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POLICY INTERVENTIONS FAVOURING SMALL BUSINESS: RATIONALES, RESULTS AND RECOMMENDATIONS

John Lester

SUMMARY

Small business has a well-deserved reputation as the driver of job growth and as a key contributor to innovation. In the 12 years ending in 2013, small and medium-sized enterprises (SMEs) accounted for about 90% of private sector job growth in Canada. What is less well-recognized, however, is that a small fraction of SMEs account for most of the job growth and innovation. As a result, governments have offered broad-based support for small businesses, rather than focusing on high-impact entrepreneurs. This approach is wasteful: firms that do not grow or innovate receive most of the benefits. Further, this approach can harm economic performance by promoting the expansion of smaller, less-efficient firms at the expense of larger ones.

The federal government elected in 2015 is focussing new initiatives on innovative and growth-oriented businesses. Legislated reductions in the small business tax rate were reversed and targeted support for innovative SMEs was increased. While the change in direction is welcome, almost 85% of the $7 billion yearly funding for small business continues to provide broad-based support.

The largest program is the special low rate of tax for small businesses, implemented to improve access to financing for capacity-expanding investment. This measure is harming economic performance because the cost of shifting capital and labour from large to smaller, less-efficient businesses outweighs the benefit from improving access to capital.

Large subsidies for small business financing are also provided by the Business Development Bank of Canada (BDC). With access to cheap government funding, the BDC is profitable, but evaluated using a more realistic cost of financing, the bank operates at a substantial loss. This loss exceeds the benefit from improving access to capital, particularly for the bank's direct-lending program.

While there is a solid argument for supporting R&D, subsidies provided to small firms are so generous that they are harming economic performance. The federal government provides a 35% tax credit for R&D performed by small firms.

Provincial tax credits raise the subsidy rate to about 42%. And those firms receiving support from the federal Industrial Research Assistance Program can have almost 60% of their project costs paid by the government. By way of contrast, large firms performing R&D receive subsidies from federal and provincial tax credits amounting to under a quarter of their costs, an intervention which improves economic performance.

Canada has had what could be described as a small business policy – broad-based support for all small businesses. The newish federal government is moving to an entrepreneurship policy: new initiatives emphasize support for the high-impact firms and individuals that make an outsized contribution to Canada's innovation and prosperity. Making the transition to the new framework will require overhauling legacy small business policies to free up resources for new initiatives and to secure fiscal savings. Three changes would pay big dividends:

- Eliminate the small-business corporate income tax deduction.
- Reduce the enhanced R&D tax credit rate to the same level as the regular credit.
- Replace the BDC's direct loan program with a loan guarantee program.

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POLITIQUES D'INTERVENTION EN FAVEUR DES PETITES ENTREPRISES : RAISONNEMENT, RÉSULTATS ET RECOMMANDATIONS

John Lester

RÉSUMÉ

La petite entreprise jouit d'une bonne réputation à titre de moteur pour la création d'emplois et d'agent pour l'innovation. Au cours des 12 années précédant 2013, les petites et moyennes entreprises (PME) ont compté pour environ 90 % de la croissance de l'emploi dans le secteur privé au Canada. Ce qu'on sait moins, cependant, c'est qu'une grande partie de cette croissance est attribuable à une petite fraction des PME. Conséquemment, les gouvernements ont offert un soutien massif aux petites entreprises plutôt que de se concentrer sur les entrepreneurs qui ont un grand impact. Cette démarche est nuisible : les entreprises où il n'y a ni croissance ni innovation reçoivent la plupart des bénéfices. De plus, cette démarche peut nuire à la performance économique en favorisant l'expansion d'entreprises plus petites et moins efficientes au détriment des plus grandes.

Le gouvernement fédéral élu en 2015 concentre ses nouvelles initiatives sur les entreprises novatrices et axées sur la croissance. Les mesures de réductions des taux d'imposition prévues pour les petites entreprises ont été suspendues et le soutien ciblé pour les PME novatrices s'est accru. Bien que ces changements d'orientation soient bienvenus, il reste que près de 85 % des 7 milliards de dollars en financement annuel pour les petites entreprises constitue toujours un soutien colossal.

Le programme le plus important concerne le taux d'imposition spécial pour les petites entreprises, mis en place pour faciliter l'accès au financement afin d'investir dans l'augmentation de la capacité. Cette mesure nuit à la performance économique puisque le coût lié au mouvement de capital et de main-d'œuvre, qui passent d'entreprises plus grandes vers des entreprises plus petites et moins efficaces, surpasse les bénéfices tirés d'un meilleur accès aux capitaux.

La Banque de développement du Canada (BDC) prévoit aussi d'importants montants pour le financement des petites entreprises. L'accès au financement à taux réduit proposé par la BDC est intéressant, mais si on évalue cette mesure en fonction d'un coût de financement plus réaliste, on observe que les opérations

de la Banque donnent lieu à d'importantes pertes. Ces pertes dépassent les avantages liés à l'accès aux capitaux, particulièrement dans le cadre du programme de prêts directs de la Banque.

Bien qu'il y ait de bons arguments en faveur de la R et D, le financement offert aux petites entreprises est si généreux qu'il nuit à la performance économique. Le gouvernement fédéral accorde 35 % en crédits d'impôt pour la R et D des petites entreprises. Pour leur part, les crédits d'impôt provinciaux portent le taux de financement à près de 42 %. Et les entreprises qui bénéficient du Programme fédéral d'aide à la recherche industrielle peuvent voir jusqu'à 60 % des coûts de leurs projets défrayés par le gouvernement. Par contraste, les grandes entreprises qui pratique la R et D reçoivent en financement, sous forme de crédits d'impôt provincial et fédéral, l'équivalent de moins du quart de leurs coûts, pour une intervention qui améliore la performance économique.

Il y a, au Canada, ce qu'on peut décrire comme une politique de la petite entreprise, soit un soutien généralisé pour toutes les petites entreprises. Le nouveau gouvernement fédéral tend vers une politique de l'entrepreneuriat : de nouvelles initiatives mettent en effet l'accent sur le soutien d'individus et d'entreprises à fort impact, qui apportent une contribution hors norme à l'innovation et à la prospérité au pays. La transition vers le nouveau cadre de travail demandera une révision des politiques de la petite entreprise afin de libérer les ressources pour de nouvelles initiatives et pour sécuriser les économies budgétaires. Ces changements pourraient avoir d'importantes retombées, dont les suivantes :

- Élimination des déductions fiscales sur les revenus des petites entreprises.
- Réduction des taux de crédit d'impôt pour la R et D au même niveau que les crédits d'impôt réguliers.
- Remplacement du programme de prêts directs de la BDC par un programme de garantie de prêts.

1. OVERVIEW

Federal and provincial governments have a substantial number of policies that support small and medium-sized enterprises and their owners. These measures are delivered through the tax system, through government business enterprises and through direct-spending programs. In the 2015–16 fiscal year, federal support targeted at non-agricultural small business and their owners amounted to almost $7 billion, or about 16 per cent of corporate income tax revenue. Policy is tilted towards broad support for small business rather than measures that support entrepreneurship. Since a very small number of firms are responsible for most employment creation and innovation, broad-based support for small business runs the risk of harming rather than helping economic performance by encouraging small-scale production. A more satisfactory policy framework would have a more nuanced approach to dealing with market failures and would favour the creation of a favourable environment for what has been described as "high-impact" entrepreneurship and, hence, innovation.

This paper reviews the economic case for policies that support high-impact entrepreneurs (or innovative startups), assesses federal policies that support small businesses[1] and their owners and makes recommendations to improve the effectiveness of these policies.

Rationales

The economic case for providing targeted support for innovative startups is not clear-cut. For example, the nature of the market failure in the risk-capital[2] market suggests over-investment is a more likely outcome than underinvestment. A possible exception is the "seed" or "angel" capital segment, where underinvestment may be occurring as a result of risk-averse entrepreneurs. There is also a strong case for government intervention to correct a misalignment of incentives for investors and entrepreneurs that results in an inefficiently low level of advice being provided. The case for giving extra support for R&D undertaken by small firms is weak in a static environment, but is more plausible in a dynamic setting. Stronger rationales for targeted support arise from externalities associated with learning by doing, information and agglomeration or network effects. In addition, labour market imperfections, barriers to entry created by incumbents, and the unintended consequences of tax policy on entrepreneurs have clearly adverse effects on the entry and performance of innovative startups.

Although empirical evidence is lacking, a reasonable conclusion would be that the number of innovative startups is inefficiently low given the set of externalities, market failures and policy-induced barriers they face. Acting directly on these issues is not always possible and, when it is, the cost of intervention can exceed the benefit. As a result, a bias to subsidizing entrepreneurial activity as a second-best policy may be appropriate.

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1 Business size can be defined in terms of employment, assets, revenue or net income. Access to the largest small-business program — the small-business deduction — and many other federal programs, is restricted to firms that have less than $15 million in assets or less than $500,000 in active business income.

2 In this paper, the term "risk capital" refers to the seed and venture capital segments taken together. The seed or angel investment segment refers to the initial round of private outside financing while the venture capital segment refers to financing in later stages. Other analysts use the term "venture capital" as I use "risk capital." Unless it causes confusion, I maintain the original usage when reviewing the literature.

Results

Federal initiatives to support small business and entrepreneurship can be classified into three broad groups: financing programs, support for R&D, and tax measures that are particularly beneficial to entrepreneurs. To the extent possible, federal policy initiatives have been assessed in a formal cost-benefit framework. Given data limitations, the results should be considered illustrative rather than definitive.

Financing Programs

The small-business deduction provides a tax preference for all small firms that finance capacity-expanding investment with retained earnings. This measure is likely harming economic performance as the cost of encouraging small-scale production outweighs the benefit of improved access to capital for smaller firms. The small-business financing program, which provides guarantees for loans initiated by private sector lenders, is also harming economic performance, but on a much smaller scale. A key shortcoming of the program is that a substantial fraction of guaranteed loans would have been approved by private lenders. The social cost per dollar of loan guaranteed is about 1.5 cents.

The Business Development Bank of Canada (BDC) is a government business enterprise that provides debt and equity financing as well as advice to small and medium-sized enterprises (SMEs). The BDC's mandate is to provide services that are complementary to rather than competitive with private sector suppliers. The BDC makes an accounting profit based on a cost of capital of about one per cent.[3] However, when its income is evaluated using the real social opportunity cost of capital, estimated at 6.25 per cent,[4] the BDC makes a substantial loss on its operations.

The BDC's largest business line is a direct loan program (the "Financing Program"), which offers financing to SMEs with a higher risk profile than those financed by private lenders. The Financing Program portfolio is, however, substantially less risky than the small-business-financing program portfolio. The rationale for a publicly funded direct-lending program is weak in general and there do not appear to be any special circumstances that strengthen the argument for the Financing Program. The net social cost per dollar of loan provided is about 4.5 cents.

The BDC's subordinate financing program targets firms that need financing to sustain growth. These investments are riskier than loans made under the Financing Program. The net social cost of the program represents about 0.5 cents per dollar of financing provided. The cost-benefit analysis does not capture the role that the subordinate financing program may be playing in providing financing for projects too risky for conventional debt but are unsuitable for venture capital financing because the expected return is too low. Getting these borrowers into the appropriate financing niche could be welfare-enhancing.

The BDC also provides advice to entrepreneurs at below-market rates. This service could enhance welfare by convincing entrepreneurs to abandon low-quality projects, thereby

[3] Calculated as interest and dividends paid to the federal government divided by loans and share capital provided by the federal government.

[4] This estimate is based on work by Jenkins and Kuo, adjusted to reflect recent developments in financial markets. See Box 5 for a discussion.

avoiding wasted resources. It could also help direct entrepreneurs to the appropriate financing vehicle.

The BDC is an important player in the venture capital market, accounting for about 10 per cent of new investments on average over the last two years. The BDC makes venture capital investments directly at every stage of a technology-based company's development and makes indirect investments via funds, some of which are led by private and other public sector funds. BDC Venture Capital recorded an accounting profit in 2015, its first since 2001, and announced another profit in 2016.

The BDC adopted a new strategic direction in 2011.[5] A key element of this strategy is to use its influence to improve the quality of fund managers and to increase the size of venture capital funds in Canada. It is also moving away from direct investment in firms and more towards partnering with private funds in its venture capital operations. These are sensible objectives and the BDC's substantial presence in the venture capital market can be used to help achieve them. For example, the BDC can select a small number of the most talented managers as partners and encourage them to increase the size of funds they manage.

There are risks and transition costs resulting from the new strategy. There is no reason to suppose that the supply of venture capital is too low, so additional public supply will crowd out private investors. A negative impact on rates of return from increased supply appears unavoidable in the short-run as the industry restructures. Success of the strategy therefore depends in large measure on the BDC's ability to select the best managers as partners who can become more efficient and survive the restructuring.

Since there are reasons to suppose that the seed capital market is characterized by underinvestment, the BDC should continue its efforts to increase supply in this segment. While, in principle, direct investment should be avoided, the BDC has made a plausible infant-industry argument that would justify a period of continued direct investment.

It was not possible to undertake a formal cost-benefit analysis of the BDC's venture capital activities. Data availability is an issue, but assessing the benefits and costs of the new strategy is particularly challenging.

Export Development Canada (EDC) also provides venture capital and private equity investment to SMEs. In 2015, EDC reported a net gain of $50 million on the "fair value" of its venture capital and private equity portfolio. However, adjusted for the social opportunity cost of capital, there was a loss of about $20 million on the portfolio.

Support for R&D

The two largest programs supporting R&D by SMEs are the enhanced scientific research and experimental development (SR&ED) investment tax credit and the Industrial Research Assistance Program (IRAP). The enhanced SR&ED credit provides a 35-per-cent refundable tax credit on up to $3 million of R&D undertaken by SMEs. R&D undertaken by other firms is eligible for a 15-per-cent non-refundable credit.

[5] Business Development Bank of Canada, "Venture Capital Industry Review" (2011), http://www.bdc.ca/EN/Documents/other/VC_Industry_Review_EN.pdf.

IRAP offers financial assistance and free business and technical advice to SMEs. On average, in 2009 IRAP assistance accounted for 24 per cent of project costs. The assistance provided is generally in addition to the federal and provincial investment tax credits. IRAP provides financial assistance to firms through contribution agreements. The monitoring and reporting requirements of this type of funding are much more burdensome than for grants and tax credits.

A cost-benefit analysis of the enhanced SR&ED tax credit and IRAP indicates that in both cases the net social benefit is negative. High compliance costs and, in the case of IRAP, high administration costs, are a factor in this outcome, but the key consideration is excessive subsidization. A firm claiming the federal and provincial SR&ED tax credits would, on average, receive a 42-per-cent subsidy and those firms receiving support from IRAP could have almost 60 per cent of their project costs paid by the government. In contrast, the average subsidy rate for a large firm benefiting from federal and provincial tax credits is about 23 per cent.

The case for providing extra support for R&D undertaken by small firms is weak. As suggested above, a premium could be justified by dynamic considerations or as a second-best alternative to compensating for other externalities, but the subsidies now available still appear excessive.

Tax measures supporting entrepreneurship

The federal government has implemented a number of tax measures available to all SMEs but which are particularly beneficial to high-impact entrepreneurs because their income is more variable and has a substantial capital gain component. These measures comprise the lifetime capital gains exemption (LCGE), allowable business investment losses (ABILs), rollovers of investments in small-business shares and the employee stock-option deduction.

Up to $800,000 in capital gains on the sale of qualifying shares in Canadian-controlled private corporations (CCPCs) is exempt from taxation over the taxpayer's lifetime. There is no explicit size limit on the exemption, but most CCPCs have well under $10 million in assets.

There is a solid case for exempting capital gains earned on the sale of assets used to generate active business income. An increase in the flow of net income generated by business assets will increase the market price of the assets. The price increase will equal the present value of the rise in the income stream generated by the asset. If the assets are sold, the income stream will be taxed twice: once as a capital gain and a second time when it is distributed as dividends. On the other hand, exempting capital gains will result in unintended revenue losses as taxpayers have an incentive to characterize other sources of income as capital gains. However, by restricting the exemption to SME shares, the LCGE appears to be a reasonable compromise between efficiency and protecting the tax base.

In most circumstances, capital losses can only be deducted from capital gains. This policy prevents taxpayers from deducting capital losses as they occur while deferring taxes on unrealized capital gains. While justifiable as a measure to protect the tax base, the asymmetric treatment of capital gains and losses may be particularly burdensome for owners of young firms, who may be more likely to have capital losses without offsetting

capital gains. The deduction for allowable business investment losses permits losses incurred on shares or debt issued by a small business to be deducted from ordinary income. This selective measure can be justified as an offset to the other barriers faced by startups.

Tax on the capital gain realized from the disposition of small-business common shares can be deferred, provided that the proceeds are reinvested in another small business. This rollover provision extends the deferral of capital gains, thereby reducing the effective tax rate. Given that exemption of capital gains on small-business shares is sound policy, deferral of capital gains is an appropriate second-best policy for investors that have used up their LCGE.

The employee stock-option deduction provides an employment benefit equal to one-half of the difference between the cost to the employee and the fair market value of the stock at the time it was acquired. The deduction is available to all employees. The additional benefit for employees of CCPCs is the deferral of tax on the employment benefit until the stocks are sold. The cost of the stock option is not a deductible expense for firms, so there is a net subsidy only for firms subject to the lower small-business corporate income tax rate and for unprofitable firms.

