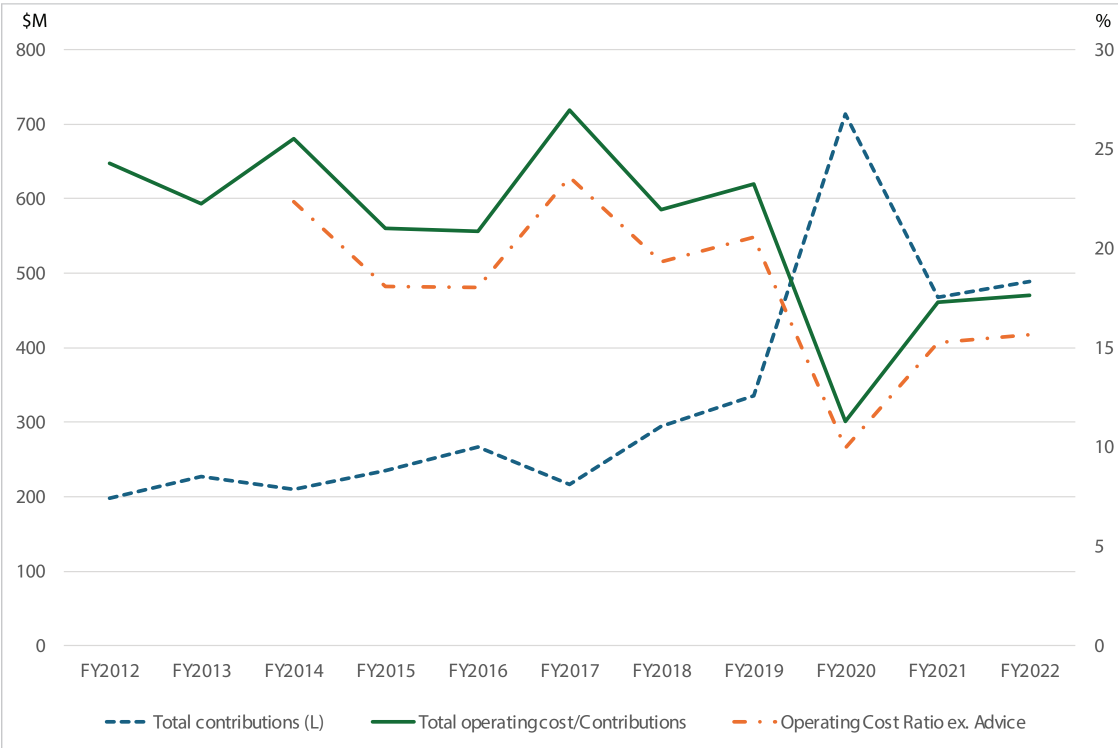
SR&ED investment tax credit rates[1]	
Federal	35.0
Weighted average provincial	10.9
Combined rate[2]	42.1
Exclusion of capital costs	-2.7
Effective subsidy rate	39.4
IRAP subsidy rate[3]	
Contributions	36.6
Advice	1.2
Total	37.7
Adjusted for base effects[4]	25.5
Combined subsidy rate	64.9

1. Based on federal and provincial statutory rates in effect in 2022. The Quebec rate on wage costs is converted to the equivalent rate on the federal SR&ED base.
2. Provincial credits are removed from the base for the federal credit.
3. Average rates over the 2016-2022 period, excluding the 2020 pandemic year.
4. IRAP subsidies are removed from the base for the federal subsidy.

2 This estimate does not include an adjustment to the value of the SR&ED tax credit to account for the delay in receiving the credit.

IRAP's business model results in high operating expenses.[3] On average from fiscal 2012 to 2022, IRAP supported approximately 2,900 projects a year, each of which required a contribution agreement prepared and managed by an ITA. On average over the same period, ITAs provided advice to 2,035 firms receiving funding and provided advice to 4,077 firms that did not receive funding. As a result of this high level of activity, ITAs accounted for about 58 per cent of operating costs over the period. From 2012 to 2017, operating expenses averaged 23.5 per cent of total contributions, but the ratio has trended down since 2017, reaching 17.5 per cent after the pandemic (Figure 2). Excluding the cost of providing advice to funded firms by ITAs, which are more properly considered part of financial assistance, the operating cost ratio averaged 15.5 per cent in 2021 and 2022.

Figure 2: IRAP Contributions and Operating Costs ($ Millions)



Sources: Access to Information request to IRAP and author's calculations.

