

Acting strategically

Aerospace support policies

Analysis by Alain Dubuc, Adjunt Professor, HEC Montréal



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INTRODUCTION

Alain Dubuc is an adjunct professor at HEC Montréal and a strategic advisor at the Institut du Québec. He has also worked as a consultant for Bombardier Inc, an aerospace company that is the subject of part of this study.

This text was written before the international crisis related to COVID-19.

In the first report, we showed how aerospace is a strategic industry that contributes substantially to wealth creation and economic progress, and that, as such, it is eminently desirable for Canada and Québec to maintain its vitality. While this success must be based first and foremost on the dynamism of the sector's companies and its development prospects, it will also hinge, in part, on public policies that can contribute to its growth. Historically, these interventions, especially those of the federal government, explain in large part why Canada, despite its relatively modest economic heft, has succeeded in building an aerospace industry that is now the fifth largest in the world.

The analysis of the industry featured in our first report, and the study in this report of the context in which it operates, lead to the conclusion that further progress in aerospace will not be possible without continued government support.

However, just because a tradition of state intervention has worked well in the past does not mean that it is still relevant. Is this state support still appropriate? Is it still desirable, in a different context, both domestically and internationally? And if so, what forms should it take? It is perfectly legitimate to ask questions about the relevance of this support and whether too much assistance is being given. The analysis presented in the first report leads us to conclude that this industry must be supported because of its strategic nature and its economic contribution. But this is conditional on the public support being necessary for its development and success. On the condition, also, that the support is reasonable in both quantitative and qualitative terms, that is to say, that the sums devoted to this support are appropriate and reasonable, and that the forms this support takes are judicious and effective.

This second study, which is in two parts, will attempt to answer these questions. In the first part, after summarizing the various forms that government intervention can take, we will review the support programs for aerospace and compare them to the support provided to other industries, as well as what is being done in other countries that we compete with. This exercise will lead to the conclusion that assistance in a new context, that of an industry undergoing major transformations, is still desirable and necessary.

The second part of this document will deal with the forms of support that should be developed in the future and will propose ways of ensuring that this state support takes on new forms that are better adapted to a new context, financially sustainable for the state, and socially acceptable.

AN ANALYSIS OF AEROSPACE SUPPORT

The first part of this report provides a snapshot of the current situation. First, an analysis of the support that the aerospace industry has received and continues to receive, then a context setting, comparing this support to what other industries enjoy in Canada, and finally, a review of the level of support provided in other countries.

But first, it seems important to quickly summarize the range of tools available to the government to support companies and industries. This exercise is necessary to dispel frequent confusion in the public debate.

Types of government support

Governments around the world, and with a marked degree of endorsement in Canada as well, have a range of tools available to support, direct and accelerate economic activity. There are three main categories of measures: financing measures, which take the form of disbursements or commitments, tax measures, and political and regulatory measures.

In this report, we will often insist on making a distinction between forms of assistance that involve a financial contribution from the government, and therefore from taxpayers, and those that involve no cost. This approach is necessary in the conversation about the aerospace industry, since the main issue raised in the public debate stems from the perception that this industry lives on the public purse.

1-Financial support

Financial support can take many forms, which are presented here in terms of their impact on public finances and, ultimately, on taxpayers.

Subsidies consist of payments to companies, sometimes with conditions attached – investment, job creation – or to encourage certain types of activity, for example, festivals. Subsidies are public expenditures; they appear in budget documents, they are financed by tax revenues, and they are paid by taxpayers.

Loans to companies usually do not require an outlay of public funds since they are most often financed by borrowing on the market. They do, however, affect the government's debt until they are repaid. There will be no cost to the government if the company repays the loan and the financing costs. Otherwise, there will be an element of subsidy if the loan is not repaid or is partially repaid. This is a relatively frequent situation because these loans carry an element of risk, since the government often intervenes after financial institutions refuse to provide support.

Loan guarantees do not involve any disbursement to the government and have no immediate effect on the debt. They allow companies to access more advantageous credit terms or to obtain financing that the financial markets would not have provided. But they do carry the risk that the company may be unable to honour its commitments, in which case the government becomes liable.

The government can also intervene through financial participation, for example, by purchasing shares in companies. In principle, these are investments and not financial aid, but these participations may be perceived as more or less disguised subsidies, depending on their degree of risk and the context in which they are made.