Recommendations

Financing Programs

1. Eliminate the small-business deduction.
2. Improve the incrementality of the Small Business Financing Program.
3. Restructure the BDC:
   - Transform the Financing Program into a loan-guarantee program and integrate it with the Small Business Financing Program.
   - Confine activity in the venture capital program to passive indirect investment, with the possible exception of the seed capital segment.
   - Subsidize private sector partners by offering leveraged returns. Cap the BDC's return on the upside without any downside protection:
     - In the seed capital segment, the subsidy should be determined with the premium required by risk-averse investors in mind.
     - In the venture capital segment, the implicit subsidy should be determined by considering the size of the incentive required for venture capitalists to offer more advice to firms they support.
     - Continue with the strategy announced in 2011. When implementing the strategy, take a cautious approach to increasing the supply of venture capital in order to balance its long-run benefits and short-run costs.
4. Eliminate venture capital and private equity investment by Export Development Canada. Transfer the EDC portfolio to BDC to take advantage of scale economies in the delivery of programs and in executing the BDC's strategy announced in 2011.

Support for R&D

1. Reduce the federal enhanced SR&ED tax credit rate from 35 to 15 per cent. This would lower the combined federal-provincial rate to about 25 per cent, which is only slightly higher than the value that minimizes the static social loss associated with the enhanced SR&ED program.
2. Limit "stacking" of federal and provincial assistance to 40 per cent of project costs. In conjunction with the first recommendation, this would effectively cap IRAP subsidies at 20 per cent.
3. Apply SR&ED risk-management practices to IRAP funding in order to reduce administration and compliance costs. The combination of a detailed application and selective auditing of claimants appears to be sufficient to keep losses at acceptable levels in the SR&ED program. Similar results are likely to be achieved for IRAP clients.

Tax measures supporting entrepreneurship

1. Fine-tune the LCGE, ABILs and rollovers to improve the support they provide to high-impact entrepreneurs (see text).
2. Implement general changes that make the tax treatment of variable income flows and capital gains more neutral:
   - Allow income averaging.
   - Extend the period for loss carry-backs and "index" the value of loss carry-forwards.
   - Allow capital losses to be deducted from ordinary income after they have been applied to realized and unrealized capital gains.

The standard tax treatment raises the effective tax rate on variable income streams and capital gains. The above changes would apply to all taxpayers, but entrepreneurs would benefit more since their income is more variable than employment income and has a large capital gain component.

No estimates of the fiscal cost of the two recommendations in this section are available. The gross fiscal saving arising from other recommendations would be $4 billion. Changes to the enhanced SR&ED tax credit would increase revenue by about $725 million. Eliminating the small-business deduction would save $3.3 billion initially, but less over the longer run. The small-business deduction amounts to an interest-free loan to finance capacity-expanding investment that is partially recovered when small firms begin distributing the income earned on this investment.

2. INTRODUCTION

Canada, like a number of other countries, provides government support targeted at small and medium-sized enterprises (SMEs) or their owners. The key motivation for providing extra support for SMEs is that they are considered a major source of employment growth and innovation, leading to rising living standards. However, since a very small number of

firms are responsible for most employment creation and innovation, indiscriminate or broad-based support for small business runs the risk of harming rather than helping economic performance by encouraging small-scale production.[6] Growing awareness of this risk has prompted most policy analysts to recommend shifting from a "small-business" policy to a framework that involves a more nuanced approach to dealing with market failures and the creation of a favourable environment for entrepreneurship and, hence, innovation.

Following Gentry and Hubbard,[7] entrepreneurs can be defined as individuals that invest time and money in undertakings that generate uncertain returns. A subset of entrepreneurs provides the link between knowledge creation, or invention, and innovation, which is the act of bringing inventions and creative insights to market. These "high-impact" entrepreneurs[8] raise the productive capacity of the economy, so society has an interest in encouraging their activity. Designing cost-effective policies to increase the rewards from high-impact entrepreneurship is a challenge, but there are substantial benefits from simply ensuring government policies are neutral with respect to risk-taking and to the choice between paid employment and entrepreneurship.

Underlying the reluctance to endorse broad-based SME policies is the often implicit assumption that market imperfections affecting all small firms are not substantial enough to justify costly government intervention. In contrast, governments implementing such policies highlight the role of small business in job creation and innovation. The employment rationale is usually formulated in terms suggesting that supporting small business will raise the overall level of employment. However, since small-business policies do not affect the supply of labour, sustained support for small business can only shift employment from large to small firms. In a static analysis, such a shift would put downward pressure on overall income because productivity is lower in the small-business sector. In a dynamic setting, there could be an offsetting gain in real income if small firms are more innovative than larger firms, resulting in more transitions to large-firm status and more exits of incumbent large firms. This analysis highlights the risk of broad-based SME policies, since such policies subsidize many firms that do not intend to grow or innovate.

Federal policies providing support for non-agricultural small business and entrepreneurship are delivered through the tax system, through the Business Development Bank of Canada (BDC) and to a lesser extent through direct-spending programs. Existing federal policy measures are tilted to broad support for small business. Despite emphasizing the importance of entrepreneurship and innovation in recent budgets, new policy initiatives have continued to focus on broad-based support for SMEs. The total cost of small-business and entrepreneurship programs was about $7 billion in fiscal 2015–16, which represents about 0.33 per cent of GDP and 16 per cent of corporate income tax revenues.

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6 For a review of the literature on the characteristics of high-growth firms see Alex Coad et al., "High-Growth Firms: Introduction to the Special Section," *Industrial and Corporate Change* 23, 1 (2014): 91–112.

7 William M. Gentry and R. Glenn Hubbard, "Tax Policy and Entrepreneurial Entry," *The American Economic Review* 90, 2 (2000): 283–287.

8 See Magnus Henrekson and Mikael Stenkula, "Entrepreneurship and Public Policy," in *Handbook of Entrepreneurship Research* (Springer, 2010), 595–637, http://link.springer.com/chapter/10.1007/978-1-4419-1191-9_21.

This paper has three objectives. First, to provide an overview of the rationales for intervening to support high-impact or innovative entrepreneurship. Second, to describe and assess federal measures that support small business and entrepreneurship. Third, to make policy recommendations to improve the effectiveness of these policies.

3. RATIONALES

Boadway and Tremblay[9] present a comprehensive analysis of externalities, market failures and policy-induced barriers affecting innovative startups. Their analysis, supplemented somewhat by the author, is summarized in Table 1. Factors affecting innovative startups are classified into four categories: externalities, labour market imperfections, non-financial barriers and financial barriers. This section discusses the barriers listed in Table 1. Because financial barriers are particularly important for innovative entrepreneurship, particular attention is devoted to capital market failures.

The economic case for providing targeted support for innovative startups is not completely cut and dried. Some factors provide a rationale for additional support for innovative startups; some factors affect all firms similarly, while others suggest small firms should instead be penalized relative to larger firms. Although evidence is lacking, a reasonable conclusion would be that the number of innovative startups is inefficiently low given the set of externalities, market failures and policy-induced barriers they face. Acting directly on these issues is not always possible and, when it is, the cost of intervention can exceed the benefit. As a result, a bias to subsidizing entrepreneurial activity as a second-best policy may be appropriate.

Externalities

Undertaking and commercializing R&D results in several externalities or spillovers, not all of which are positive. The knowledge created by R&D inevitably spills over to other firms and the price reductions that accompany cost-reducing process innovations increase the total value of consumer surplus, implying that an R&D subsidy is appropriate. On the other hand, innovators do not internalize the destruction of rents[10] from existing products and technologies, so if first-mover advantages are large, competition could cause a wasteful dissipation of the rents available from innovation. Both of these effects weaken the case for a subsidy.

Should the subsidy vary by size of firm? There is evidence that, compared to larger firms, small firms tend to undertake more R&D intended to develop new products and processes, with less of an emphasis on R&D intended to improve existing products and processes.[11] As a result, knowledge spillovers could be higher, but there may be an offsetting impact from greater rent destruction. High fixed costs may prevent small firms from using

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9 Robin Boadway and Jean-François Tremblay, "Public Economics and Start-up Entrepreneurs," in *Venture Capital, Entrepreneurship, and Public Policy*, ed. Christian Keuschnigg and Vesa Kanniainen (MIT press, 2005), http://www.academia.edu/download/41844451/Venture_Capital_Entrepreneurship_and_Pub20160201-6136-1j0ac6.pdf.

10 These rents, which represent the ability to produce valued output with fewer resources, are valuable to society.

11 Statistics Canada, *Science Statistics: Industrial Research and Development, 2005 to 2009*, Statistics Canada catalogue no. 88-001-X, 2009.

patents and other informal methods of protecting intellectual property, such as the use of complementary technologies, as intensively as larger firms do. Employee turnover may also be a more important source of knowledge spillovers from small firms. On the other hand, small firms are less likely to establish networks and linkages with universities and other firms,[12] so spillovers could be smaller.

Bloom, Schankerman and Van Reenen[13] present evidence that spillovers rise with firm size. Their explanation for this finding is that smaller firms operate in technological "niches," which limit the scope for knowledge spillovers. The sample consists of relatively large, publicly traded firms, so the results may or may not apply to SMEs. For example, the niche effect may be offset by the greater difficulties small firms have protecting their intellectual property. The niche effect is, however, substantial: spillovers associated with the smallest size category in their sample (less than 500 employees) are only 55 per cent as large as spillovers associated with the largest size category.

In contrast, most of the other externalities discussed by Boadway and Tremblay are likely to have unfavourable impacts on innovative startups, suggesting that subsidizing entrepreneurs would be appropriate.

- To the extent that firms have vintage-specific cost structures, the gap between the private and social costs of learning by doing is greater for new firms than for existing firms. New firms benefit from the experience embodied in the technology available when they enter, but their entry decision is not affected by the benefits conferred on future entrants.
- Entry also provides a signal about the profitability of products and processes that benefits other firms, causing entry to fall below the social optimum.
- Finally, innovative startups may have less flexibility than larger firms about location decisions so it could be more difficult for them to take advantage of agglomeration or network economies.

The exception is the decision to introduce a new product, which has an ambiguous impact on innovative startups. Entry and product diversity could be too high because the loss of rents on existing products is not considered; but they could be too low because the social benefit from product diversity on consumer surplus is not part of the entry decision.

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12 ibid.

13 Nicholas Bloom, Mark Schankerman, and John Van Reenen, "Identifying Technology Spillovers and Product Market Rivalry," *Econometrica* 81, 4 (2013): 1347–1393.

TABLE 1: RATIONALES FOR GOVERNMENT INTERVENTION TO SUPPORT INNOVATIVE ENTREPRENEURS

Issue	*Description*	*Impact*	*Impact on Entrepreneurs*[1]
Externalities			
R&D / Process innovation	Knowledge spillovers Higher consumer surplus from lower costs Destruction of incumbents' rents "Innovation contests"	All firms underinvest All firms underinvest All firms overinvest; larger impact for startups Dissipation of potential rents. Entry of new firms will occur too soon	Neutral Neutral Favourable Favourable
New products	Destruction of rents and higher consumer surplus are ignored	High correlation of entry and new products means entrants affected most; but the impact of the offsetting influences is ambiguous	Ambiguous
Learning by doing	Experience raises productivity; some of this knowledge may spill over to other firms	New firms bear the cost but cannot appropriate all the benefits, so entry is too slow	Unfavourable
Information	Entry provides a signal of profitability that benefits other firms	New firms bear the cost but cannot appropriate all the benefits, so entry is too slow	Unfavourable
Agglomeration or network effects	Firms benefit from lower costs by co-locating	Entrepreneurial startups may have less flexibility in location choice, so may get smaller benefit from agglomeration economies	Unfavourable
Labour market imperfections			
Adverse selection	Cannot determine quality of workers ex ante, so all in the pool are offered the same rate	Marginal product of marginal employee exceeds wage rate; impact may be worse for firms hiring workers for the first time	Unfavourable
Search externalities	Employees and employers do not capture all of the benefits of their search efforts	Startup may expend more effort searching and pay higher wages	Unfavourable
Non-financial barriers			
Incentive to innovate	Either entrants or incumbents may innovate too soon	Entrants ignore existing rents; incumbents attempt to prevent entry Direction of bias depends on timing and disruptiveness of innovation	Ambiguous
Entry deterrence by incumbents	Incumbents have an incentive to overinvest in capital, advertising and patenting	Entry will be too low; Best policy response is to tax established firms	Unfavourable
Tax policy	Asymmetric treatment of profits and losses Asymmetric taxation of capital gains and losses Calendar-year taxation with progressive rates Profit-insensitive taxes — payroll, property taxes Compliance costs	Loss-making startups will pay a higher effective tax rate Discourages risk-taking Higher effective tax rate on "lumpy" returns Loss-making startups will be at a disadvantage Fixed costs put startups at a disadvantage	Unfavourable Unfavourable Unfavourable Unfavourable
Financial market failures			
Adverse selection	Quality of projects/entrepreneurs difficult to determine ex ante	Risk-neutral agents: overinvestment in innovative projects most likely outcome Risk-averse entrepreneurs: underinvestment in startups	Favourable Unfavourable
Moral hazard	Acting in self-interest undermines efficiency	Entrepreneurs undersupply effort and capitalists undersupply advice	Unfavourable

1. The contents of this column are meant to indicate whether policy should encourage, discourage or be neutral relative to entrepreneurship. In many cases, the first-best policy is to correct the market failure or act on other market participants rather than directly subsidizing or taxing entrepreneurial effort.

Labour market imperfections

Labour market imperfections are also likely to have a more severe effect on innovative startups. Adverse-selection issues arise in labour markets serving innovative industries because it is particularly difficult to assess the quality of workers, so all workers in a given category are offered the same wage. In a competitive equilibrium, the average marginal product of workers will equal the wage rate determined elsewhere in the economy where adverse selection is not an issue. Since the marginal worker in the hiring pool will have a

higher marginal product than the wage rate, hiring will be inefficiently low. This pooling equilibrium is expected to be more problematic for startups since they are hiring workers for the first time.

The process of matching workers with vacancies will not in general be efficient because of search externalities.[14] In models inspired by Diamond, employers and employees brought together through a search process negotiate a wage. Search effort by a given employee increases the probability of filling vacancies, but makes it harder for other workers to find employment. Similarly, posting a vacancy increases the probability of workers finding a match, but makes it harder for other firms to fill vacancies. In the case of posting a vacancy, an efficient outcome requires that the negotiated wage rate equals the social marginal product of the worker. Only in special circumstances will the negotiated wage rate equal the marginal product of the worker plus the social costs incurred as a result of adding to the pool of vacancies.

Startups may have a less effective search process than established firms. If so, startups will have a lower probability of finding and keeping a well-matched worker. In addition, startups are likely to have a weaker bargaining position, so there would be upward pressure on the negotiated wage rate.

The existence of adverse selection and search externalities in labour markets suggests that wage subsidies for startup entrepreneurs could be welfare-improving.

Non-financial barriers

Either entrants or incumbents may innovate more rapidly than is socially efficient. Entrants do not consider the destruction of rents on existing products when they make the decision to enter with a new product or process. On the other hand, incumbents have an incentive to innovate to prevent entry. Incumbents will be willing to sacrifice the rents available on existing products and technologies as long as the expected profits exceed those available after introduction of a competing product or technology.

Whether entrants or incumbents are favoured depends on the nature of innovation. For example, if innovations cannot easily be anticipated by incumbents and are highly disruptive, innovation by entrants could exceed the socially efficient pace. In this case, penalizing startups would be the appropriate policy.

Incumbents have an incentive to overinvest in capital, advertising and patenting to deter entry of competitors. In principle, these incentives could be dulled by taxing investment and advertising by existing firms, but designing relatively efficient taxes that primarily affect existing firms would be a challenge. There may be more scope for changing patent regulations to make patents less susceptible to use as an unwarranted entry barrier. A second-best approach is to implement policies that favour innovative startups without acting on a market failure.

A number of tax policy measures have unintended impacts on entrepreneurship. In most tax systems, asymmetric treatment of corporate profits and losses raises the effective tax rate

[14] Peter A. Diamond, "Wage Determination and Efficiency in Search Equilibrium," The Review of Economic Studies 49, no. 2 (1982): 217–227.

on startups. Existing firms are able to deduct from other revenue streams losses incurred during the introduction of a new product or technology. Startups incurring losses can only carry them forward for deduction against future profits. Since the losses carried forward are held constant in nominal terms, startups will, on average, face a higher effective tax rate on innovation than will existing, diversified firms. Increasing the value of deductions by the cost of borrowing by small firms would be an appropriate policy response.

Capital gains and losses are not treated symmetrically in most tax systems, which discourages risk-taking. Capital gains are taxed upon realization, but capital losses can only be deducted against capital gains. Investment in projects with a greater variance in rates of return will therefore face a higher effective tax rate than will investment in less-risky projects. An appropriate policy response would be to allow capital losses to be deducted from other income, provided that they exceed unrealized capital gains. This will only result in full loss-offsetting if the entrepreneur has enough income from other sources to offset the loss. In the absence of refundability, carry-backs and "indexing" capital losses would improve efficiency.

Gentry and Hubbard[15] make the point that since a progressive income tax reduces the return to success, it should discourage entry by risk-neutral individuals into entrepreneurship, which is characterized by highly variable outcomes. The combination of calendar-year taxation and progressive tax rates can discourage entry even for entrepreneurs that experience average returns but that vary substantially from year to year. For example, if returns to a project are meagre or non-existent for several years followed by a large payout, the effective tax rate on the return will be higher than if it were spread out evenly over the same number of years. Allowing income averaging could therefore improve welfare by removing a disincentive to entrepreneurship.

The use of profit-insensitive taxes, such as payroll and property taxes will put startups at a disadvantage since they typically have low profits or losses. Exemptions for startups would be an appropriate policy response.

Finally, since there is a substantial fixed-cost component to tax compliance, small firms will in general suffer a disadvantage relative to larger firms.