The decline in the operating expense ratio reflects in part an increase in the average contribution per project, which reduces expenses per dollar of assistance provided. In 2018–19, the maximum project size eligible for funding was increased to $10 million from $1 million, which likely drove the tripling of the average contribution per project from 2017 to 2022. Staffing levels were below target from 2018 to 2021, particularly for ITAs (National Research Council 2022, 13). The number of ITAs increased substantially in 2022, lowering the ratio of projects per ITA below its pre-pandemic level. However, the average ITA salary was less than one per cent higher in 2022 than 2019, which suggests there will be upward pressure on operating costs in the future from rising ITA salaries.

3 Operating expenses are measured net of the costs recovered from other departments for providing business and technical assessments of funding proposals.

By way of comparison, the operating cost ratio of the Strategic Innovation Fund (SIF) in the three years ending in 2019–20 was under two per cent (Industry, Science and Economic Development Canada 2021).[4] However, the SIF supports large-scale projects, which reduces operating costs per dollar of assistance provided, and does not provide extensive client services. Contribution funding averaged approximately $32 million per project, compared to $102,000 for IRAP projects over the same period.

BENEFIT-COST ANALYSIS OF IRAP

INTERNAL EVALUATIONS OF IRAP

IRAP's mandate is to "stimulate wealth creation for Canada through innovation." The two most recent evaluations of IRAP (National Research Council of Canada 2017, 2022) assess this objective using benefit-cost analysis, concluding that the program provides a large net benefit to Canada. Under the federal government's Directive on Results (Government of Canada n.d.a), using benefit-cost analysis (BCA) in evaluations of spending programs is optional. BCA is infrequently used in program evaluations,[5] so IRAP's application of the methodology is commendable.

Despite the claim made in the 2017 evaluation, IRAP's approach is not consistent with the Treasury Board Secretariat's (TBS) guidance (Government of Canada n.d.b.) for conducting benefit-cost analyses of regulatory proposals.[6] The IRAP evaluation estimates the benefits of the program as the profits of selected client firms and compares them with the financial assistance these firms received. The TBS guidance states that incremental benefits and costs should be considered. Including the gross profits of client firms is misleading because it fails to consider opportunity costs, which are the profits firms would have made without IRAP assistance.

Another shortcoming is that the IRAP evaluation does not respect the TBS guidance requirement that benefits and costs not reflected in market prices, or externalities, be included in the assessment. When firms perform R&D, some of the new knowledge created inevitably leaks out or spills over to other firms, allowing them to benefit from the R&D without performing it themselves. There is also a potential negative externality. When firms bring new products to market and develop new production processes, the increase in sales can be at the expense of other firms, which offsets the spillover benefit of investment in R&D. Empirical work by Bloom, Schankerman and Van Reenen (2013) and Lucking, Bloom and Van Reenen (2017) indicates that the positive impact of knowledge spillovers is greater than the negative product market rivalry or business-stealing effect. A positive externality should therefore be included in the benefit-cost analysis.

Even if the benefits of IRAP were correctly calculated, comparing them to the amount of assistance received to determine if the size of the economic pie has been increased would be misleading. The financial assistance received is a transfer from taxpayers to client firms, which in itself does not affect overall incomes in Canada. To calculate the social costs of the program, administration expenses and compliance costs of firms should be added to the opportunity cost of the additional resources used by subsidized firms.

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[4] This includes the cost of administering legacy programs such as the Automobile Innovation Fund that were discontinued with the SIF's implementation in 2017, but which had ongoing funding commitments.

[5] A review of 48 evaluations prepared since 2020 in eight departments found only three evaluations that applied formal benefit-cost analysis.

[6] Regulatory proposals must pass a benefit-cost test before they can be implemented.

AN ALTERNATIVE BENEFIT-COST ANALYSIS FRAMEWORK

Consistent with TBS guidance, the BCA used in this paper measures the benefits of IRAP as the incremental profits and labour income, or the incremental output, arising from the financial assistance provided. Incremental output is measured as the increase in output of subsidized firms less the output that would have been produced elsewhere in the economy by the additional capital and labour employed by subsidized firms. In a fully employed economy, or on average over the business cycle, subsidized firms must attract labour and capital from other sectors to raise output.