Capital market imperfections

There is general recognition in the literature that information asymmetries leading to adverse selection and moral hazard result in less-than-perfect capital markets. There is also a consensus that the problems created by asymmetric information are more severe for young, knowledge-intensive firms. First-time entrepreneurs, by definition, do not have a track record that will help secure financing, and if the proposed project is difficult to understand, the impact of asymmetric information becomes much larger. There is, however, less of a consensus on the implications of the market failure for firm financing and the appropriate role for government.

[15] Gentry and Hubbard, "Tax Policy."

Adverse selection with risk-neutral agents and no monitoring costs

Two early and equally plausible models come to opposite conclusions on the impact of adverse selection on capital markets. Stiglitz and Weiss[16] conclude that there is too little investment because adverse selection raises the cost of funds for marginal investments. In contrast, de Meza and Webb[17] show that there could be too much investment in the sense that projects with an expected return below the opportunity cost of capital could be funded because they will be cross-subsidized by high-yielding projects.

As explained in Boadway and Tremblay,[18] these conflicting results arise from different assumptions about lender knowledge of returns conditional on success (R) and the probability of success (p). Both Stiglitz-Weiss and de Meza-Webb assume that there is a one-to-one relationship between R and p: as p increases, R falls. As a result, there is a unique value p* that determines the marginal project that will be funded. De Meza and Webb assume lenders know R, but cannot distinguish between projects by probability of success. As result, when lenders set a minimum required value of R to obtain funding, they are effectively offering financing to all projects with $p \geq p^*$. The average probability of success of projects funded, p_a, is greater than p*, which implies that some of the projects have returns below the cost of capital, indicating overinvestment. Lenders fund too many low-p, high-R projects. In Stiglitz-Weiss, lenders are able to differentiate projects by their expected returns (pR), but for a given expected return cannot separate projects by probability of success. When lenders offer to finance all projects with a minimum expected return, they are effectively offering financing to projects with $p \leq p^*$, assuming pR falls as p increases. In this case, $p_a \leq p^*$, indicating underinvestment. In other words, lenders will not offer financing for some high-p, low-R projects that have returns above the cost of capital.

Boadway and Keen[19] develop a generalized version of the Stiglitz-Weiss and de Meza-Webb models by allowing projects to take on varying combinations of p and R. The debt-financing case is illustrated in Chart 1, adapted from Boadway and Keen.

The curved lines illustrate projects with combinations of p and R such that either private costs and benefits or social costs and benefits are equal. The slope of the social "zero net benefit" curve is steeper than the slope of the private "zero profit" curve indicating that the increase in R required to compensate entrepreneurs for a reduced probability of success is less than the increase required to cover all social costs. This difference arises because entrepreneurs only pay interest if they are successful, but the social cost of financing is independent of the project outcome.

Projects in areas A and B (or more precisely some portions of these areas) are handled efficiently: projects that should be undertaken, are (area A), and projects that should not be undertaken, are not (area B). Areas C and D are characterized by overinvestment and underinvestment respectively. Overinvestment occurs in high-risk (low p), high-conditional-

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16 Joseph E. Stiglitz and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," The American Economic Review 71, 3 (1981): 393–410.

17 David de Meza and David C. Webb, "Too Much Investment: A Problem of Asymmetric Information," The Quarterly Journal of Economics 102, 2 (1987): 281–292.

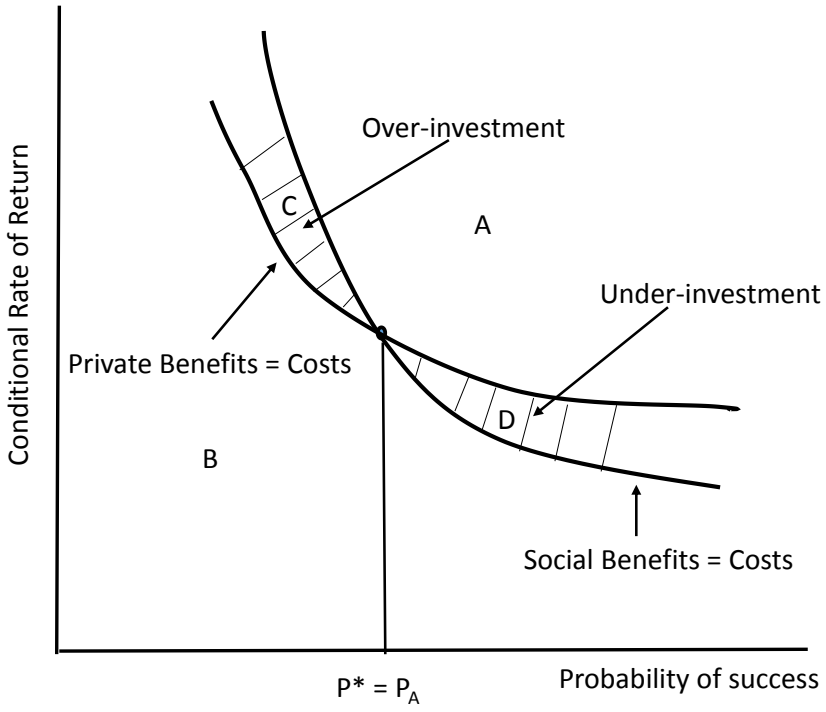
18 Boadway and Tremblay, "'Public Economics.'"

19 Robin Boadway and Michael Keen, "Financing and Taxing New Firms under Asymmetric Information," FinanzArchiv: Public Finance Analysis 62, 4 (2006): 471–502.

return projects, while underinvestment occurs in lower-risk, lower-conditional-return projects. The net impact cannot be determined a priori.

If only equity financing is available, the Boadway-Keen model predicts that adverse selection results in excessive investment, both when projects are pooled or separated by rate of return. When both debt and equity financing are available, the model predicts overinvestment if projects are pooled, but the results are ambiguous in the presence of return-specific contracts.

Chart 1: Financing Under Adverse Selection
The General Case With Debt Financing



Risk-averse entrepreneurs

The Boadway and Keen model, and the other models in this literature, assumes that outside investors and entrepreneurs are both risk-neutral. This assumption is worth reconsidering because most entrepreneurs in small innovative firms are not able to hold a diversified portfolio of assets. Most of their wealth is invested in their firm, so entrepreneurs may adopt risk-averse rather than risk-neutral behaviour.

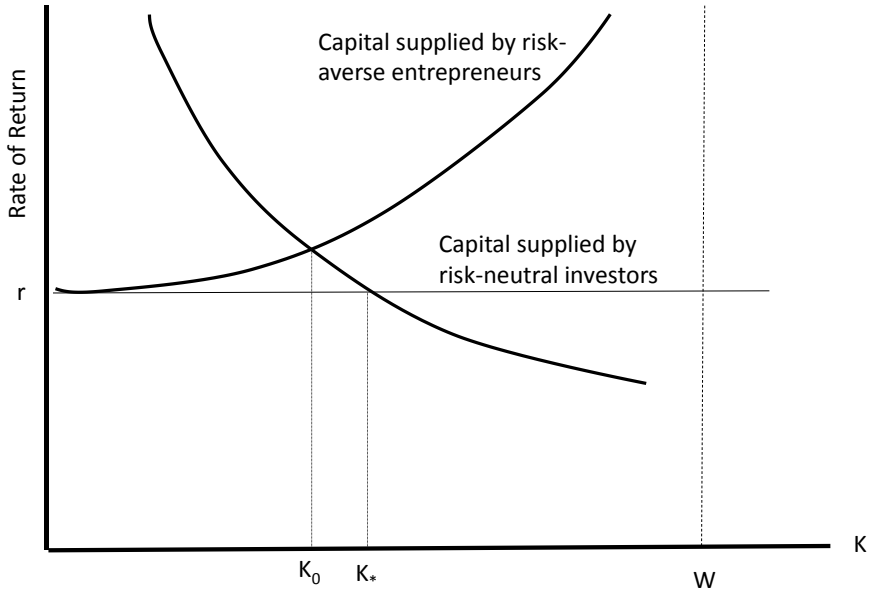
Braido, da Costa and Dahlby[20] amend the Boadway and Keen model to allow for risk-averse entrepreneurs. The authors first establish that with risk-averse, wealth-constrained entrepreneurs having access to debt and equity financing, along with project pooling by outside investors, the Boadway-Keen conclusion of excessive investment no longer holds. They do not investigate outcomes with return-specific contracts. Similar to the Boadway-Keen result for debt financing, there is a distorted mix of investments and the total volume

[20] Luis HB Braido, Carlos E. da Costa, and Bev Dahlby, "Adverse Selection and Risk Aversion in Capital Markets," FinanzArchiv: Public Finance Analysis 67, 4 (2011): 303–326.

of investment may be higher or lower than what would occur in an efficient capital market. The authors explain this finding by noting that there are two market failures at work. As a result of adverse selection, some low-risk projects with negative social benefits are financed while, as a result of risk-averse entrepreneurs, some high-risk projects with positive social benefits are not undertaken. In a second step, Braido, da Costa and Dahlby use numerical analysis to demonstrate that, with plausible assumptions about the degree of risk aversion by entrepreneurs, the net impact of the two market failures is too little investment in entrepreneurial projects.

The investment decision of a risk-averse entrepreneur is illustrated in Chart 2, developed by Dahlby.[21] The entrepreneur requires a premium over the risk-free rate, r, to finance the project out of his or her wealth (W). (Note that the premium rises along with the share of the entrepreneur's wealth invested in the project.) With risk aversion, the amount invested by the entrepreneur is below the socially optimal level K*, which is also the level that would be chosen by a risk-neutral entrepreneur. If the entrepreneur could share the risk with outside investors, the amount invested in the project would also be K*. The inability to benefit from risk sharing may reflect high fixed costs of financial intermediation or the existence of asymmetric information problems.

Chart 2: Market Equilibrium with Risk-Averse Entrepreneurs



Monitoring and advisory costs

Boadway and Sato[22] examine inefficiencies in financing when lenders incur costs to assess the probability of success of projects and use the results to set interest rates on loans. The authors assume that entrepreneurs can switch lenders after receiving a loan offer and that lenders engage in Bertrand competition for loans using interest rates. Two types of loan are

[21] Bev Dahlby, "The Optimal R&D Subsidy for Risk Averse Firms" (2011).

[22] Robin Boadway and Motohiro Sato, "Information Acquisition and Government Interventon in Credit Markets," *Journal of Public Economic Theory* 1, 3 (1999): 283–308.

considered, high quality and lower quality. In this setting, only entrepreneurs with lower-quality projects will have an incentive to switch lenders. To retain these entrepreneurs, lenders offer a pooled interest rate on loans rather than a rate that reflects their risk profile. As a result, ex ante evaluation costs will be recovered through higher interest rates on good-quality loans, pushing them above their efficient levels. An efficient equilibrium would require that lenders incur economic losses. Further, the evaluation effort may be higher than the efficient level. Lenders experience a net gain by incurring monitoring costs to reduce errors in classifying projects. Assuming that it is easier to identify high-quality than low-quality projects, error correction will consist of shifting projects from higher to lower categories. As a result, borrowers with lower-quality projects experience a loss as they pay higher interest rates on their loans. The private gain to the lenders will exceed the social gain, which is the sum of the lenders' gains and the borrowers' losses, so lenders have an incentive to allocate too many resources to an ex ante assessment of project quality.

Dietz,[23] and Keuschnigg and Nielsen,[24] analyze adverse selection in models of equity financing that explicitly include advice provided by venture capitalists. In Dietz, entrepreneurs with knowledge of the quality of their projects actively seek higher-cost venture capital financing for high-risk (low-p), high-return (high-R) projects, because they expect the advice provided will raise their net return by increasing the probability of success. Assuming that advice has a larger impact on higher-risk projects than on lower-risk projects, venture capitalists will also want to finance high-risk, high-return projects. High risk and the cost of providing advice drive the cost of venture capital finance well above that of "pure" (no-advice) equity financing, so entrepreneurs with projects that have a probability of success above a certain threshold do not have an incentive to seek venture financing. In principle, this could result in an efficient outcome, but if competition among venture capitalists reduces the cost of venture financing, the standard adverse-selection problem arises. Some entrepreneurs with low-risk projects will have an incentive to switch from pure equity financing to venture equity financing because they will perceive a net benefit from higher-cost financing accompanied by some advice. These lower-risk projects will not be profitable for venture capitalists. In the absence of screening, risky projects will pay too much for venture financing and less risky projects will pay too little.

Keuschnigg and Nielsen obtain the same result, although they start with the assumption that neither the entrepreneur nor the venture capitalist knows the probability of success until a formal relationship is set up. Venture capitalists are assumed not to screen applicants and some entrepreneurs are too optimistic about the quality of their projects, which gives rise to the classic adverse-selection problem.

Dietz highlights the fact that venture capitalists have an incentive to incur screening costs to eliminate the low-risk projects that cannot be profitably financed. This does not necessarily improve efficiency in Dietz's framework: some low-risk projects that

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[23] Martin D. Dietz, "Risk, Self Selection and Advice: Banks versus Venture Capitalists" (2002), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=302080.

[24] Christian Keuschnigg and Soren Bo Nielsen, "Self-Selection and Advice in Venture Capital Finance" (2007), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=963319.

would benefit from advice do not receive any.[25] In a subsequent analysis, Dietz[26] assumes that project quality is revealed to the entrepreneur at the screening stage. All refused applications are assumed to be correctly identified as low-quality projects. If rejected projects are dropped rather than financed by pure equity or bank loans, venture capital screening generates a social benefit by eliminating wasteful projects. Venture capitalists invest in screening until the marginal cost of screening equals the marginal benefit from raising the quality of projects financed. Venture capitalists bear all of the costs of screening but do not capture the benefit of avoiding wasteful spending by entrepreneurs on poor-quality projects. The investment in screening is therefore inefficiently low.

If screened-out projects are unsuitable for venture financing, but profitable when financed by pure equity or conventional debt, underinvestment in screening does not necessarily occur. Kanniainen and Leppämäki[27] develop a model in which venture capitalists are able to classify entrepreneurs by talent or quality and offer financing for all entrepreneurs above a minimum talent level. Entrepreneurs screened out by venture capitalists are assumed to be of higher quality than the average entrepreneur seeking debt. An increase in screening effort by venture capitalists could therefore cause some entrepreneurs to switch from equity to debt (or pure equity) financing, which would enhance efficiency by increasing profits of both venture capitalists and banks. On the other hand, in a zero-profit equilibrium, the cost of debt finance will fall; this encourages entry of less-qualified entrepreneurs, which means the net impact on efficiency could be positive or negative. This result seems to depend on the cost of debt finance being at or below its optimal level in the absence of screening by venture capitalists. A plausible case can be made that self-selection of projects into venture finance from bank finance puts upward pressure on the cost of debt finance.

Moral hazard

The above analyzes focus on adverse selection. Moral hazard can also be an issue, particularly for equity financing. Investors wanting to protect their investment against hidden actions by entrepreneurs will structure contracts to align incentives of both parties and take an active role in managing the business. As pointed out by Elitzur and Gavious,[28] there is a "double" moral-hazard problem in equity finance because both the entrepreneur and the venture capitalist contribute to the success of the project, but neither receives the full value of their contribution. As a result, the amount of business-management services (advice) provided by venture capitalists is likely to be inefficiently low.

Moral hazard will also diminish the use of riskpooling by investors. If entrepreneurs are more risk-averse than investors, equity contracts can fulfill a risk-pooling function that will allow investors to bear some of the risk.[29] But if outcomes are affected by the unobservable

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25 Note that the optimal amount of advice that should be provided declines as projects become less risky.

26 Martin D. Dietz, "Screening and Advising by a Venture Capitalist with a Time Constraint" (CFS Working Paper, 2003), https://www.econstor.eu/handle/10419/25406.

27 Vesa Kanniainen and Mikko Leppämäki, "Financial Institutions and the Allocation of Talent" (2002), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1020547.

28 Ramy Elitzur and Arieh Gavious, "Contracting, Signaling, and Moral Hazard: A Model of Entrepreneurs, 'Angels,' and Venture Capitalists," *Journal of Business Venturing* 18, 6 (2003): 709–725.

29 Boadway and Tremblay, "Public Economics."

effort of entrepreneurs, the incentive to provide risk-pooling services declines. However, as demonstrated in Dewatripont, Legros and Matthews,[30] the sequential use of convertible debt and equity can circumvent this trade-off.

Implications for government intervention

Boadway and Keen caution that it would not be appropriate to draw strong policy conclusions from their analysis of adverse selection, noting that it is tempting to conclude that the best response may be for governments not to intervene. However, since governments do intervene, the focus in this section is on exploring the circumstances in which government support for financing entrepreneurial projects is most likely to be welfare-enhancing.

Loan guarantees

The Boadway-Sato finding of inefficiently high monitoring effort and interest rates, even with risk-neutral agents, points to a role for government. One policy response is for governments to compensate lenders for losses incurred on projects that fail. A loan-guarantee program reduces the incentive for lenders to undertake ex ante loan assessments, which will also reduce the interest rate charged on better-quality projects. On the other hand, a loan guarantee reduces the interest rate charged on lower-quality loans below its efficient level, so if the portion of the loan guaranteed is too high, economic efficiency could be harmed rather than helped.

If entrepreneurs are risk-averse, a loan-guarantee program could be welfare-enhancing even in the absence of ex ante quality-assessment costs by lenders. In Chart 1, which assumes zero monitoring costs, a loan guarantee would shift down the zero-profit line for entrepreneurs. While this would reduce or eliminate the underinvestment shown in area D, it would expand overinvestment in area C and could create an additional area of overinvestment below area D. This would make overinvestment a more likely outcome. With risk-averse entrepreneurs, the zero-profit line would be higher, which would reduce the size of the overinvestment in area C and this would in turn make it less likely that a loan-guarantee program would cause a net increase in overinvestment.

The Stiglitz-Weiss[31] analysis referred to earlier provides a simpler rationale for loan-guarantee programs. In their model, lenders maximize the return on their loan portfolio by lending to lower-risk borrowers. While loan volumes could increase by raising the interest rate to attract more borrowers, the additional loans will be higher risk than the loan-portfolio average. As a result, the expected return on the additional loans will be lower than the portfolio average. In this model, higher-risk borrowers are refused credit instead of being offered loans at higher interest rates or with less-favourable conditions. A loan-guarantee program could mitigate the resulting market failure.

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30 Mathias Dewatripont, Patrick Legros, and Steven A. Matthews, "Moral Hazard and Capital Structure Dynamics," *Journal of the European Economic Association* 1, 4 (2003): 890–930.

31 Stiglitz and Weiss, "Credit Rationing."

Survey evidence suggests this Stiglitz-Weiss framework has some relevance for policy, despite its focus on a single interest rate. R. A. Malatest and Associates[32] presented loan applications from participants in the small-business financing program to a sample of lenders and asked how the application would have been processed in their institution. There were three choices: accepted; accepted with less-favourable conditions, such as additional collateral or a lower loan amount; and rejected. One-quarter of loans would have been accepted, 30 per cent would have been conditionally accepted, and 45 per cent would have been rejected by the respondents' institutions. Lenders appear to engage in credit rationing, although some loans are priced to risk.

A second policy response to dealing with costly information acquisition is for governments to lend directly to entrepreneurs. A government-supported bank could promote efficiency by pricing loans to risk and treating the fixed costs of ex ante assessments as a non-recoverable cost. The potential improvement in efficiency may not be realized if the public sector bank is not as good at assessing risk as are private sector banks. This is a concern since the public bank has less of an incentive to maximize profits. An offsetting advantage of direct lending is that loans provided by a public bank that has invested in ex ante evaluation provide a signal about project quality to private sector lenders, which improves access to credit. Overall, direct involvement by governments in financial markets carries risks that can be avoided by implementing a loan-guarantee program.

Free advice

The analysis of adverse selection in equity finance by Dietz[33] suggests that venture capital screening could be too high or too low. However, in either case, government provision of advice to entrepreneurs could be sensible policy. If projects screened out by venture capitalists can be profitably financed by other means, a limited amount of free advice would raise the probability of success of these projects, which could be welfare-enhancing. If projects screened out by venture capitalists would not be profitable when financed by other means, the provision of free advice could convince some entrepreneurs to avoid wasteful expenditures on unprofitable projects. In the Keuschnigg-Nielsen model, providing free advice would allow entrepreneurs to obtain a more realistic assessment of their projects, which would also reduce the number of welfare-reducing applications for venture financing.

Support for seed financing

There is a solid argument for providing government support to entrepreneurs seeking seed finance. Such entrepreneurs are likely to be more risk averse and have less collateral than entrepreneurs seeking additional financing for an ongoing enterprise. In addition, to the extent that angel investors spend more time with each entrepreneur than venture capitalists do, the scope for risk pooling may be more limited than for venture capital. The seed or angel investment market is small relative to the venture capital segment, suggesting that government intervention would be small-scale. The visible component of the angel capital market represented 13 per cent of the venture capital segment in 2015 (Box 1).

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[32] R. A. Malatest and Associates Ltd., "CSBFP Lender Awareness and Satisfaction Study," 2014, https://www.ic.gc.ca/eic/site/csbfp-pfpec.nsf/eng/la03244.html.

[33] Dietz, "Risk"; and Dietz, "Screening."

Box 1 : Relative size of the seed or angel investment market

The visible angel investment segment is small relative to the venture finance component of the risk capital market. Individuals and groups registered with the National Angel Capital Organization (NACO) financed 283 companies for a total investment of $130 million in 2015.[1] In contrast, there were 536 venture capital deals worth a total of $2,259 million in the same year.[2] However, $154 million in venture capital financing in 178 deals was classified as seed financing. The angel/seed market was therefore about $285 million in 2015, involving about 460 deals and representing about 13 per cent of the value of venture capital financing. It is unlikely that all angel investors are registered with the NACO, but the visible component would have to represent only five to seven per cent of the total for angel investment to be roughly comparable to venture capital investment.

1. National Angel Capital Organization (2015) *2014 Report on Angel Investing Activity in Canada* June.
2. Canadian Venture Capital and Private Equity Association (2015) 2014 *Canadian Venture Capital Market Overview* http://www.cvca.ca/research-resources/industry-statistics/

As can be seen from Chart 2, there is a social benefit from subsidizing investment at a rate roughly equal to the risk premium required for the entrepreneur to accept outside financing.[34] What form should the assistance take? Given the nature of the market failure, policies to reduce the risk aversion of entrepreneurs and to enhance risk pooling by angel investors should be considered first. Changing bankruptcy laws to make them more favourable to debtors would make entrepreneurs less risk averse, although some of the gain would be lost since investors would be likely to raise their required return to compensate for higher losses when projects fail. If entrepreneurs are more risk averse than investors, however, tilting bankruptcy policy more in favour of debtors should result in a net increase in the number of projects financed.

In principle, governments could subsidize either entrepreneurs or angel investors to get the market for seed capital to clear. Governments are unlikely to have the specialized knowledge required to act as angel investors, so subsidizing entrepreneurs through the direct provision of seed capital is fraught with risk. A subsidy could be provided indirectly by implementing a preferential capital gains regime for entrepreneurs, which would raise the expected after-tax return, although it would be very difficult to target such a measure at innovative startups.

The "side-car" investment approach now used in the venture capital segment could be used to subsidize the supply of seed capital. In this approach, the government would passively invest in angel investors, capping its upside return but accepting loss of all the capital invested. Angel investors would select projects to finance without input from the government participant. This investment model raises the expected return to the private investors, which will increase supply. Some of the increase in expected return will be passed on to entrepreneurs, prompting more of them to accept financing offers. This approach also reduces the importance of the moral-hazard market failure identified above by raising the return to effort (providing advice) by angel investors: less of the extra return generated by their effort will be shared with the entrepreneur.

[34] More formally, the optimal subsidy rate in the absence of costs of delivering assistance is the proportion of the marginal return on the investment that accrues to the rest of society. If the entrepreneur's required rate of return is ρ and the social opportunity cost of capital is r, the optimal subsidy rate is $(\rho - r)/(1 + \rho)$. See Dahlby, "The Optimal" for a complete derivation. This formulation does not include the costs associated with providing the subsidy.

On the other hand, with governments sharing proportionately in losses but less than proportionately in the gains, angel investors would have an incentive to undertake riskier projects, which could reduce efficiency. Another disadvantage of this approach is the large number of angel investors or syndicates of investors with whom the government would partner. While dealing with angel investors would be cheaper and less fraught with risk than directly investing in entrepreneurs, the extra costs should be considered when assessing the benefits and costs of intervention.

The government should set up a contract with angel investors so that the expected value of the subsidy is closely related to the risk premium required by entrepreneurs. While it will not be possible to develop precise estimates of the risk premium, some illustrative calculations could be performed to put a cap on the subsidy. For example, if a risk-neutral entrepreneur requires a 15-per-cent return on investment, a five-percentage-point risk premium suggests that the subsidy should be just over four per cent of the amount invested. The subsidy would have to be increased to reflect the fact that, with an upward sloping supply curve for angel investment, not all of the subsidy will be passed through to entrepreneurs. Nevertheless, this estimate of the optimal subsidy would remain much lower than proposed by some other analysts (Box 2).

Box 2 : The "optimal" capital market subsidy

It is sometimes suggested (for example by Brander, Hellman and Egan[1]) that government intervention in the venture capital market is justified by the spillovers from the policy-induced increase in R&D and innovation. This point of view is inconsistent with the standard advice to act directly on market failures where possible. If existing subsidies for performing R&D are optimal in the sense that they maximize the net benefit from supporting R&D, an additional subsidy can only provide a net benefit if it is addressing a market failure other than knowledge spillovers. Further, as discussed below, evaluations of R&D support programs indicate that subsidies for R&D undertaken by small firms are above their optimal level, so an excessive capital market subsidy would increase the net loss arising from the R&D subsidy.

1. Brander, James, Edward Egan and Thomas Hellman, "Government Sponsored versus Private Venture Capital: Canadian Evidence," in *International Differences in Entrepreneurship*, ed. Josh Lerner and Antoinette Schoar (Chicago: University of Chicago Press, 2010), Chapter 9, http://www.nber.org/books/lern08-2.

Another way to increase the supply of seed capital is to give angel investors a subsidy for each dollar they invest. The subsidy should be set at the same rate as for the "side-car" investment fund. While such a subsidy would increase the supply of seed capital and the same percentage of the subsidy would flow through to entrepreneurs, the incentive effects would be quite different. The subsidy would be a fixed percentage of the amount invested so there would not be any incentive to increase the amount of advice provided, nor would angel investors increase the risk profile of their investments. In addition, the cost of administering a subsidy could be less than for a side-car fund, particularly if the subsidy is delivered through the tax system.

Venture capital financing — encouraging the provision of advice

The theoretical analysis of venture capital finance indicates that intervention in this segment of the risk capital market should be focused on improving the incentives for venture capitalists to provide advice. "Side-car" funding by the government that gives

private investors leveraged returns appears to be an appropriate policy response. As discussed above, such investment provides an incentive to provide additional advice since it increases the venture capitalists' share of the value added from advice. Since there is no evidence to support the view that the supply of venture capital is too low, government side-car funding should displace or crowd out private venture capital. But complete crowding out is not an equilibrium response because the expected private sector rate of return will rise as a result of government participation. Private supply will increase to reduce returns to their pre-policy, competitive levels. The new equilibrium will show a small increase in overall supply and unchanged returns for venture capitalists with the government subsidy being used by venture capitalists to pay for additional advice.

The cap on the government's return could be adjusted to achieve the desired subsidy rate. In contrast to the seed capital investment, the optimal size of the subsidy rate is not known, even in the abstract. An alternative would be to cap the government return so that its expected return would be equal to either its cost of borrowing or the social opportunity cost of capital.

It is worth emphasizing that the theoretical analysis suggests that adverse selection results in overinvestment in the venture capital segment. Rates of return will be lower than they would be with symmetric information, but they should be equal to the return available in competing asset classes after allowance for higher risk. Additional government supply will inevitably drive down rates of return and crowd out private investors. (If fund managers were obtaining super-normal returns, additional supply would reduce returns but private investors would not necessarily exit.) Fund managers benefiting from a subsidy, such as the tax credit for labour-sponsored venture capital corporations, may be less sensitive to a decline in rates of return, so the impact on rates of return could be substantial.

Summary of policy implications

In summary, theoretical analysis suggests the following conclusions about government intervention in capital markets:

- While adverse selection may affect all markets, the problems are likely only severe enough to justify intervention for innovative projects.
- Loan-guarantee programs should support the less-risky innovative projects that can be financed by debt. Such projects require an above-average level of screening by lenders but are not suitable for venture capital financing because outside advice would not appreciably affect their probability of success.
- Governments should provide basic advice to entrepreneurs at below-market prices. This could enhance welfare by preventing entrepreneurs from wasting resources on low-quality projects or by raising the probability of success of projects that are too risky for debt or pure equity financing but not risky enough to warrant venture financing.
- Risk aversion likely results in too little investment by startup entrepreneurs. Policies to reduce risk aversion and facilitate risk pooling and measures to increase the supply of seed capital could be welfare-enhancing.

- Adverse selection likely results in too much investment in the venture capital segment. Moral hazard results in the under-provision of advice by venture capitalists, so policies that raise the incentive to provide advice without increasing the supply of venture capital are likely to be welfare-improving.
- Direct provision of credit by governments should be avoided. Intervention designed to correct distorted market signals is likely to be as good as or superior to direct provision of credit.

4. RESULTS AND RECOMMENDATIONS

Federal government programs that support small business and entrepreneurship are presented in Table 2. These programs are delivered through the tax system, through direct-spending programs and through two government business enterprises, the Business Development Bank of Canada (BDC) and Export Development Canada (EDC). Official sources indicate that these programs have a total cost of about $5.5 billion; however, the cost of programs delivered by the BDC is understated. The adjusted cost of support programs is almost $7 billion, which represents about 0.33 per cent of GDP and 16 per cent of corporate income tax revenues. On the other hand, the cost of the largest program—the special low rate of income tax for small corporations—is overstated by an unknown amount.

Tax measures, excluding refundable tax credits, account for about 60 per cent of the support provided to small business. The BDC adjusted cost accounts for another 18 per cent of the total, leaving about 22 per cent for direct-spending programs. Programs are tilted almost five to one in favour of small-business policy (i.e., they are available to all small businesses).

4.1 Financing programs

The small-business deduction

The stated objective of the federal small-business deduction is to "provide small corporations with more after-tax income for reinvestment and expansion."[35] The special low rate of income tax is available on up to $500,000 of active business income earned by Canadian-controlled private corporations (CCPCs). The benefit is reduced to zero as assets increase from $10 to $15 million. The federal small-business rate was 11 per cent from 2008 to 2016; the general rate was reduced from 19.5 per cent in 2008 to 15 per cent in 2012. The four-percentage-point small-business preference resulted in a maximum tax reduction of $20,000. The 2015 budget announced that the small-business rate would be reduced by two percentage points by 2019, but with a change in government in 2015, only the first 0.5-percentage-point reduction in January 2016 was allowed to stand. The fiscal cost of the small-business deduction was $3.3 billion in 2015.

[35] Finance Canada, *Tax Expenditures: Notes to the Estimates/Projections* (2010), 75, http://www.fin.gc.ca/taxexp-depfisc/2010/taxexp1004-eng.asp.

TABLE 2 FEDERAL TAX AND SPENDING PROGRAMS THAT SUPPORT SMALL BUSINESS AND ENTREPRENEURSHIP[1] 2015-16[2]

Policy	Description	Type of Support	Cost ($ Million)	
			Reported	Adjusted[3]
Financing Programs				
Small Business Deduction	Low rate of income tax on up to $500,000 of active business income; reduced to zero as assets rise from $10 to $15 m.	SB	3,250.0	3,250.0
Business Development Bank of Canada (BDC)	Financing--direct provision of non-investment grade loans	SB	-441.8	1,133.5
	Subordinate financing--direct supply of higher risk instruments	E	-53.7	4.3
	Venture capital program	E	-70.7	18.1
	Consulting -- below-cost provision of business advice	E	31.6	31.6
	Securitization--promote asset-based financing by small fincos	SB	-3.1	36.6
	Total BDC		-537.7	1,224.1
Small Business Financing (Loan guarantee program)	Government pays 85% of loan losses, capped at about 12% of value of portfolio. Fees cover about 70% of program costs.	SB	62.7	10.0
Export Development Canada	Venture capital and private equity investment	E	-50.0	20.0
Labour-sponsored venture capital corporations (LSVCCs) tax credit	15% tax credit on up to $5,000 investment in LSVCCs.	E	90.0	90.0
Subtotal Financing Programs			2,865.0	4,594.1
Support for R&D and innovation				
Enhanced SR&ED Investment Tax Credit	Higher refundable tax credit for R&D small firms (35% vs.15%)	E	1,265.0	722.9
Industrial Research Assistance Program (IRAP)	Subsidies and free advice for firms undertaking R&D.	E	168.5	168.5
	Subsidies for organizations providing services to firms	E	13.1	13.1
IRAP Youth Employment Strategy	Subsidies for firms hiring highly-skilled youth	E	23.7	23.7
Incubator and Accelerator Program	Services to support early-stage firms and entrepreneurs (closed)	E	18.2	18.2
Business Innovation Access Program	Business services and technical assistance from educational and research institutions.	E	11.5	11.5
Subtotal: Support for R&D and Innovation			1,500.0	957.9
Support for Entrepreneurship				
Lifetime Capital Gains Exemption	Up to $800,000 capital gains tax exemption on disposition of shares in Canadian-controlled private corporations.	SB	775.0	775.0
Deduction of Allowable Business Investment Losses	Capital losses deductible from ordinary income when they exceed realized capital gains.	E	55.0	55.0
Rollover of investments	Sales of small business shares do not trigger a capital gain if the proceeds are re-invested in another small business	E	2.0	2.0
Employee Stock Option Deduction	Only half of the employee benefit is included in income. Available to all employees.	E	N.A.	N.A.
Spending programs supporting entrepreneurship	Futurpreneur, Women's Enterprise Initiative	E	10.8	10.8
Subtotal: support for entrepreneurship			832.0	832.0
Other programs targeted at small business				
Hiring Tax Credit for small business	Reduction in employment insurance premiums	SB	305.0	305.0
Business Development Program (Atlantic Canada Opportunities Agency)	Subsidies for startup, expansion or modernization of SMEs	SB	133.1	133.1
Subtotal other programs			438.1	438.1
Total Support			5,635.1	6,822.1
Percent of total support				
Entrepreneurship			26.7%	17.4%
Small business			73.3%	82.6%

1. Excluding agriculture and fishing. 2. 2015 for tax measures and the BDC. 3. See text for explanation.
Legend: SB Small Business; E Entrepreneurship

The reported cost of the small-business deduction is overstated. The deduction reduces taxes on retained earnings used for business expansion, but the taxes paid on these retained earnings when they are eventually distributed are not deducted from the cost estimate. When a firm reaches its target size so that investment equals depreciation of its capital stock, income earned on its capital that is distributed as dividends will be taxed at approximately the same rate as dividends from a large firm when both personal and corporate income taxes are considered. Further, small firms that grow into large businesses pay the large-firm income tax rate on the income generated by all of their capital, so governments will eventually recover the benefit in this case as well. In this context, the small-business deduction is more like an interest-free loan to finance investment than an outright subsidy, which suggests that the net cost is likely to be substantially less than the gross fiscal cost.