I assume that capital and labour would have been used as efficiently as possible prior to the subsidy-induced shift in resources, so the overall level of output will be smaller because of the subsidy. This assumption needs some explanation because the small, innovative firms targeted by IRAP are affected by several market imperfections that cause the number of these firms to fall below the privately optimal level (Lester 2017). However, these imperfections are being addressed by other government policies, which makes it possible to achieve the privately efficient outcome. IRAP subsidies are intended to increase the amount of R&D above the privately efficient level because knowledge externalities result in an additional social benefit from R&D. A benefit-cost test of IRAP should therefore include both the cost and benefit of expanding R&D beyond the privately efficient level.

In this paper, only the net loss in output is calculated. It is approximated using a simplified Harberger triangle calculation (Box 2). The loss can be illustrated by considering how the subsidy reduces the market rate of return on the additional R&D performed. The subsidy lowers the hurdle rate for a profitable investment, so firms undertake R&D projects with less commercial value, which reduces the market value of their output. Firms performing the R&D receive their required return on investment, but part of the return comes from the subsidy.

Box 2—A Simplified Benefit-cost Model

$$(1)\ NSB = R_e \Delta RD - .5\Delta RD(s_r - mcc) - SubsidyOutflow_{ex} - (A + C)$$

$$(2)\ \Delta RD = RD - \frac{RD}{1 - \varepsilon(s_r - mcc)} = \frac{-\varepsilon(s_r - mcc)RD}{1 - \varepsilon(s_r - mcc)}$$

Where:

NSB is the net social benefit
R_e is the external return on R&D (the spillover rate)
ΔRD is the amount of R&D induced by the subsidy
s_r is the subsidy rate
mcc is marginal compliance costs, expressed as a proportion of R&D spending
RD is the level of R&D spending in the current year
$SubsidyOutflow_{ex}$ is the proportion of the subsidy transferred to foreigners via lower export prices.
A is administration expenses
C is the cost incurred by firms in applying for the subsidy and responding to follow-up questions
ε is the price elasticity of demand for R&D, a negative number

The first term on the right of equation 1 is the spillover benefit. The second term is the loss of production efficiency caused by reducing the market price of R&D. It is a simplified Harberger triangle calculation of the deadweight loss caused by a subsidy.

The second term on the right of equation 2 is an estimate of R&D spending excluding the impact of the subsidy. The subsidy rate is reduced by the marginal compliance costs incurred by firms because these costs reduce the value of the subsidy to firms.

Note that the cost of financing the subsidy with distortionary taxation is not included in the model. The R&D subsidy is assumed to be financed with a higher corporate income tax rate. This leaves the overall fiscal burden on business investment, and the distortions caused by taxation, unchanged.

Since the TBS guidance is for regulatory proposals, it does not address the cost of financing the subsidy. Higher taxes cause economic performance to suffer through their effects on incentives to work, save and invest. However, an investment subsidy financed by raising the corporate income tax rate leaves the overall fiscal burden on investment unchanged.[7] On the other hand, if the subsidy is financed by higher personal income taxes or increases in the GST, tax distortions are likely to decline (Baylor and Beauséjour 2004).[8] In this paper, the subsidy is assumed to be financed by raising corporate income taxes so that the benefit-cost analysis is not affected by changes in the tax mix. Nevertheless, this financing assumption understates the social costs of IRAP. An increase in the corporate income tax rate encourages multinational enterprises to shift taxable income to lower tax jurisdictions. The resulting loss in tax revenue raises the social cost of the business subsidy, but this impact is not included in the benefit-cost analysis.

The TBS guidance addresses the issue of which groups affected by a policy initiative should have standing — whether their benefits and costs should be included in the assessment. The guide recommends that impacts on Canadians broadly defined should be included and impacts on other nationals be excluded. Some of the IRAP assistance will be passed on to the consumers of the products developed from the subsidized R&D in the form of lower prices. If these products are exported, some of the subsidy will be transferred to foreigners. This transfer represents gain to foreigners, which is excluded from the analysis, and a loss to Canadians, which is included.

DATA AND PARAMETERS

Table 2 lists the data and parameters used in the BCA along with some notes on their sources. Knowledge spillovers and the responsiveness of R&D spending to a subsidy are two important parameters that deserve additional explanation. Researchers typically determine the importance of knowledge spillovers by estimating the parameters of a production or cost function that includes the owned stock of R&D, tangible capital and labour as inputs, along with some measure of R&D that is external to the firm as an additional factor affecting output or costs. A positive coefficient on the stock of external R&D, or the spillover pool, indicates that firms benefit from the knowledge created by other firms. More specifically, the coefficient can be used to measure, on average, how much a $1 increase in the spillover pool raises a firm's productivity or reduces its costs.[9] For example, an adjusted coefficient of .2 on the spillover pool means that a dollar spent on R&D by one firm reduces costs of other firms by 20 cents. The adjusted coefficient on the spillover pool is often described as the spillover rate.