Box 3: What determines the net fiscal cost of the small-business deduction?

The intention of the small-business deduction appears to be to provide an interest-free loan to undertake capacity expanding investment with retained earnings. For a given target size of firm, the cost of this loan will rise with the discount rate used (the opportunity cost of public funds) and with the share of investment financed by retained earnings. The net cost moves in the opposite direction as the rate of return on assets because, as the rate of return rises, it will take less time to reach the firm's target size and the loan will be repaid more quickly. A plausible high-cost scenario for surviving firms can be developed by making the following assumptions:

- The rate of return on assets is five per cent, approximately equal to the average rate of return on small-business assets.
- The firm uses all profits to finance a doubling of its assets over 15 years.
- The real discount rate is 6.25 per cent, as discussed in Box 5.
- The firm stops expanding after 15 years and distributes all net income via dividends.

With these assumptions, the net present value of benefits is 42 per cent of the gross amount claimed. Few surviving firms are likely to receive a benefit that is substantially higher than this, although the net fiscal cost of the deduction will be 100 per cent for firms that claim it but fail before paying dividends. In a low-cost scenario (10-per-cent rate of return on assets, 50 per cent of expansion financed with retained earnings and a five-per-cent discount rate) a firm with the same growth objective would receive a net benefit of 22 per cent of the SBD benefits received over nine years and repaid over the following three years.

Firms that invest retained earnings passively and distribute accumulated retained earnings via a share buyback can obtain a larger net benefit. For example, if in the high cost scenario described above, the firm passively invests net income earned from year 16 to 31 and distributes accumulated retained earnings through a share buyback in year 32, the present value of benefits is approximately 90 per cent of gross amount claimed. Not many firms would be able to achieve this result.

On the other hand, although retained earnings that are invested passively are subject to a special tax, this does not eliminate the tax advantage from passive investment of retained earnings because the tax is refundable. In addition, retained earnings can be distributed as a capital gain through share buy-backs, in which case the effective tax rate on distributions from a small business would be lower than on distributions from a large business. Nevertheless, it would be unusual for firm to retain the full benefit of the small business deduction even when taking full advantage of these two tax planning opportunities. (Box 3.) As a result, it is safe to concluded that the reported cost of the small business deduction exceeds its true cost, but there is not enough information available to determine how much the cost is overstated.

An illustrative cost-benefit analysis of the small-business deduction

The small-business deduction allows firms to finance more of their investment through retained earnings. A static cost-benefit analysis of the small-business deduction is presented in Table 3. In this example, adapted from Dachis and Lester,[36] it is assumed that the small-business tax reduction is financed by an increase in the tax rate on other firms, which is a natural financing source to consider since it leaves the overall tax burden on business investment unchanged. The analysis assumes that small firms pay a five-percentage-point risk premium on the cost of debt finance and that their debt-asset ratio is 0.3, compared to 0.5 for larger firms. In 2015, the federal small-business tax advantage was four percentage points, which reduces the user cost of capital by about one per cent. Because of the ambiguity about the net amount of tax revenue forgone, costs and benefits are expressed per dollar of tax revenue forgone.

The social benefit from correcting the capital market failure is assumed to equal the reduction in marginal production costs arising from the tax reduction. Using a simple version of the Harberger Triangle formula, this benefit is estimated to be 0.4 per cent of the tax revenue forgone (Box 4).

The decrease in the relative income tax rate in the small-business sector causes a reallocation of capital and labour from the large- to the small-business sector. There will be a social benefit from the tax reduction on small business and a social cost from the increase in tax on other business investment. The social cost will exceed the social benefit for two reasons. First, large firms are more efficient than small firms. Second, a higher tax rate on large firms leads to profit shifting out of Canada by multinationals and a loss of tax revenue, which adds to the social cost of taxing large firms.

There are two studies demonstrating that efficiency increases with firm size in Canada. Lee and Tang[37] compare total factor productivity (TFP) in Canadian and U.S. manufacturing over the 1985–95 period and find that larger firms are about 15-per-cent more productive than firms with less than 100 employees. Leung, Meh and Terajima[38] analyze TFP by firm size for all Canadian industries over the 1984–97 period. In their study, TFP in firms with more than 100 employees is 8.4-per-cent higher than in other firms over the entire period and 5.1-per-cent higher over the last five years of the sample.[39]

Tax-base shifting has substantial impacts on corporate tax revenue. In a meta-analysis of existing empirical work on international profit shifting, Heckemeyer and Overesch[40] develop a "consensus" prediction that a one-percentage-point reduction in the corporate

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[36] Benjamin Dachis and John Lester, "Small Business Preferences as a Barrier to Growth: Not So Tall after All," C.D. Howe Institute Commentary 426 (2015), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2609527.

[37] Frank C. Lee and Jianmin Tang, "Multifactor Productivity Disparity between Canadian and US Manufacturing Firms," *Journal of Productivity Analysis* (2001): 115–128.

[38] Danny Leung, Césaire Meh, and Yaz Terajima, "Firm Size and Productivity," Bank of Canada Working Paper (2008), http://www.econstor.eu/handle/10419/53956.

[39] These estimates relate to average productivity; the impact of marginal changes in the size distribution of firms may be smaller.

[40] Jost Heckemeyer and Michael Overesch, "Multinationals' Profit Response to Tax Differentials: Effect Size and Shifting Channels," ZEW-Centre for European Economic Research Discussion Paper 13-045 (2013), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2303679.

income tax rate increases reported profits of multinationals by 0.8 per cent.[41, 42] Given a statutory tax rate of 26.7 per cent, a semi-elasticity of 0.8 implies that the direct revenue loss arising from applying a lower statutory tax rate to the profits of multinationals should be grossed up by 21 per cent to account for tax-planning effects.[43] Assuming that multinationals account for 85 per cent of large-firm profits in Canada, the gross-up factor is about 18 per cent.

I capture the impact of TFP differentials and tax-base shifting by adjusting the marginal excess burden (MEB) of taxation for large and small firms. The MEB of taxation measures the loss in economic efficiency per dollar of tax revenue raised. Analysis by Baylor and Beauséjour[44] implies that the social cost of raising an extra dollar in corporate income tax revenue is approximately 37 cents in Canada. Dahlby[45] develops an estimate of 1.45 for the marginal cost of public funds, which under certain circumstances equals the MEB plus one. The average value of the MEB from these two studies is 0.41.

Assuming that TFP is 8.4-per-cent higher in large firms than in small firms and that the gross-up factor for tax planning is 18 per cent, the MEB for income taxes on large business is 27.9-per-cent (1.084 x 1.18) larger than the MEB for small businesses. With the additional assumption that the overall MEB is a capital-stock-weighted sum[46] of the individual MEBs, this relationship implies that the MEBs for small and large businesses are 0.328 and 0.422 respectively. As a result, a decrease in the small-business tax rate financed by an increase in the large-business tax rate lowers real income by approximately 9.5 cents per dollar of tax revenue forgone. The benefit of mitigating the capital market failure reduces the net social cost to about nine cents per dollar of tax revenue forgone (Table 3). Using the estimated net fiscal cost of the small-business deduction shown in Table 2, the annual social cost of the measure would be about $100 million. Assuming the program continues indefinitely, the present value of this annual cost would be about $1.2 billion.

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41 This is lower than the average semi-elasticity of 1.55 in the literature surveyed because the meta-analysis gives more weight to studies that use micro-data, improved econometric techniques and more recent data sets.

42 Dharmapala accepts the consensus estimate but notes that the most recent studies obtain even lower semi-elasticities, likely due to the ability to control for unobserved foreign-affiliate effects along with the now-standard controls for country and industry effects. See Dhammika Dharmapala, "What Do We Know about Base Erosion and Profit Shifting? A Review of the Empirical Literature" (2014), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2398285.

43 The loss in tax revenue from profit shifting is calculated as $\Delta t \cdot \gamma \cdot TB \cdot t$ and the direct tax-revenue loss is given by $\Delta t \cdot TB$, where t is the tax rate, γ is the tax-base semi-elasticity and TB is the tax base. The overall revenue loss is therefore $\Delta t \cdot TB \cdot (1 + \lambda \cdot t)$, which amounts to a 21-per-cent gross-up when t=0.267.

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

45 Bev Dahlby, "Reforming the Tax Mix in Canada," University of Calgary School of Public Policy Research Paper 5, 14 (April 2012), https://www.policyschool.ca/wp-content/uploads/2016/03/bev-dahlby-012-3.pdf.

46 Firms claiming the small-business deduction accounted for 13 per cent of total investment over the 2000–11 period (Finance Canada, *Tax Expenditures and Evaluations 2013,* 66). It is assumed that the capital stock share also averaged 13 per cent.

TABLE 3 ILLUSTRATIVE STATIC BENEFIT-COST ANALYSIS OF THE SMALL BUSINESS DEDUCTION (PERCENTAGE OF THE NET FISCAL COST OF THE PROGRAM)

Social Benefits	
Mitigate capital market failure	0.4
Tax reduction for small business	32.8
Subtotal -- Benefits	33.2
Social Costs	
Tax increase on large business	-42.2
Net social benefit	-9.0
Other costs not quantified	
Increased tax evasion	
Higher administration and compliance	
Threshold effects on investment	

This estimate understates the social cost of the small-business tax preference because it excludes tax-compliance issues. There is considerable evidence that the self-employed are less inclined to comply with the tax code. Schuetze[47] reports an estimate that the self-employed in Canada under-reported income by 18 per cent in 1990. The self-employed are broadly defined to include owners of unincorporated and incorporated businesses, and the under-reporting rate may not be the same for both categories of the self-employed. Nevertheless, subsidizing entry into small business is highly likely to result in additional tax evasion and this additional revenue loss has to be financed by higher taxes or lower spending, both of which will harm economic performance. A second, less-important missing cost is higher administration and compliance costs arising from a separate small-business rate.

[47] Herb J. Schuetze, "Profiles of Tax Non-Compliance among the Self-Employed in Canada: 1969 to 1992," *Canadian Public Policy* (2002): 219–238.

Box 4: The social benefit from correcting a market failure

The social benefit arising from correcting the assumed capital market failure equals the increase in real income resulting from the improved allocation of resources. The increase in real income is approximated by the increase in producer surplus from the reallocation. This increase is expressed relative to the amount of tax revenue forgone (TRF) in the following equation.

$$\frac{\Delta E}{TRF} = \frac{-.5 \cdot s \cdot \xi \cdot \Delta I}{s \cdot \mu \cdot (UC - \partial) \cdot \alpha \cdot K_t} = \frac{-.5 \cdot s^2 \cdot \xi \cdot \varepsilon \cdot I_{t-1}}{s \cdot \mu \cdot (UC - \partial) \cdot \alpha \cdot K_t} = \frac{-.5 \cdot s \cdot \xi \cdot \varepsilon}{(1 - s \cdot \xi \cdot \varepsilon)} \cdot \frac{I_t}{\mu \cdot (UC - \partial) \cdot \alpha \cdot K_t}$$

In the above equation, ΔE is the efficiency gain from mitigating the capital market failure, TRF is the tax revenue forgone, s is the percentage reduction in the user cost of capital (1.0 per cent), ξ is the percentage of the subsidy that gets passed through to the user cost of capital (0.83[1]), ε is the elasticity of investment with respect to its user cost (-1), I is investment, μ is the reciprocal of the semi-elasticity of the user cost (UC) with respect to changes in the statutory rate of income tax (4), δ is the economic depreciation rate of capital, K, and α is the share of capital financed by equity.

The amount of tax revenue forgone equals the percentage-point change in the statutory rate (s times μ) that reduces the user cost by s multiplied by an estimate of shareholder income.[2] Using values for overall business-sector investment and capital stock, the second term on the right-hand side of the equation had a value of 0.6 on average from 2010 to 2014.

1. The pass-through percentage is based on an elasticity of demand of -1 and an elasticity of supply of five.
2. The pre-tax return to equity, UC-δ, is calculated from data in Statistics Canada, "Financial and Taxation Statistics for Enterprises," CANSIM Table 180-0003. Its average value from 2010 to 2014 is 12.1 per cent.

The possibility that a two-tier rate could affect firm size by raising the cost of capital as firms grow is often raised as a further cost of a preferential small-business tax rate. However, as discussed in Dachis and Lester,[48] in most cases the benefits from growth will exceed the cost of losing the small-business tax preference, so most firms will jump over the barrier. Benefits from growth include scale-related cost reductions, improved access to financing, and a larger presence in the marketplace, which gives firms more pricing power. These benefits tend to rise, albeit not indefinitely, as a percentage of firm size, while the increase in the cost of capital arising from losing the small-business tax preference is a constant percentage of capital investment. As a result, firms with a target size that is well above their size when the thresholds for access to the tax preference begin to bind, will conclude that the benefits from growth exceed the cost of losing the special low rate of income tax. On the other hand, firms with a target size that is only slightly above their size when the thresholds begin to bind are likely to conclude that the benefits from growth are less than the cost of losing the tax preference. This decision will show up in clustering at the thresholds, but based on the evidence presented by Dachis and Lester, the social cost of the forgone scale-related cost reductions will be small relative to the tax revenue forgone.

Policy recommendations

The small-business deduction may be providing a social benefit by mitigating a capital market failure affecting all small businesses, but by encouraging less-efficient small-scale production it is imposing a net social cost on the economy. It should be eliminated. The

[48] Dachis and Lester, "Small Business." Note that the analysis captures the impact of federal and provincial preferential tax rates for small business.

fiscal savings will equal the reported tax revenue forgone initially, but will decline over time as tax revenue from the "recovery" of the deduction falls.

The small-business financing program

The small-business financing program (SBFP) is another generally available measure. Under this program, the federal government guarantees loans originating in the private sector. In order to participate in the program, lenders must offer variable-rate loans at no more than three percentage points above the prime rate for business loans, and fixed-rate loans at no more than three points higher than the rate for a single-family residential mortgage. These rates include a 1.25-per-cent annual administration fee paid to the federal government. Lenders also collect a two-per-cent registration fee on behalf of the government. The government pays 85 per cent of losses on defaulted loans, but for large lenders, total default claims cannot exceed approximately 12 per cent of the value of the loan portfolio (it was 10 per cent until 2009).[49] In the fiscal year ending March 2015, the cost of the SBFP recorded in the public accounts was $63 million; net of fees collected, the cost was $10 million.

In fiscal 2015, the total value of new loans registered with the federal government was $785 million, trending down from about $1 billion in 2011.[50] Loans were concentrated in the accommodation and food services sector (37 per cent) and retail trade (14 per cent) in 2014. Borrowers are predominantly young and small firms: in fiscal 2015, 60 per cent of participating firms were less than a year old and about 40 per cent had less than $500,000 in annual turnover. The number of loans guaranteed in fiscal 2015 was 5,067, which was just under half the number registered in 2005. Lender dissatisfaction with profitability and the administrative effort required to register loans and process claims appears to have decreased the use of the program.[51] Limits on the size of loans may also have been an issue, but they were increased in 2014. The 2015 federal budget increased the loan amount and maximum term for investment in real property and raised the size-eligibility criterion for participation in the program.

As discussed above, the expected impact of a loan-guarantee program depends on the nature of the market for small-business loans. If lenders price loans to risk and incur costs through ex ante assessments of loans, they may not be able to recover all of these costs on higher-risk loans, so they will raise the interest rate on higher-quality loans. Higher-risk borrowers can take the loan offer to a competitor who can provide a lower interest rate because the competitor does not have to incur the assessment costs. A loan-guarantee program could reduce the amount spent on assessments, which would lower the interest rate on higher-quality loans. On the other hand, reducing the market interest rate on higher-risk loans harms rather than helps efficiency, so the net impact is ambiguous. In contrast, if lenders engage in credit rationing, a program that only provides guarantees to borrowers that have been rejected by private lenders will generate a net social benefit.

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[49] Program parameters are described in *Canada Small Business Financing Act—Annual Report 2014–15*, https://www.ic.gc.ca/eic/site/csbfp-pfpec.nsf/eng/h_la03257.html.

[50] The source for the data in this paragraph is Innovation, Science and Economic Development Canada, "Annual data since April 1, 1999," https://www.ic.gc.ca/eic/site/csbfp-pfpec.nsf/eng/h_la00039.html.

[51] Canada. Department of Innovation, Science and Economic Development, *Evaluation of the Canada Small Business Financing Program* (2014), 15, https://www.ic.gc.ca/eic/site/ae-ve.nsf/eng/h_03711.html.

I have undertaken an illustrative cost-benefit analysis of the SBFP assuming that lenders engage in credit rationing, as suggested by survey evidence cited earlier. With this assumption, the social benefit from reducing credit rationing can be approximated by calculating the producer surplus on the additional loans resulting from the loan-guarantee program. The additional producer surplus is approximately equal to the additional return on investments financed with a guarantee, relative to the return on investments financed with loans from the general pool. By assumption, the increase in the rate of return on projects financed with a guaranteed loan equals the reduction in the loan rate made possible by the loan guarantee.

The subsidy resulting from the loan guarantee can be calculated by considering the value of the loan guarantee, net of the annual fee, and how this net benefit is likely to be shared between borrowers and lenders. From 2000 to 2009, losses on SBFP-registered loans averaged 9.65 per cent of the value of loans issued in each year.[52] If this default rate continued to apply after 2009 for all lenders, they would have been able to claim 85 per cent of their loan losses, worth 8.2 per cent of loans issued. Since lenders are required to deduct the 1.25-per-cent annual fee from the interest received from the borrower, the net benefit to the lender is 6.95 per cent. In a competitive loan market, this benefit would be shared between borrowers and lenders, with the share depending on the relative size of the demand and supply elasticities for loans. Assuming that supply is two times as elastic as (the absolute value) of demand, two-thirds of the benefit would be passed through to borrowers,[53] and the implicit interest-rate reduction for borrowers participating in the guarantee program would be 4.65 percentage points.

The incrementality of the SBFP is assessed on a periodic basis, using both survey and econometric analysis. The most recent survey of lenders[54] was discussed above. Seens and Song[55] develop a credit-scoring model similar to those used by banks. The model provides a satisfactory prediction of bank approvals of applications for conventional loans.[56] When the model is applied to SBFP participants in 2011, it predicts that 67 per cent of participants would have been refused a conventional loan compared to 45 per cent in the Malatest survey. The average of the two estimates, 0.56, is used in the cost-benefit analysis.

The value of outstanding loans in fiscal 2015 is estimated at $4.2 billion.[57] With an incrementality ratio of 0.56, the SBFP resulted in $2.4 billion in loans that would not have

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52 Canada's ministry of Innovation, Science and Economic Development provides data on claims by year of loan issue. The default rate was calculated in two steps. First, the present value of claims paid over the term of loans issued in a given year was divided by the value of loans issued in that year. Second, a weighted-average rate was calculated for the 2000–09 period and then divided by 0.85 to obtain the overall default rate. A discount rate of five per cent was used to calculate the present value of claims. The loan and claims data can be accessed at: https://www.ic.gc.ca/eic/site/csbfp-pfpec.nsf/eng/h_la00039.html (Tables 10a, 10b and 10c).

53 The formula used to determine the pass-through percentage is $\eta/(\eta-\varepsilon)$, where η is the elasticity of loan supply and ε is the elasticity of loan demand. See Box 4.

54 R. A. Malatest and Associates Ltd., "CSBFP Lender."

55 Daniel Seens and May Song, "Requantifying the Rate of Incrementality for the Canada Small Business Financing Program" (2015), https://www.ic.gc.ca/eic/site/061.nsf/vwapj/RRI_CSBFP-NQTA_PFPEC_eng.pdf/$file/RRI_CSBFP-NQTA_PFPEC_eng.pdf.3,19]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}

56 The count R-squared, which is defined as the number of correct predictions as a proportion of the total number of observations, is 0.71.

57 Borrowers pay a 1.25-per-cent fee on the outstanding loan balance each year. In 2015, fee revenue was $52.670 million, so the value of outstanding loans was $52.670 / 0.0125 = $4,213.6 million.

been made without the guarantee. The social benefit (the producer surplus) from these additional loans is approximately $55 million (0.56 x 4214 x 0.0465 x 0.5 = $54.9 million).

TABLE 4 ILLUSTRATIVE BENEFIT-COST ANALYSIS OF THE CANADA SMALL BUSINESS FINANCING PROGRAM (IN MILLIONS OF $)

Social Benefits	
Mitigate capital market failure	54.9
Social Costs	
Administration expenses	-3.2
Financing cost	-62.8
Total social cost	-66.0
Net social benefit	-11.1

Program costs consist of administration expenses and the cost of financing the net cost of the program. Administration expenses were $3.2 million in 2014.[58] The present value of claims on loans outstanding in 2015 would be about $350 million (0.082 x $4.214 billion), while the present value of fees owed is estimated at $190 million. The expected net fiscal cost in 2015 is therefore estimated to be about $160 million. Assuming a marginal excess burden of taxation of 0.4, the social cost of financing the program was approximately $65 million. With the above assumptions and calculations, the net social cost of the program was about $11 million in 2015. Benefits and costs of the program would be roughly evenly balanced if 67 per cent of loans guaranteed under SBFP would have been refused by lenders.

Policy recommendations

The SBFP may be acting on a capital market failure caused by credit rationing. If so, the program is more likely to generate a net social benefit than if the market failure results from the inability of lenders to recover ex ante assessment costs from higher-risk borrowers. However, even assuming the existence of credit rationing, the SBFP is generating a net social loss. A key reason for this outcome is that about 45 per cent of loans supported by the program would have been approved by lenders without a guarantee. The program's objectives are to improve access to loans for small business by guaranteeing loans that would otherwise be rejected by lenders or that would have been approved with a higher interest rate or less-favourable conditions. Guaranteeing conditionally approved loans harms economic efficiency in much the same way as guaranteeing unconditionally approved loans.

The decision to participate in the loan-guarantee program is made by the borrower and lender; SBFP administrators play no direct role in the decision. SBFP administrators can, however, influence the incrementality of the program through ex post assessments of participants. Nevertheless, greater efforts to focus program participation on loans that would have been rejected outright should be made. A useful starting point would be to rule out participation if the loan would have been conditionally approved. SBFP administrators should also undertake some monitoring of lenders, such as a random assessment of participants, to increase incrementality.

[58] Canada. Department of Innovation, Science and Economic Development, "Canada Small Business Financing Act Comprehensive Review Report (2009–2014)," 2015, https://www.ic.gc.ca/eic/site/csbfp-pfpec.nsf/eng/h_la03256.html.

The Business Development Bank's Financing Program

The Business Development Bank of Canada (BDC) has five business lines, all of which serve small and medium-sized enterprises (SMEs). The BDC has recorded a profit every year since 2001, but this is based on an unrealistically low cost of capital. Calculated using a 6.25-per-cent real social opportunity cost of capital (Box 5), the BDC has recorded a loss in every year since 2002.

The BDC's largest business line is the Financing Program, with a loan portfolio of $19.7 billion in fiscal 2016. The BDC's mandate is to provide services complementary to those offered by commercial banks.[59] The BDC reports that the Financing Program provides loans to SMEs with a higher average risk profile than those offered by commercial banks, although an explicit comparison is not provided. The allowance fell from 2011 to 2015, reaching about half of the average of the five years ending in 2011. The allowance for credit losses edged up to 3.0 per cent of the loan portfolio in 2016. The Financing Program portfolio is substantially less risky than the SBFP portfolio, where defaults averaged 9.65 per cent of loan values from 2000 to 2009.

An illustrative cost-benefit analysis of the BDC Financing Program is presented in Table 5. The social benefit is calculated using the same methodology and some of the same parameters as for the SBFP.

The implicit assumption in the illustrative cost-benefit analysis is that the BDC is correcting a capital market failure that causes credit rationing, which prevents higher-risk borrowers from obtaining credit. The rate of return on projects financed by these loans is expected to be higher than for projects financed by conventional bank loans, even after default costs. The difference in the rates of return is approximated by the subsidy BDC financing is able to offer because its cost of capital is lower than commercial banks. There are three elements to the subsidy calculation.

- Following Bergevin and Poschmann,[60] the BDC's debt is assumed to be financed at the same rate as subordinated debentures issued by commercial banks instead of a government bond rate. The gap between these two measures widened greatly from about 50 to 75 basis points prior to the financial crisis, but recent issues suggest that it has since narrowed to about 150 basis points. The average rate on 10-year government bonds issued in fiscal 2016 was 1.5 per cent, which would put the rate on subordinated bank debentures at 3.0 per cent. The effective rate of interest paid by the BDC Financing Program on funds borrowed from the federal government was 0.8 per cent in 2016. The higher cost of capital would have reduced the $536-million profit of the BDC Financing Program in 2016 to $27 million.
- Again following Bergevin and Poschmann, it is assumed that commercial banks typically have a 15-per-cent rate of return on equity. The extra income required to reach this target return in 2016, given the adjusted net income calculated above and a prorated share (89 per cent) of the BDC's $5.3 billion in equity, would be approximately $685 million (0.15 x 0.89 x $5324 million – $27 million = $686.9 million).

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[59] Canada. *Business Development Bank of Canada Act* (1995), http://lois-laws.justice.gc.ca/eng/acts/B-9.9/FullText.html.

[60] Philippe Bergevin and Finn Poschmann, "Reining in the Risks: Rethinking the Role of Crown Financial Corporations in Canada," C.D. Howe Institute Commentary 372 (2013), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2286869.

- The last step is an adjustment for corporate income taxes that are paid by commercial banks but not by the BDC. In 2016, the combined federal-provincial corporate income tax rate was 26.7 per cent, so the total additional cost arising from treating the BDC like a commercial bank would have been about $950 million in fiscal 2016.

Box 5: Does the Business Development Bank make a profit?

The Business Development Bank of Canada (BDC) is a government business enterprise with a mandate to support entrepreneurship by providing financial and management services, particularly to small and medium-sized enterprises.[1] The bank's activities are expected to be complementary to commercial financial institutions. The BDC's capital is provided by the federal government in the form of equity investment — limited to $3 billion — and loans, which are limited by a cap on the debt-equity ratio and a capital-adequacy ratio. The bank's debt and contingent liabilities cannot exceed 12 times its equity. In the last 15 years, the BDC's total capital has risen from $943 million to $22,271 million. Most of the increase has taken place since 2007, when federal investment was $1,808 million.

The BDC has reported positive net income every year since 2000. In the 2016 fiscal year, which ended March 31, 2016, the BDC reported net income of $535.5 million (Table 2). Reported net income is, however, not the best measure of the cost of resources allocated to BDC. The main consideration is the corporation's cost of capital. In 2016, the BDC had outstanding loans of $16.9 billion with the federal government and paid $76.2 million in interest, which implies an effective interest rate of 0.8 per cent. Excluding retained earnings, the federal government's equity stake in the BDC was $2.1 billion in 2016. If the government's total investment is assumed to be financed by additional borrowing (and the interest on this borrowing is financed by higher taxes), the BDC's cost of capital in 2016 would have been about $370 million. This estimate assumes that the entire amount was financed by bond issues in 2016, when the interest rate on new issues of 10-year bonds was 1.5 per cent. With this estimate of the cost of capital, the BDC's net income in 2016 would be about $170 million.

A cogent argument can be made that using the government's cost of borrowing still understates the BDC's cost of capital. Funds borrowed by the federal government and given to the BDC could have been deployed elsewhere in the economy. Jenkins and Kuo[2] recommend using an eight-per-cent real rate of return for this economic opportunity cost of capital in Canada. However, since this estimate was prepared, views on the cost of capital have shifted lower. For example, the Bank of Canada[3] now assumes the neutral real interest rate is in the range of 1.0 to 1.75 per cent, down 1.75 percentage points from its level prior to the financial crisis. The Bank of Canada cites a population-induced slowdown in the potential growth rate of the Canadian economy and a substantial imbalance between global saving and investment as key reasons for the decline in the neutral interest rate.

Assuming that the real economic opportunity cost of capital has also fallen 1.75 percentage points to 6.25 per cent, and assuming a two-per-cent inflation rate, the BDC's cost of capital would be about $1.8 billion in 2016, which would leave the BDC with a deficit of approximately $1.2 billion. Using this measure of the cost of capital, the BDC has recorded a loss in every year since 2002.

1. Canada. *Business Development Bank of Canada Act* (1995), http://lois-laws.justice.gc.ca/eng/acts/B-9.9/FullText.html.
2. Glenn Jenkins and Chun-Yan Kuo, "The Economic Opportunity Cost of Capital for Canada—An Empirical Update" Queen's Economics Department Working Paper no. 1133 (2007), http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.489.3929&rep=rep1&type=pdf.
3. Stephen S. Poloz "Living with Lower for Longer" 20 September 2016. http://www.bankofcanada.ca/2016/09/living-lower-longer/

The potential additional costs are equivalent to a subsidy received by the BDC that can be passed on to borrowers. With $19.7 billion in loans outstanding in 2016, the subsidy would have allowed BDC to reduce interest rates on loans by 4.8 percentage points. By assumption, this reduction is equal to the increase in the expected rate of return on BDC-financed projects relative to projects financed by commercial bank loans. Applying the Harberger Triangle calculation and assuming a 0.56 incrementality ratio for BDC loans used in the SBFP analysis, the social benefit of correcting the assumed market failure is almost $300 million.

TABLE 5 ILLUSTRATIVE BENEFIT-COST ANALYSIS OF THE BDC'S FINANCING PROGRAM (2015-16 IN MILLIONS OF $)

Social Benefits	
Mitigate capital market failure	295.7
Social Costs	
Opportunity cost of capital	-1642.2
Reported net income	441.8
Interest paid to federal government	66.9
Net social benefit	-837.8
Percentage of loan portfolio	-4.6%

The social cost of the Financing Program is the opportunity cost of the capital invested less net income earned on financing operations. As indicated above, almost 90 per cent of the BDC's capital (debt plus equity) is attributable to the Financing Program, which amounts to about $19.9 billion. Assuming an 8.25-per-cent economic opportunity cost of capital (Box 5), the Financing Program's cost of capital would be about $1.6 billion. Recorded net income less interest payments to the federal government represents the part of the cost of capital paid by borrowers, so it has to be deducted from the opportunity-cost measure. The net social cost of the program was about $850 million in 2016.

The estimated net cost is not particularly sensitive to the incrementality assumption. If all BDC loans are incremental (that is, if no BDC borrowers could have obtained financing from a commercial bank), the net social cost would have been $600 million. There is no information available to help assess whether the incrementality ratio used, 0.56, is too high or too low. On the other hand, the Financing Program would have a net social cost of zero if the opportunity cost of its capital were about four per cent.

Policy recommendation

The net social cost of the Financing Program is about 4.5 cents per dollar of loan issued, compared to about 1.3 cents for the SBFP. This comparison suggests that the social cost of the Financing Program could be dramatically reduced if BDC operated a loan-guarantee program instead of a direct-lending program. This finding is consistent with theoretical analysis that suggests governments should focus on guarantee programs instead of direct lending. They could be combined into one program that, if appropriately structured to raise incrementality, would be likely to provide a small net social benefit.

BDC subordinate financing

The subordinate financing program targets high-potential firms that need financing to sustain growth or need to transition from one owner to the next.[61] The program makes debt and some equity-like investments that have subordinate status relative to other debt issued by firms receiving financing, making these investments riskier than loans made under the Financing Program. Less information is available on the risk profile of subordinated loans than on the term loans of the Financing Program, but there is a substantial difference in the

[61] Business Development Bank of Canada, "Annual Report 2015" (2015), 24, https://www.bdc.ca/en/documents/annualreport/BDC_AnnualReport_2015.pdf.

required capital-adequacy ratios: 10 per cent for the Financing Program and 25 per cent for subordinated financing. The additional risk is reflected in relative interest income as well. In 2016, interest income represented 8.3 per cent of the subordinate financing portfolio, compared to 5.2 per cent for the Financing Program portfolio.

All of the financing activity takes place via joint ventures with the Caisse de dépôt et placement du Québec. The BDC acts as a general partner, handling all lending and managerial activities in exchange for fees.[62] In 2016, the value of the subordinated-financing program investments was $751 million. Although information on the geographic and sectoral distributions of investments is provided in annual reports, information about investment stage (seed, startup, etc.) is not provided.

TABLE 6 ILLUSTRATIVE BENEFIT-COST ANALYSIS OF THE BDC'S SUBORDINATE FINANCING PROGRAM (2015-16 IN MILLIONS OF $)

Social Benefits	
Mitigate capital market failure	0.7
Social Costs	
Opportunity cost of capital	-62.6
Reported net income	53.7
Interest paid to federal government	4.6
Net social benefit	-3.6
Percentage of loan portfolio	-0.5%

Applying the cost-benefit framework used for the Financing Program to the subordinated financing program suggests that social costs exceed benefits by a small margin (Table 6): the net cost represents under one per cent of the investment portfolio compared to 4.5 per cent for the Financing Program. The key reason for this more favourable outcome is strong net income results. In fiscal 2016, net income from subordinated financing was $53.7 million, or approximately seven per cent of the value of the portfolio. The comparable figure for the Financing Program was two per cent. An important consideration is that fees received from the Caisse de dépôt et placement and others cover almost all operating expenses. The BDC draws attention to unusually low investment losses in recent years,[63] and projects a much lower level of net income for 2017 as losses return to levels more consistent with the riskiness of the portfolio. If net income had been the same share of the investment portfolio as for the Financing Program, subordinated financing would have incurred a net social cost equal to about 4.5 per cent of the investment portfolio. Note that an implication of the relatively high profitability is that a relatively small subsidy is provided to clients: 0.2 percentage points compared to 5.4 per cent for the Financing Program.

The cost-benefit analysis does not capture two important elements of the subordinate financing program. As explained in the "Rationales" section, the program will be of particular interest to entrepreneurs with projects that are too risky for conventional debt finance but who do not, even if successful, offer a high enough return to attract venture capital. Getting these borrowers into the appropriate financing niche could be welfare-enhancing. On the other hand, the program will also be attractive to entrepreneurs with

[62] Business Development Bank of Canada, "Annual Report 2004" (2004), 30.

[63] Business Development Bank of Canada, "Annual Report 2016" (2016), 34, https://www.bdc.ca/EN/Documents/annualreport/BDC_AR2016_EN_Final.pdf.

projects too risky for conventional projects for which they believe, rightly or wrongly, that advice from venture capitalists will not increase the probability of success sufficiently to cover the extra cost of venture capital financing. If these entrepreneurs are correct in their assessment, obtaining financing could be welfare-enhancing; but if they are not, obtaining subordinated financing could impose a social cost in the form of wasted resources in a failed project. The impact of these additional elements on the net social cost of the subordinate financing program cannot be predicted.

Policy recommendation

The subordinate financing program may be filling a gap in the supply of risk capital by providing financing for projects too risky for conventional debt but not suitable for venture capital financing. Not enough detail on the program is publicly available to be highly confident about recommending some fine-tuning to improve performance. It would be worth investigating, however, if more resources should be allocated to screening and advising loan applicants. It is also questionable to have the BDC take the lead in its partnership with the Caisse de dépôt. The possibility of providing side-car funding should be investigated.