7 This can be seen by noting how the tax rate and the subsidy rate have offsetting impacts on the user cost of capital and hence the incentive to invest. The user cost of capital $\left(\frac{r+\partial}{1-u}\right) * (1-uz) * (1-s)$ where r is the rate of return on investment, δ is the economic depreciation rate, u is the corporate income tax rate, z is the present value of depreciation deductions and s is the subsidy rate, which may be either an investment tax credit or an investment subsidy.

8 However, the most economically damaging financing source is an increase in the top personal income tax rate (Dahlby and Ferede 2022).

9 The unadjusted coefficient measures the output elasticity of the spillover pool — the percentage change in output arising from a one-per-cent change in the spillover pool. It is transformed into a rate of return on the spillover pool, or a spillover rate, through multiplication by the ratio of output to the R&D capital stock.

Table 2: Key Parameters in the Benefit Cost Analysis (Percentage, except as noted)

	Small Firms	Notes on sources and methods
Effective subsidy rates		
Federal + provincial SR&ED	39.4	See Table 1.
IRAP	37.7	
SR&ED + IRAP	64.9	
Spillover rate[1]	19	Kim-Lester (2019).
Price responsiveness of R&D[2]	-1.4	Median value of eight estimates for small firms.
Percentage of subsidy transferred to foreigners through lower export prices	2.1	Lester (2021).
Administration expenses[3]		
SR&ED	2.7	Total administration expenses represented 2.2% of claims in 2018-19. This cost was allocated to large and small firms based on the number and value of claims.
IRAP	15.5	See text.
Compliance costs[3]		
SR&ED	12.8	Fees paid to third party claim preparers. See Lester (2024) for a description.
IRAP	11.2	Based on survey results reported in Lester (2012).

1. Reduction in production costs per $100 of R&D induced by the subsidy.
2. Elasticity, which is the percentage change in R&D spending induced by a one percentage point decline in the cost of performing R&D.
3. Percentage of the subsidy provided.

There are sound theoretical reasons for spillovers to vary by firm size,[10] so it is important to have credible spillover estimates that are relevant for an analysis of the smaller firms that benefit from IRAP subsidies. While there is a large volume of research estimating spillover rates for all firms, estimates by size of firm are rare. We are aware of only three. Bloom, Schankerman and Van Reenen (2013), working with U.S. data, report that spillovers rise with firm size, but their sample includes only publicly listed firms, which excludes many small firms. The median number of employees per firm in the bottom quartile of the sample is 370. Ornaghi (2006) analyzes spillovers for a complete range of firm sizes in Spain, finding that spillovers decline with firm size. Kim and Lester (2019) estimate the spillover rates from R&D performed by small and large firms in Canada. They find the spillover rate is much lower for small firms than for large firms: 19 per cent compared to 52 per cent. We use the Kim-Lester estimate for small firms in the BCA.

How R&D responds to a reduction in its price from a subsidy — the price elasticity of R&D — has a substantial impact on the size of the spillover benefit. A greater price elasticity increases the amount of R&D performed in response to a subsidy, which raises knowledge spillovers and hence the social benefit. However, shifting additional resources into R&D has a social cost so the impact on the net social benefit is smaller. The review of empirical estimates of the price elasticity of R&ED in Lester (2021) finds evidence that small firms respond more strongly to R&D subsidies. The typical elasticity for small firms is -1.4 compared to -1.1 for all firms.

[10] Spillovers could vary by firm size because of differences in the nature of the R&D undertaken, in the use of networks and linkages and in the ability to appropriate or capture the knowledge gained through research.

RESULTS

Table 3 shows the results of the benefit-cost analysis of IRAP. R&D spending eligible for the IRAP subsidy is $915 million, which is about $300 million higher than it would be in the absence of the 37.7 per cent subsidy and the assumed price elasticity of -1.4. With a spillover rate of 19 per cent, the knowledge created from additional R&D reduces production costs by approximately $58 million. The largest social costs included in the analysis are the lower private return on subsidized R&D and administration expenses, each of which is only slightly smaller than the spillover benefit. The loss arising from the partial transfer of the subsidy through lower export prices represents less than five per cent of total costs. Total social costs are almost $100 million greater than the social benefits. This net cost represents about 28 per cent of the subsidy received by firms.