BDC venture capital

The BDC makes venture capital investments directly at every stage of a technology-based company's development and makes indirect investments via funds, some of which are led by private and other public sector funds. The BDC is a significant player in the risk capital market. In fiscal years 2015 and 2016, new investments, including the Venture Capital Action Plan (VCAP), amounted to $236 million and $318 million, which was about 11 per cent of the value of all new risk capital investments reported by the Canadian Venture Capital Association. As VCAP funding is fully deployed, the BDC will become a more important participant in the risk capital market.

The total value of the venture capital portfolio in 2016, excluding $138 million invested separately under the VCAP, was $928 million. In 2016, the venture capital portfolio was split roughly 60-40 in favour of direct investments, down from 85-15 in 2010. There was $360 million in authorized but undisbursed financing in 2016, most of which will be allocated to indirect investments. VCAP funding, which has a potential size of $400 million, is placed with larger funds focused on later-stage financing. Like most other participants, BDC Venture Capital was unprofitable for much of the 2000s. Capital gains on the BDC's investment portfolio (realized and accrued) were negative from 2002 to 2010. BDC Venture Capital recorded a profit in 2015, the first since 2001, and a larger profit in 2016. Capital gains on the portfolio were positive for four out of the five years ending in 2016.

A 2011 review of the industry and the BDC's role in it concluded that the Canadian venture capital industry was "broken."[64] The venture capital market shrank dramatically after the "dot-com" boom and fell further by 2010 as negative returns prompted private investors to exit the industry. According to the BDC, substantial changes would be required to draw

[64] Business Development Bank of Canada, "Venture Capital Industry Review."

them back.[65] The review drew attention to the small scale of Canadian funds and the lesser skill of fund managers compared to their U.S. counterparts as key reasons for industry underperformance. It also noted that substantial investments were made by government and retail funds that have objectives and constraints that may hurt returns.

The 2011 report announced a new strategic direction, the most important element of which was the intention to use BDC resources to promote the emergence of "at-scale" funds managed by skilled personnel, emphasizing indirect rather than direct investment. This approach implies an increasingly passive and smaller role for the BDC as private sector managers become more skilled.

Assessing the net social benefit of the venture capital program is even more difficult than for the other financing programs considered so far. One issue is that it is hard to specify the benefit of supplying additional funding to the seed capital market. There are sound reasons to suppose that the seed and startup segments of the risk capital market are undersupplied, so it would be possible, in principle, to determine the additional return earned on funds shifted into these market segments. However, the BDC no longer publishes the rate of return on its VC portfolio and the Canadian Venture Capital and Private Equity Association has also suspended publication of its rate-of-return data while it assesses its methodology. In addition, there is no recent publicly available information on investments by stage of development.[66]

A second issue is that the benefits of the new strategic orientation would be difficult to assess at the best of times and are impossible to assess after the relatively short period that it has been underway. Further, while improving the quality of managers and increasing the size of the funds they work with would be beneficial, there could be substantial transition costs. The nature of the market failure in the venture capital segment does not suggest that the amount of venture capital available is too low, so the additional public supply will displace or crowd out some private investors. Downward pressure on rates of return appears to be inevitable in the short run, but they will recover as weaker participants leave the industry.

Policy recommendations

Although it was not possible to perform a cost-benefit analysis of BDC Venture Capital, some policy recommendations based on the analytical framework developed above can be made. First, the BDC should shift from direct seed capital investments to passive or side-car investments with angel investors. In this approach, the government would offer private investors leveraged returns by capping its return while leaving its entire investment at risk. The cap would be set so that the expected private return would rise by an amount equal to the estimated premium required by risk-averse entrepreneurs. The risk premium is unknown, as is the proportion of the subsidy that will be passed on to entrepreneurs, so the BDC should experiment with relatively small subsidies — for example, three to seven per cent of the investment — to gain some understanding of the market.

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[65] ibid.

[66] In 2012, the last year the data were published, direct investments were allocated as follows: seed capital, 16 per cent; startup capital, 21 per cent; development capital, 50 per cent; and expansion capital, 13 per cent. Startups are defined as firms with fewer than 12 consecutive months of sales.

In its 2011 review, the BDC made the point that the angel network is not well developed in Canada. While the theoretical expectation is that risk-neutral investors would find all profitable investment opportunities, there could be a shortage of investors with enough industry knowledge to provide useful advice. If this is still a limitation, the BDC could continue to make direct investments at the same time as side-car investments. A comparison of rates of return obtained in the two approaches would provide a useful test of the hypothesis that there is a shortage of skilled angel investors.

Second, activity in the venture capital segment should be confined to indirect investment, with the private sector taking the lead in most circumstances. The only tenable rationale for direct investment in venture capital by a public enterprise is to mitigate the moral-hazard problem by providing more advice than would be forthcoming from private investors. But this can be achieved at a lower cost by investing passively in private sector funds and offering leveraged returns to its partners.

Third, the BDC should increase the supply of venture capital cautiously when implementing its strategy to restructure the venture capital industry. Considerable judgment will be required to get the right balance between short-run costs and long-run benefits of the strategy. The BDC should also be prepared to decrease its presence in the industry as its strategic goals are achieved. A competitive rate of return in the venture capital industry would be a sign of successful intervention.

There is an ongoing need to address the issue of correcting the incentive for private investors to provide the socially optimum amount of advice to firms they support. Continued presence by the BDC in the form of passive investment with leveraged returns for its partners is one solution. In this case, the BDC would attempt to participate in all private sector funds, choosing a level of investment and caps that provide an incentive large enough to alter private sector behaviour. The social benefits of mitigating this market failure are difficult to assess, so the BDC should proceed cautiously. A prudent starting point would be to provide a subsidy that raises the expected value of private sector returns by two to four percentage points.

There is not enough information in the public domain to permit recommendations on how the BDC should allocate its resources between seed/startup and venture capital investments. The best way to make a decision is to keep an eye on ex post rates of return. In a healthy market, they should be approximately the same in both segments and higher than in public markets to account for the higher risk.

BDC consulting services

The BDC provides a broad range of advisory services to entrepreneurs at subsidized rates. The percentage of costs recovered through fees has been on a downward trend since 2010; in 2016, the cost-recovery rate was 34.7 per cent, a bit more than 40 per cent of its value in 2010. A further decline is expected for fiscal 2017.

Providing consulting services at below-cost rates is, in principle, a sound policy. As discussed in the "Rationales" section, providing technical advice could enhance welfare by convincing entrepreneurs to abandon low-quality projects, thereby avoiding wasting resources. Subsidized technical advice could also improve welfare by raising the probability of success of projects rejected by venture capitalists as "low-return" but which are too

risky for debt financing or pure equity financing (i.e., financing provided without advice). These benefits would arise from assisting entrepreneurs applying for subordinate financing or venture capital financing and a small slice of Financing Program clients. There is a plausible case for providing subsidized business-management advice to potentially high-impact entrepreneurs. Such entrepreneurs may fail in the absence of business advice, so such a service can be seen as indirectly subsidizing knowledge creation. The case for providing subsidized business-management advice to all startups to address an externality is much less compelling.

4.2 Support for R&D

The two largest federal programs that support R&D undertaken by SMEs are the enhanced Scientific Research and Experimental Development (SR&ED) Investment Tax Credit and the Industrial Research Assistance Program (IRAP), a spending program administered by the National Research Council.

The Enhanced SR&ED Investment Tax Credit

SMEs can claim a 35-per-cent refundable tax credit on up to $3 million in qualifying R&D. The $3-million "expenditure limit" is reduced to zero as taxable income rises from $500,000 to $800,000, or as business assets rise from $10 to $50 million. R&D spending in excess of the expenditure limit is eligible for a 15-per-cent tax credit that is 40-per-cent refundable until the firm exceeds either the taxable income or asset threshold. Prior to 2014, the regular credit rate was 20 per cent. Since the regular tax credit cannot always be claimed as it is earned, its present value is lower than 15 per cent. The pattern of regular SR&ED claims in the early 2000s reduced the present value of the regular credit by about 15 per cent, or 2.25 percentage points.[67]

The fiscal cost of the enhanced SR&ED tax credit in 2015 was $1.3 billion. The cost of the additional support provided — the difference between the 35-per-cent and 15-per-cent tax credit — was $725 million. Lester[68] finds that the enhanced credit results in a net social *cost* of about 12 cents per dollar of tax revenue forgone, which would put the annual social cost at $155 million in 2015. In contrast, the regular credit generates a net *benefit* of about 12 cents per dollar of tax revenue forgone. The higher subsidy rate and higher compliance costs per dollar of credit received for smaller firms explain the different outcomes. The loss is even more substantial if provincial tax credits are included. The federal-provincial weighted average SR&ED statutory tax credit for SMEs is about 42 per cent (Table 7), which implies a social cost of about $205 million for federal and provincial programs in 2015. The optimal statutory subsidy rate — the rate that minimizes the loss — for smaller firms is about 23 per cent.[69] The social loss at this rate would be about $120 million. The optimal statutory subsidy rate for large firms is approximately the same.[70]

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[67] Canada. Expert Panel Review of Federal Support to Research and Development, "Assessing the Scientific Research and Experimental Development Tax Credit" (2011), http://rd-review.ca/eic/site/033.nsf/eng/h_00326.html.

[68] John Lester, "Benefit-Cost Analysis of R&D Support Programs," *Canadian Tax Journal* 60, 4 (2012), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2215681.

[69] About 92 per cent of R&D spending is eligible for the enhanced credit, so the optimal effective subsidy rate is about 20 per cent.

[70] This estimate does not include an adjustment for the decline in the effective rate caused by non-refundability of the regular credit.

The optimal subsidy rates were calculated assuming that knowledge spillovers and the responsiveness of spending to a subsidy are the same for both categories of firm. As discussed in Section 2, theoretical and empirical analyses does not provide much guidance on the relative size of spillovers. The safest conclusion would be that spillovers are the same for large and small firms. The empirical work on the price sensitivity of R&D spending by size of firm is not extensive, but provides limited support for the view that spending by small firms is more sensitive to price changes than spending by larger firms.[71] Based on the model used in Lester,[72] if spending by small firms were 25-per-cent more sensitive to the price of R&D than larger firms, which would be a large difference, the optimal subsidy rate would rise by about 3.5 percentage points to about 25 per cent. Given the other uncertainties associated with calculating the optimal rate, there is no compelling reason to adopt a higher optimal rate for small firms.

TABLE 7 FEDERAL AND PROVINCIAL SR&ED INVESTMENT TAX CREDIT RATES (2016, %)

	Statutory Rates			Optimal Rates
	Federal	Provincial	Combined[1]	Combined
Enhanced credit	35.0	11.1	42.2	22.0
Regular credit	15.0	5.3	19.5	23.0
	Recommended Federal Rates			
	Federal	Provincial[2]	Combined[1]	
Enhanced credit	15.0	11.1	24.4	
Regular credit	15.0	5.3	19.5	

1. The base for the federal credit is reduced by the amount of provincial assistance provided.
2. Actual rates.

Policy recommendations

Taken at face value, the cost-benefit analysis suggests that the federal enhanced investment tax credit should be eliminated. However, the static cost-benefit framework provides an imprecise measure of the net social benefits. Benefits could be understated because the impacts on consumer surplus are not adequately captured, or they could be overstated because the estimated spillover benefits do not include the destruction of rents caused by innovations. In a dynamic setting, however, benefits are more likely to be understated because some innovations may have large and long-lasting impacts on living standards. It is not possible to quantify these benefits, but their possible existence is a strong argument against eliminating the enhanced credit. Maintaining the enhanced credit could also be justified as a second-best policy to offset the net negative impact of the set of externalities, market failures and policy-induced barriers faced by innovative startups.

A more prudent policy approach than eliminating the enhanced credit would be to reduce the static loss by setting the federal rate such that the combined federal-provincial rate is close to its optimal value of 22 per cent. At current provincial rates, this would be achieved by setting the federal rate at 12.5 per cent. To obtain a 23-per-cent combined rate for the regular credit, the federal rate should be set at 19 per cent. A less controversial option would

[71] Lester, "Benefit-Cost Analysis."

[72] ibid.

be to set the federal enhanced credit rate at 15 per cent, the same as the current regular credit rate. This would put the combined federal-provincial enhanced credit slightly above its optimal rate and the combined regular credit about three percentage points below its optimal rate (Table 7).

In order to ensure that the combined rate does not substantially exceed the optimal rate, the federal government should also announce its intention to adjust its rate if provincial rates change. One possibility would be to periodically adjust the federal rate to offset changes in the weighted average provincial rate.

As explained in Lester and Warda,[73] there is a particularly strong case for refundability for young firms, which are unlikely to have taxable income while their first round of R&D is underway. In addition, even a 15-per-cent subsidy results in a negative effective tax rate on R&D so commercialization of R&D undertaken by an undiversified firm will not generate sufficient income to make use of the subsidy as it is earned. The absence of refundability therefore puts young and undiversified firms at a disadvantage relative to established, diversified firms. Note that with refundability, setting the two federal rates at the same value would not result in any administrative savings because criteria for refundability would have to be maintained.

The Industrial Research Assistance Program (IRAP)

IRAP provides assistance to corporations operating in Canada with up to 500 full-time-equivalent employees, but most awards are made to firms with fewer than 50 employees. The value of awards to firms in fiscal 2016 was $168 million. In addition to direct financial assistance, firms also receive technical and business advice by industrial technology advisers (ITAs). In 2007, the last year for which the data are publicly available, advice amounted to almost a third of direct financial assistance.[74] If this ratio still applied in fiscal 2016, the total benefit received by firms would have been $222 million.

The financial assistance to firms is provided as contribution funding, which increases administration and compliance costs of the program. Direct assistance to firms can be provided as a grant, a contribution, or a loan. In contrast to the awarding of grants or claiming a tax credit, firms receiving contribution assistance are required to submit progress reports and a final accounting of the use of funds; they may also be audited to verify the accuracy of submitted reports. Further upward pressure on IRAP administration expenses arises from a rigorous assessment of applicants by ITAs to ensure that applicants

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[73] John Lester and Jacek Warda, "An International Comparison of Tax Assistance for Research and Development: Estimates and Policy Implications," University of Calgary School of Public Policy Research Paper 7, 36 (November 2014), http://www.policyschool.ca/publications/international-comparison-assistance-research-and-development/.

[74] National Research Council, "Impact Evaluation of the NRC Industrial Research Assistance Program—Final Report" (2007), online document dated 2007 available on request from NRC-IRAP.\\uc0\\u8221{} 2007, online document dated 2007 available on request from NRC-IRAP.}","plainCitation":"National Research Council, "Impact Evaluation of the NRC Industrial Research Assistance Program—Final Report," 2007, online document dated 2007 available on request from NRC-IRAP."},"citationItems":[{"id":1292,"uris":["http://zotero.org/users/2713875/items/DEDJMZS4"],"uri":["http://zotero.org/users/2713875/items/DEDJMZS4"],"itemData":{"id":1292,"type":"article","title":"Impact Evaluation of the NRC Industrial Research Assistance Program—Final Report","URL":"online document dated 2007 available on request from NRC-IRAP","author":[{"family":"National Research Council","given":""}],"issued":{"date-parts":[["2007"]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}

are "investment ready" and that their projects are worthy of funding. Many are not: only about a third of IRAP clients are receiving financial assistance at any given time.[75, 76]

As a result of these characteristics, administration and compliance costs represent a substantial fraction of IRAP funding. The most recent publicly available information indicates that prior to 2009, IRAP administration costs — excluding the cost of advice provided — amounted to almost 25 cents per dollar of payments to firms. Compliance costs are also relatively high at about 11.5 cents per dollar of funding-assistance received. The sum of compliance and adjusted administration costs is about 33 per cent of benefits received, compared to about 17 per cent for the enhanced SR&ED credit.[77]

IRAP clients received a direct subsidy of about 20 per cent of their project costs on average in 2009. (The subsidy rate on eligible costs was much higher.) The cost of advice received raised the overall subsidy rate to just under 24 per cent. This subsidy is in addition to any benefits received through federal and provincial tax credits. One of the criteria for obtaining financial assistance through IRAP is that a firm must have a plan to develop and commercialize "innovative, technology-driven new or improved products, services, or processes." It is therefore highly likely that all IRAP clients will be eligible for the enhanced SR&ED tax credit. In the cost-benefit analysis discussed below, it is assumed that all IRAP clients perform R&D and claim the enhanced SR&ED credit.

Lester[78] reports that the costs of providing assistance through IRAP exceeded the benefits in the 2009 version of the program (Table 8). The static net cost of the program is likely understated since the study made three assumptions favourable to finding a positive net benefit.

- First, as discussed above, it was assumed that technological advice provided by ITAs is equivalent to R&D spending by the recipient firm and therefore generates spillovers. The spillover benefit is overstated, however, because ITAs provide business-management advice as well as technological advice to clients and it was not possible to separate the two.
- Second, it was assumed that the rigorous screening process undertaken by ITAs results in more projects receiving assistance in the "applied research" stage than the "experimental development" stage, where the spillovers are considerably smaller. Spillovers from IRAP-financed projects are assumed to be 76 per cent compared to 56 per cent on average for all R&D projects.
- Third, IRAP was analyzed as a stand-alone program instead of an add-on to the federal and provincial SR&ED tax credits.

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75 ibid."URL":"online document dated 2007 available on request from NRC-IRAP","author":[{"family":"National Research Council","given":""}],"issued":{"date-parts":[["2007"]]}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}

76 The high administration expenses also reflect IRAP's substantial regional presence and the provision of services to other programs without recovering all costs.

77 Lester, "Benefit-Cost Analysis."

78 ibid.

Receiving IRAP funding technically reduces the federal enhanced SR&ED tax credit, but the effective impact is to reduce the marginal value of the IRAP subsidy. This reduction lowers the amount of additional R&D stimulated and hence the value of spillovers.[79] On the other hand, the lower fiscal cost of the SR&ED credit reduces the cost of financing the credit, and this social saving should also be attributed to IRAP.[80] As a result of these changes, the net social cost of IRAP rises from about eight per cent to 14 per cent of program costs (Table 8).

TABLE 8 BENEFIT-COST ANALYSIS OF THE ENHANCED SR&ED CREDIT AND IRAP (MILLIONS OF DOLLARS, EXCEPT AS NOTED)

	SR&ED Enhanced Credit[1]	IRAP[2]	
		Stand-alone	SR&ED Add-on
Amount of support received by firms[3]	1145	187	187
Effective Subsity Rate	32.3%	23.9%	15.5%
Additional R&D induced by the support	855	145	98
Spillover rate (% of induced R&D)	56%	76.0%	76.0%
Benefits			
Spillover Benefit to Society	467	110	74
Costs of Providing Assistance			
Financing Cost	286	54	39
Resource Reallocation Effect	194	39	32
Administration Expenses[4]	19	27	27
Compliance Costs[4]	107	8	8
Net Benefit	-140	-18	-32
As a % of program spending[5]	-12.2%	-7.9%	-13.9%

1. Scientific Research and Experimental Development Investment Tax Credit, 2007 data with Budget 2012 program parameters.
2. Industrial Research Assistance Program, 2009 program parameters, with Budget 2012 funding. IRAP clients typically also claim the SR&ED credit. This relationship is ignored in the 'stand-alone' scenario.
3. IRAP estimate includes technical and management advice provided.
4. Fixed expenses only; variable expenses are captured in the spillover benefit and the resource reallocation effect.
5. Program spending includes administration expenses.

Policy recommendations

The cost-benefit analysis, although based on the 2009 version of the program, highlights the need to reduce the cost of administering IRAP.[81] The contrast with the enhanced SR&ED tax credit, which costs about 2.5 per cent of program expenses to administer, is striking. Part of the explanation for the difference is economies of scale: the SR&ED tax credit is received by almost 10 times as many firms. But as noted above, monitoring requirements are much more demanding for contribution funding than for either grants or tax-based measures. Requiring all clients to submit progress and final reports and having ITAs review them is too resource-intensive. It would seem reasonable to apply to direct-spending

79 The effective IRAP subsidy rate is (1 – 0.35) x 0.239 = 0.155, where 0.35 is the statutory rate for the federal SR&ED tax credit and 0.239 is the average IRAP subsidy rate.

80 The induced effect on the cost of the SR&ED tax credit is calculated as the value of IRAP subsidies multiplied by the difference between the nominal and effective IRAP subsidy rates.

81 IRAP provides an unknown amount of project-evaluation services to other departments and agencies that should not be included in the cost-benefit analysis of IRAP.

programs the same risk-management practices used to monitor tax-based spending programs. This would involve establishing client characteristics that trigger in-depth reviews and randomly selecting clients for detailed assessment. If a risk-based assessment approach were able to reduce administration expenses by 40 per cent and compliance costs by half, social benefits and costs would be roughly balanced.

On the other hand, the high subsidy rate resulting from stacking IRAP and SR&ED benefits is cause for concern. A firm receiving the average IRAP subsidy rate along with federal and provincial SR&ED tax credits would have 58 per cent of the cost of a project subsidized by the government. Such a high subsidy rate is likely to make moral-hazard problems more acute. Further, with such high subsidy rates, the assumption of substantially higher-than-average spillover effects may not be realistic, in which case IRAP would show a net social loss of about 10 per cent of total program expenses, even if administration and compliance costs are reduced. These considerations suggest that it would be prudent to reduce the maximum IRAP subsidy rate, without necessarily lowering overall program funding.[82]

If the SR&ED incentive remains at current levels, the maximum subsidy rate would have to be reduced by about nine percentage points in order to keep the overall subsidy rate on IRAP-financed projects under 50 per cent. That would put the IRAP average effective subsidy rate at about 10 per cent. With no change to SR&ED, serious consideration should be given to transforming IRAP into an advice-only program. As discussed in Section 2 and again in the review of the BDC's consulting services, providing technical advice to potentially high-impact entrepreneurs is sound policy and there is a plausible case for providing free or subsidized business-management advice to these firms. It is, however, more difficult to justify offering subsidies of around 60 per cent of project costs.

If the enhanced SR&ED credit rate were reduced to 15 per cent, resulting in a combined federal-provincial rate of around 25 per cent, the average effective IRAP subsidy rate would rise to about 20 per cent. The overall subsidy rate (federal and provincial SR&ED plus a nominal IRAP subsidy of 24 per cent) would fall to 45 per cent. Reducing the nominal IRAP subsidy rate to 18 per cent would keep the effective rate at 15.5 per cent and the overall subsidy rate would decline to 40 per cent. IRAP funding levels would not need to change.

4.3 Non-targeted tax measures supporting entrepreneurship

There are four federal tax measures that support entrepreneurship. Three of these — the lifetime capital gains exemption (LCGE), the deduction of allowable business investment losses (ABIL) and the rollover of investment in small-business shares — reduce the capital gains tax on entrepreneurial activity or investment in such activity. None of these measures is targeted at high-impact entrepreneurs, but they are of particular benefit to investors and entrepreneurs undertaking high-risk projects where the return is realized largely through capital gains. The fourth measure provides a more favourable tax treatment of labour income received in the form of stock options. While stock option benefits are not limited to the small-business sector, options on small-business shares are treated more favourably.

[82] Simulations with the cost-benefit model indicate that the loss would be minimized at a higher subsidy rate. However, the model does not capture the impact on the behaviour of entrepreneurs of increasing the subsidy rate substantially above 50 per cent.

However, since the cost of the option is not a deductible expense, the net subsidy is positive only for small or unprofitable firms. Further, the net subsidy is a small fraction of the cost of the stock option.

The lifetime capital gains exemption

Up to $800,000 in capital gains on the sale of qualifying shares in Canadian-controlled private corporations (CCPCs) is exempt from taxation over the taxpayer's lifetime. There is no explicit size limit on the exemption, but most CCPCs have well under $10 million in assets. The shares must have been held for 24 months prior to the sale by the taxpayer or the taxpayer's spouse or common-law partner. More than half of the assets of the business must have been used to earn active business income, which excludes income from property and income from personal-services corporations.[83] Shareholders of a CCPC may choose to crystallize a capital gain if the firm goes public. The stated objectives of the measure is to "bolster risk taking and investment in small businesses, help small-business owners to accumulate funds for retirement and facilitate intergenerational transfers."[84] The amount of tax revenue forgone in 2015 was $775 million.

There is a solid case for exempting capital gains earned on the sale of assets used to generate active business income. An increase in the flow of net income generated by business assets — due to, for example, a product, process or managerial innovation — will increase the market price of the assets. The price increase will equal the present value of the rise in the income stream generated by the asset. If the assets are sold, the income stream will be taxed twice: once as a capital gain and a second time when it is distributed as dividends. Taxation of capital gains remains appropriate when they are obtained from trading activities and could be justified when assets are revalued due to interest-rate changes. Interest-rate induced revaluations do not give rise to double taxation because the income stream generated by the asset does not change.

Exempting business shares from capital gains has the disadvantage of making it more difficult to protect the revenue base. For example, income that would normally be distributed as dividends could be relabelled as a tax-free capital gain by using retained earnings to buy outstanding shares. Restricting the benefit to small-business shares may reduce the importance of this problem, because in many cases there could be a capital gain on the sale of shares without the firm ever having paid a dividend. There is no data available to quantify this supposition, but it is worth noting that few small businesses are profitable. In 2009, about two-thirds of firms eligible to claim the small-business deduction did not do so because they did not have positive active business income.[85]

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[83] A personal-services business exists when a person performing services for a corporation could reasonably be considered an employee of the corporation.

[84] Finance Canada, *Tax Expenditures: Notes*, 42, http://www.fin.gc.ca/taxexp-depfisc/2010/taxexp1004-eng.asp.

[85] The source is unpublished data from Dachis and Lester, "Small Business."

Restricting the LCGE to small-business shares and imposing a lifetime limit makes it particularly beneficial to entrepreneurs starting a high-risk business for which the return is largely in the form of capital gains. Outside equity investors can also benefit, but could be expected to reach the lifetime limit more quickly than entrepreneurs, who would not necessarily be involved in a series of startups. The LCGE would mitigate moral-hazard problems in risk capital financing. Since neither entrepreneurs nor venture capitalists receive the full return to their effort in a joint project, the amount of effort supplied will be too low; lower capital gains taxation increases the return to effort by both entrepreneurs and outside investors.

Restricting the LCGE to small-business shares has been criticized as creating a barrier to the growth of small firms.[86] The return to effort and growth generally becomes smaller when the LCGE is exhausted. As mentioned earlier, there are offsetting benefits from growth that rise more than proportionately with firm size, so firms with aggressive growth plans are more likely to jump over the barrier. Firms with a target size not much above the point where the LCGE is exhausted are more likely to remain below the threshold. The tax benefit is substantial, so this negative impact could be significant.

The LCGE partially corrects a distortion by reducing the double taxation of capital gains on small-business shares. It also reduces the importance of the asymmetric treatment of capital gains and losses. It may not raise welfare, however, because the LCGE opens up the possibility of unintended revenue losses, as income that would otherwise be taxable is characterized as a tax-free capital gain. On the other hand, since it applies only to small-business shares, the LCGE reduces the relative cost of capital for small firms relative to large firms. This "distortion" could be seen as an appropriate offset to the numerous other disadvantages suffered by small firms listed in Table 1.

The optimal cap on the LCGE would be determined by assessing the unintended revenue losses arising from re-characterizing dividend income as tax-free capital gain. The social benefit of not taxing capital gains and the social cost of financing the associated revenue loss are a constant proportion of the intended revenue loss. If income re-characterization is also a constant fraction of the intended revenue loss, the efficiency case for a cap on the LCGE disappears since the net social benefit will increase as the cap rises. Since there is a natural limit on the use of share buy-backs via a rising debt-equity ratio, it is likely that the ratio of unintended to intended revenue losses will fall as the cap rises. On the other hand, equity considerations could motivate a cap.

Policy recommendations

The LCGE appears to represent a reasonable compromise between the efficiency gains arising from mitigating the double taxation of capital gains and protecting the revenue base. The LCGE would be more cost-effective if it were possible to restrict access to high-impact entrepreneurs, since this would raise the value of spillover benefits per dollar of tax revenue forgone. There is probably not any satisfactory way to target high-impact entrepreneurs, so no changes are recommended.

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[86] Duanjie Chen and Jack M. Mintz, "Small Business Taxation: Revamping Incentives to Encourage Growth," University of Calgary School of Public Policy Research Paper 4, 7 (2011), https://www.policyschool.ca/wp-content/uploads/2016/03/mintzchen-small-business-tax-c_0.pdf.

Deduction for allowable business investment losses (ABIL)

In most circumstances, capital losses can only be deducted from capital gains. This policy prevents taxpayers from deducting capital losses as they occur while deferring taxes on unrealized capital gains. While justifiable as a measure to protect the tax base, the asymmetric treatment of capital gains and losses may be particularly burdensome for owners of young firms, who may be more likely to have capital losses without offsetting capital gains.

The deduction for allowable investment business losses (ABIL) permits losses incurred on shares or debt issued by a small business to be deducted from ordinary income. If the ABIL exceeds other sources of income for the year, the excess may be converted to a non-capital loss that may be carried back three years and carried forward 10 years. In the 11th year, the non-capital loss becomes a net capital loss that can only be deducted from capital gains. The amount deductible is adjusted to ensure that the interaction with the LCGE does not enhance the value of the deduction.[87]

The amount of forgone personal income tax revenue in 2015 as a result of ABILs was $55 million. This is surprisingly small given that almost half of firms fail in the first three years after startup.[88] Part of the explanation is the requirement that losses be first applied against capital gains deductions (the LCGE multiplied by the capital-gains-inclusion rate) claimed in earlier years. Another reason is that the cost of converting an ABIL to a non-capital loss is not included in the tax-expenditure estimate.

Policy recommendations

Taxpayers making use of an ABIL are not first required to deduct the loss against unrealized capital gains, so claimants can continue to benefit from a tax deferral. This selective measure can be justified as an offset to the other barriers faced by startups. Indeed, the measure could be fine-tuned to make it more beneficial to startups. First, the carry-forward of ABILs converted to non-capital losses should be increased over time to maintain a constant present value. Second, although ABILs can be transferred to a spouse or partner by transferring the underlying asset, allowing a direct transfer of the deduction would be simpler. Third, it is worth considering making capital losses on unincorporated business ventures eligible for the deduction.

A more general solution to the problem of asymmetric treatment of capital gains and losses should be considered. Allowing all capital losses to be deducted from ordinary income after they have been applied to realized and accrued capital gains (in order limit the benefit of a tax deferral) would raise efficiency. There would be an offsetting loss through higher compliance and administration costs — determining the value of unrealized capital gains could be relatively expensive. The net effect is unknown, but with the advances in computerized systems a net positive impact is possible.

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87 Canada Revenue Agency, "Capital Gains Form T4037," 2014, http://www.cra-arc.gc.ca/E/pub/tg/t4037/t4037-e.html.

88 Ryan Macdonald, *Firm Dynamics: The Death of New Canadian Firms: A Survival Analysis of the 2002 Cohort of Entrants to the Business Sector* (Statistics Canada, Economic Analysis Division, 2012), http://www.statcan.gc.ca/pub/11-622-m/11-622-m2012028-eng.pdf. Macdonald performs a survival analysis of the 2002 cohort. The three-year survival rate for that cohort is 55 per cent.

Rollover of investments in small-business shares

Tax on the capital gain realized from the disposition of small-business common shares can be deferred provided that the proceeds are reinvested in another small business. The shares must be issued by a CCPC with active business income and with less than $50 million in assets, less than half of which may be real estate. Professional corporations and corporations involved in real estate are not eligible for the rollover.[89] The stated objective of the measure is to improve access to capital for small-business corporations.[90] The amount of tax revenue forgone in 2015 was $2 million.

Policy recommendations

Fine-tuning the rollover provision would involve making all classes of small-business shares eligible for the rollover. Expanding coverage to investments in unincorporated businesses should also be considered.

Stock options

The employment benefit arising from granting a stock option is calculated as the difference between the cost to the employee and the fair market value at the time the stocks are acquired. Subject to certain conditions, employees may deduct one-half of the employment benefit from taxable income. The additional benefit for small business is deferral of tax on the employment benefit until the stocks are sold. To qualify for the deferral, the options have to be offered by a CCPC.

The cost of providing employee stock options is not a deductible expense for corporations, so the net subsidy on employment expenses equals one-half the employee's marginal rate less the corporate income tax rate. The federal corporate income tax rate for large corporations is 15 per cent, so if the recipient were taxed at the top federal rate of 33 per cent, the net subsidy would be 1.5 per cent of the cost of the stock option. The federal corporate income tax rate for a small firm qualifying for the small-business deduction is 10.5 per cent, so the net subsidy is six per cent of the cost of the option at the top marginal rate and 3.5 per cent for employees in the second-highest tax bracket of 29 per cent.[91] If the firm providing the option is non-taxable, the net subsidy will be higher because the corporate tax liability will be deferred. If the deferral period is five years and the discount rate is five per cent, the net subsidy rises from six per cent to 8.3 per cent of the cost of a stock option provided by a small non-taxable firm to employees in the top tax bracket.

Some of this wage subsidy will be captured by firms. Further, stock options represent deferred compensation that is only payable if the firm is successful, so the tax preference could be seen as offsetting some of the policy-induced disadvantages faced by innovative startups.

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89 Canada Revenue Agency, "Capital Gains Form T4037."

90 Finance Canada, *Tax Expenditures: Notes, 44*.

91 In 2016, the 33-per-cent tax bracket applied to taxable income above $200,000; the 29-per-cent bracket applied to taxable income in the $140,388-to-$200,000 range.

In 2015, the reported tax revenue forgone for all employee stock-option deductions was $685 million.[92] But as pointed out by Mintz and Venkatachalam,[93] this estimate does not include the additional corporate income tax revenue arising from the non-deductibility of employee stock options. The above examples, and the more detailed calculations by Mintz and Venkatachalam, indicate that the net revenue forgone is likely to be very small.[94]

Policy recommendation

As recommended by Mintz and Venkatachalam, full taxation of employee stock-option benefits combined with deductibility of the cost by corporations would improve tax neutrality with respect to forms of employee compensation. Maintaining the current system for young CCPCs — less than five or seven years old, for example — would preserve a small benefit for high-impact entrepreneurs.

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92 Finance Canada, *Report on Federal Tax Expenditures — Concepts, Estimates and Evaluations 2017*, https://www.fin.gc.ca/taxexp-depfisc/2017/taxexp17-eng.asp.

93 Jack Mintz and Ven Balaji Venkatachalam, "Taxing Stock Options: Efficiency, Fairness and Revenue Implications," University of Calgary School of Public Policy Research Paper 8,3 (2015), https://www.policyschool.ca/wp-content/uploads/2016/03/taxing-stock-options-mintz-venkatachalam.pdf.

94 Mintz and Venkatachalam estimate that the net amount of tax revenue forgone is approximately zero, but their methodology does not accurately capture the impact of options offered by small firms.

About the Author

John Lester is a former federal government economist who writes on public policy issues. Mr. Lester's last public service assignment was as Director of Research for the Expert Panel Review of Federal Support to Research and Development. Prior to that, he managed the Tax Evaluations and Research Group at Finance Canada. Since leaving the public service, Mr. Lester has published papers with The School of Public Policy, the *Canadian Tax Journal*, *Canadian Public Policy* and the C.D. Howe Institute. His research and current interests include federal government's expenditure management system (including evaluation policy), cost-benefit analysis of government programs, particularly those related to R&D and innovation, as well as market failures in the financing of innovative projects and entrepreneurship policy.

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