Table 3: Benefit-Cost Analysis of IRAP ($ millions, except as noted)

Total project costs[1]	915
Effective subsidy rate[2]	37.7%
Cost of the subsidy	345
Price elasticity of demand	-1.40
Subsidy-induced change in R&D	303
Spillover rate (% of induced R&D)	19.0%
Benefits	
Lower production costs from spillovers	57.6
Costs	
Lower private return on R&D	-53.6
Administration expenses	-53.5
Compliance costs	-40.0
Lower export prices of commercialized R&D	-6.7
Total costs	-153.9
Benefits less costs	-96.3
Percentage of subsidy cost	-27.9%

1. Average approved project costs from 2016 to 2022, excluding the pandemic year 2020.
2. See Table 1.

Although bleak, the preceding analysis understates the size of the net social loss from IRAP subsidies. Since almost all IRAP beneficiaries also receive federal and provincial SR&ED tax credits, IRAP assistance should be assessed as incremental to the SR&ED benefits. That is, the benefit-cost analysis should determine how the net social benefit of the tax credits changes when a firm receives IRAP assistance in addition to the credits.

The SR&ED tax credits also fail a benefit-cost test. The net social cost is substantially smaller than for IRAP largely because of lower administration expenses and compliance costs. For IRAP, these costs amount to $93 million compared to $55 million for the federal and provincial SR&ED incentives.

Modelling IRAP as a top-up to the SR&ED incentives makes it even more difficult for IRAP to pass a benefit-cost test, for three reasons. First, the amount of additional R&D stimulated by a subsidy declines as the subsidy rate increases — increasing the subsidy rate from, for example, 30 to 40 per cent has a bigger impact on R&D than increasing the rate from 40 to 50 per cent.[11]

11 See equation 2 in Box 2.

Second, because the base for the SR&ED credit is reduced by the amount of IRAP assistance received, the effective subsidy rate declines when IRAP is assessed as a top-up to SR&ED credits. This also results in a smaller amount of additional R&D and hence spillovers that can be attributed to IRAP. Third, as more resources are shifted into R&D production the private rate of return on R&D projects declines at an accelerating pace, causing the loss to rise relative to the amount of additional R&D stimulated.[12]

Table 4 shows the results of evaluating IRAP as a top-up to the federal and provincial SR&ED tax credits. The net loss is about 50 per cent higher than when IRAP is assessed as a stand-alone program. The biggest contribution to the increase comes from lower spillover benefits, which fall from $58 million to $21 million. When IRAP is assessed as a stand-alone program, the subsidy rate is 37.7 per cent; assessed as a top-up to SR&ED, the subsidy rate falls to 25.5 per cent. This decline in the subsidy rate accounts for about half of the decline in the spillover benefit. The other half of the decline comes from the non-linear impact on the amount of additional R&D, and hence knowledge spillovers, arising from increases in the subsidy rate. The non-linear reduction in the private return on R&D as the overall subsidy rate rises also makes a substantial contribution to the larger net social loss. Administration expenses and compliance costs are not substantially affected by the assessment method used.

Table 4: Benefit-Cost Analysis of IRAP as a Top-up to Federal and Provincial SR&ED Tax Credits[1] ($ millions, except as noted)

Total project costs[2]	915
Subsidy rate	37.7%
Adjusted for base effects[3]	25.5%
Cost of the subsidy	345
Price elasticity of demand	-1.40
Subsidy-induced change in R&D	107
Spillover rate (% of induced R&D)[3]	19.0%
Benefits	
Lower production costs from spillovers	21.4
Costs	
Lower private return on R&D	-69.9
Administration expenses	-53.9
Compliance costs	-39.3
Lower export prices of commercialized R&D	-4.7
Total costs	-167.8
Benefits less costs	-146.4
Percentage of subsidy cost	-42.4%

1. Impacts when firm receive both SR&ED benefits and IRAP subsidies less impacts when firms receive only IRAP subsidies.
2. Average approved project costs from 2016 to 2022, excluding the pandemic year 2020.
3. See Table 1.

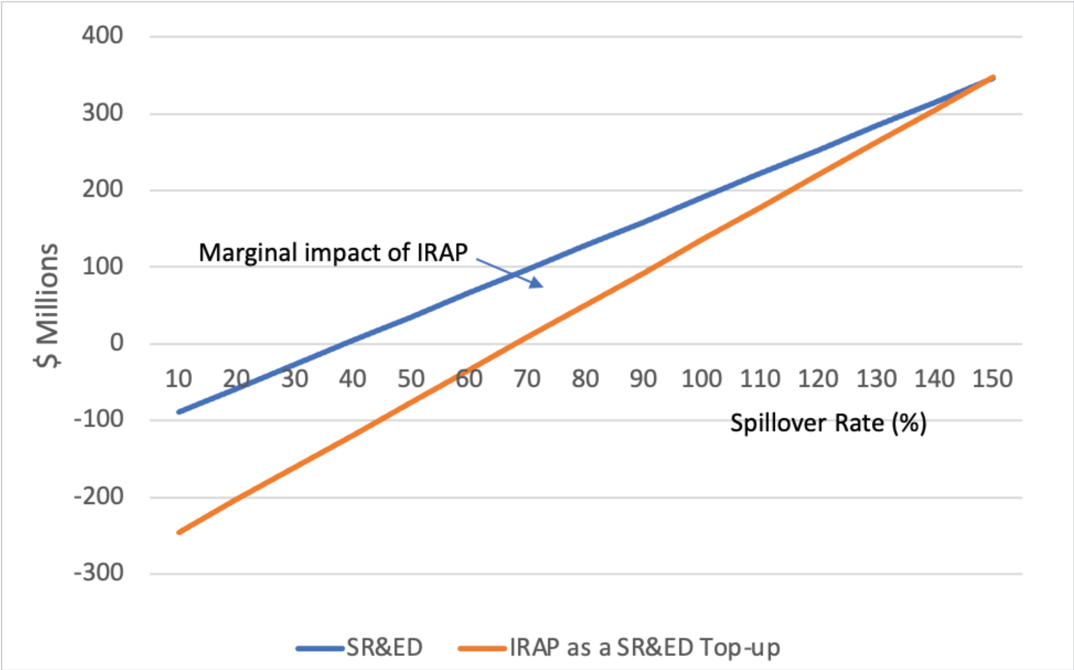
[12] Substituting equation 2 into equation 1 in Box 2 shows that the deadweight loss increases with the square of the subsidy rate.

SENSITIVITY TESTS

The net benefit rises with the spillover rate. A plausible case can be made that projects receiving IRAP assistance have higher than average spillovers. IRAP projects are reviewed by ITAs, who prioritize projects with the greatest potential for commercialization and may make recommendations for improving product quality. These higher quality projects may generate more new knowledge per dollar of additional R&D than other projects, leading to greater spillover benefits. Since the spillover rate used in this paper is based on a single empirical study, and no other estimates for small firms are available, the only empirically based test of the sensitivity to the spillover rate is to use the confidence interval of the estimate. The 95 per cent confidence interval for the 19.1 per cent point estimate of the spillover rate obtained by Kim and Lester (2019) ranges from 8.2 per cent to 30.1 per cent. Replacing the point estimate with top of the confidence interval reduces the net loss from 42 to 38 per cent of the subsidy.

A more informative approach is to determine the minimum spillover rate required for IRAP to generate a net social benefit of zero. Figure 4 summarizes the results of this exercise. The net benefit from SR&ED rises steadily with the spillover rate, reaching zero at a spillover rate of approximately 40 per cent. The net benefit from IRAP assessed as a SR&ED top-up rises at a slightly faster pace because the higher subsidy rate encourages more R&D and hence more spillovers. The net benefit from IRAP reaches zero with a spillover rate of just under 70 per cent, but the marginal impact of topping up SR&ED with IRAP remains negative until the spillover rate reaches 150 per cent.

Figure 4: Net Social Benefit from SR&ED and IRAP assessed as a Top-up to SR&ED



This result is not sensitive to the price elasticity of R&D. Increasing the elasticity 50 per cent above its median value changes the threshold value for the spillover rate by about one percentage point. The higher elasticity induces more R&D and increases the spillover benefit, but this is offset by a further reduction in the private rate of return on R&D. This outcome reflects the high subsidy rate IRAP provides.

A spillover rate of 150 per cent is implausibly high, so it is reasonable to conclude that IRAP is not fulfilling its mandate to create wealth for Canadians. However, some analysts would argue that the benefit-cost analysis leaves out an important benefit. In addition to generating knowledge spillovers, IRAP subsidies allow new products to be commercialized. If these new products generate rents — that is, if they can be sold at prices that result in above-normal profits after paying no less than competitive wages — there could be another source of social benefit. These economic rents would accrue to investors and workers in the subsidized firms and the higher income would result in additional tax revenue that benefits the broader economy.

The response to this observation builds on the earlier discussion of the multiple market imperfections faced by small, innovative firms, which implies that a separate policy instrument should be used to address each market imperfection, if possible. That is, if there are spillover benefits from commercializing intellectual property developed from R&D, the appropriate policy response is to subsidize commercialization directly, not indirectly through an R&D subsidy. The existence of knowledge spillovers is the rationale for subsidizing R&D. The motivation for subsidizing commercialization of inventions is different, so the preferred or optimal subsidy rate won't necessarily be the same as the IRAP subsidy rate. In this case, using one instrument to achieve two policy goals would be inferior to using separate instruments. On the other hand, if it were not feasible to implement separate policies, using IRAP to achieve more than one objective could be the next best alternative.

Other analysts would argue that the analysis in this paper understates the benefits of subsidizing R&D because it does not capture the possibility that a permanent increase in R&D will affect the growth rate of productivity, not its level.[13] However, Bloom, Jones, Van Reenen and Webb (2020) demonstrate that for R&D levels to affect productivity growth there must be constant returns to research effort, but they also demonstrate that the empirical evidence points to diminishing returns. With diminishing returns, productivity growth requires growing expenditures on R&D, so a subsidy-induced permanent increase in the level of R&D would permanently increase the level of productivity, as assumed in this paper.

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[13] There is a substantial body of literature on endogenous growth based on the idea that total factor productivity growth is proportional to the amount of research effort undertaken so that a one-time increase in the amount of research performed raises the growth rate of total factor productivity. The classic references are Romer (1990) and Aghion and Howitt (1992).

POLICY RECOMMENDATION

Topping up the small firm SR&ED tax credit with IRAP subsidies makes a bad situation worse. As discussed in Lester (2024), a better approach would be to use IRAP to support commercialization of inventions. There are relatively few innovative Canadian-based multinational enterprises, in part reflecting the fact that many innovative startups are acquired by foreign entities, who relocate the firm to their home market (Carpentier and Suret 2014, Gallini and Hollis 2019). IRAP is well placed to identify promising inventions to support through its ITAs, particularly if the ITAs continue to provide free technical advice to firms. The assistance would be repayable as commercialization generates profits. To encourage the retention of IP in Canada, the assistance would be repayable immediately with interest if the IP is sold to a foreign entity. In this setup, the government provides risk capital but since its return is capped, private investors have a leveraged return: they face the same risk of loss as the government but have a higher upside. Limiting government assistance to well under half the project costs will ensure that only relatively high-quality projects receive assistance.

The federal government now has 10 programs that provide support for commercialization. Total funding for these programs is $785 million in 2025/26, although nine of the programs have multiple objectives and only four support SMEs only. For example, the Global Innovation Clusters have $285 million in funding to support commercialization and scale-up by all business sizes. A revamped IRAP would have to be accompanied by a review of these programs to minimize overlap and duplication.

I am making this recommendation with full awareness that the case for subsidizing commercialization and scale-up is ambiguous. The potential benefits to Canada arise from above-normal profits, or rents, earned by innovative firms when they implement new processes or bring new products to market. Investors and workers in the subsidized industry and the broader economy share these rents through higher tax revenue, but even if such rents are available the cost of providing assistance may exceed the benefit. After implementation, the repayable assistance program should be subject to a rigorous benefit-cost analysis and discontinued if the net social benefit is negative.

REFERENCES

Aghion, Philippe, and Peter Howitt. 1992. "A Model of Growth through Creative Destruction." *Econometrica* 60(2): 323–51. https://www.econometricsociety.org/publications/econometrica/1992/03/01/model-growth-through-creative-destruction.

Baylor, Max, and Louis Beauséjour. 2004. "Taxation and Economic Efficiency: Results From a Canadian CGE Model."Department of Finance. http://epe.lac-bac.gc.ca/100/200/301/finance/working_papers-ef/2004/10/wp2004-10e.pdf.

Bloom, Nicholas, Charles I. Jones, John Van Reenen, and Michael Webb. 2020. "Are Ideas Getting Harder to Find?" *American Economic Review* 110(4): 1104–44. DOI: 10.1257/aer.20180338.

Bloom, Nicholas, Mark Schankerman, and John Van Reenen. 2013. "Identifying Technology Spillovers and Product Market Rivalry." *Econometrica* 81(4): 1347–93. https://doi.org/10.3982/ECTA9466.

Carpentier, Cécile, and Jean-Marc Suret. 2014. "Post-Investment Migration of Canadian Venture Capital-Backed New Technology-Based Firms." *CIRANO-Scientific Publications 2014s-27*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2444976.

Dahlby, Bev, and Ergete Ferede. 2022. "What Are the Economic Costs of Raising Revenue by the Canadian Federal Government?" Fraser Institute. https://roam.macewan.ca/items/73cf71a0-209f-4634-91a7-98d019750638/full.

Gallini, Nancy, and Aidan Hollis. 2019. 'To Sell or Scale Up: Canada's Patent Strategy in a Knowledge Economy'. http://irpp.org/wp-content/uploads/2019/08/To-Sell-Or-Scale-Up-Canadas-Patent-Strategy-in-a-Knowledge-Economy.pdf

Government of Canada. n.d.a. Directive on Results. https://www.tbs-sct.canada.ca/pol/doc-eng.aspx?id=31306.

Government of Canada. n.d.b. Requirements for Developing, Managing and Reviewing Regulations. Cabinet Directive and Policies. https://www.canada.ca/en/government/system/laws/developing-improviing-federal-regulations/requirements-developing-managing-reviewing-regulations/guidelines-tools.html.

Industry, Science and Economic Development Canada. 2021. "Evaluation of the Strategic Innovation Fund (SIF)." https://ised-isde.canada.ca/site/audits-evaluations/sites/default/files/attachments/h_03942_en.pdf.

Kim, Myeongwan, and John Lester. 2019. "R&D Spillovers in Canadian Industry: Results From a New Micro Database." Research Report 2019–02. Centre for the Study of Living Standards. http://www.csls.ca/reports/csls2019-02.pdf.

Lester, John. 2017. "Policy Interventions Favouring Small Business: Rationales, Results and Recommendations." University of Calgary School of Public Policy Research Paper 10 (11): 55. https://www.policyschool.ca/wp-content/uploads/2017/05/Small-Business-Lester.pdf.

———. 2021. "Benefit-Cost Analysis of Federal and Provincial SR&ED Investment Tax Credits." University of Calgary School of Public Policy Research Paper 14 (1). https://www.policyschool.ca/wp-content/uploads/2021/01/Tax-Credits-Lester.pdf.

———. 2024. "Spurring R&D: Canada Needs Focused Reforms to SR&ED and an IP Box." C.D. Howe Institute. https://www.cdhowe.org/sites/default/files/2024-05/E-Brief_353_0.pdf.

Lucking, Brian, Nicholas Bloom, and John Van Reenen. 2018. “Have R&D Spillovers Changed?” Working Paper 24622. NBER Working Paper Series. National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w24622/w24622.pdf.

National Research Council. 2007. “Impact Evaluation of the NRC Industrial Research Assistance Program — Final Report.” Online document dated 2007 available on request from NRC-IRAP.

———. 2017. “Evaluation of the Industrial Research Assistance Program.” https://nrc.canada.ca/sites/default/files/2019-03/irap_evaluation_report_2017_en.pdf.

———. 2022. “Evaluation of the NRC’s Industrial Research Assistance Program.” https://nrc.canada.ca/sites/default/files/2022-10/irap22_evaluation_report_0.pdf.

Ornaghi, Carmine. 2006. “Spillovers in Product and Process Innovation: Evidence From Manufacturing Firms.” *International Journal of Industrial Organization* 24 (2): 349–80. https://doi.org/10.1016/j.ijindorg.2005.07.002.

Romer, Paul M. 1990. “Endogenous Technological Change.” *Journal of Political Economy* 98 (5, Part 2): S71–102. https://doi.org/10.1086/261725.

About the Author

John Lester is a former federal government economist who writes on public policy issues. Since leaving the public service John has published papers with The School of Public Policy, the Canadian Tax Journal, Canadian Public Policy and the C.D. Howe Institute, where he is a Fellow-in-Residence. Many of these papers address fiscal policy issues such as the use of "fiscal rules" to control government deficits, the burden of the public debt, expenditure management systems, business subsidies, and tax expenditure analysis. John has championed the use of benefit-cost analysis in evaluating business subsidy programs and other government programs. Other research interests include innovation policy, particularly support for R&D, implementation of a preferential tax regime for the income generated from intellectual property, and market failures in the financing of innovative projects. John has also undertaken an empirical assessment of the knowledge spillovers from R&D.

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