Some add another form of government financial assistance: loans from Export Development Canada (EDC). This federal Crown corporation has a mandate to support international trade, with loans and guarantees to foreign buyers of Canadian products. This vehicle is widely used by the aerospace industry, as in the United States, Europe and Japan, where similar institutions exist. However, it is not government financial assistance. EDC is a Crown corporation, but it is financially independent of the Canadian government and does not require any public funds. It operates like a business, financing itself through the markets, charging market rates to its customers, and it is profitable. While it plays a valuable role in supporting foreign trade, its activities can in no way be equated with interventions of a subsidizing nature.

2-Tax measures

The State also intervenes with the fiscal tool to promote business development, encourage investment and job creation, or to attract foreign investment. The costs are less visible because these measures do not involve disbursements, but rather reduce government revenues. These are called tax expenditures. For 2018,¹ the Québec Ministry of Finance estimated that tax expenditures for businesses totaled \$3.328 billion. In addition to that, there are federal tax expenditures.

Some of these measures are aimed at all companies, or a large number of them, such as lower tax rates for SMEs or depreciation mechanisms. These provisions cannot be viewed as assistance, but rather as components of the tax environment.

The most widely used financial support is the tax credit. Canada and Québec offer a large number of these credits, which are well described in a document prepared for Investissement Québec by Raymond Chabot Grant Thornton.² This tool allows companies to reduce the amount of tax payable if they meet criteria established by the government.

Some of these tax credits are intended for all businesses while targeting a specific objective, such as scientific research, e-business development or regional development. In some cases, however, the measures are aimed only at very specific sectors, such as the production of multimedia titles, resources or film or television production.

A distinction must be made between non-refundable and refundable tax credits. In the first case, the credit reduces or eliminates the amount of tax owed by the company, but will not be applicable if the company has no tax to pay. On the other hand, a refundable tax credit is owed to the business. If the business does not make a profit and has no taxes payable, it will be entitled to a payment from the public treasury.

3-Administrative and political measures

Finally, governments have a powerful arsenal of administrative and political measures at their disposal to support industrial sectors, regions or companies.

Protectionist measures reduce competition from foreign producers. Less used because of international agreements, they remain important. In the case of agriculture, for example, supply management programs impose prohibitive tariffs of almost 300% on dairy products. Sanitary measures can also constitute non-tariff barriers.

Local purchasing measures allow for preferential treatment, as do provisions in government contracts that require a percentage of local content.

¹ Dépenses fiscales Édition 2018, Québec Ministry of Finance, March 2019.

² Taxation in Québec: Measures favourable to investment, 2019 edition, Investissement Québec and Raymond Chabot Grant Thornton.

Regulations or laws may support industries or professions, such as a ban on providing prescriptions for glasses online. They may also include mechanisms that restrict foreign ownership in an industry or erect barriers to entry, such as those found in the banking system, telecommunications and air transportation.

Crown corporations, which vary in their independence, can also play a role as partners or mobilizers. This is the case, for example, with Hydro-Québec's preferential electricity rates to attract large-user companies. Or EDC, which is very active in the aerospace industry but whose involvement is highly indirect because it finances foreign companies that buy Canadian products and does so by operating as a bank with profitable loans.

Support for aerospace

The brunt of support for the aerospace industry has historically been provided through two types of tools: refundable loans for research and development, and tax credits, also for scientific research.

1-Repayable loans

The federal government has relied on this form of assistance since the late 1950s to support the aerospace and defence industry, which was booming at the time of the Second World War.³ Initially, this support was part of Cold War thinking, with a military focus, and gradually evolved into an industrial development program.⁴

Four major programs have been carried out over six decades. They have all relied on the mechanism of repayable contributions, some of them on an unconditional basis, but more often in the form of royalties on sales, where there is no repayment if the supported project does not go into production.

- The Defence Industry Productivity Program (DIPP) operated from 1959 to 1995. It provided repayable contributions of approximately \$2 billion. Several projects were supported by this program, including the Challenger and the CRJ.
- Technology Partnerships Canada (TPC) was launched in 1996 and ended in 2006. Under the aegis of Industry Canada, TPC had three components: environmental technologies, enabling technologies for various sectors (life sciences, information and communications technologies, advanced manufacturing), and aerospace and defence. In the interest of transparency, the federal government has published details of the repayable contributions made under this program in a document last updated on November 1, 2017.⁵ It reports 97 projects for authorized assistance of \$3.17 billion and repayments of \$1.54 billion. According to this document, the last repayments, due to long development delays, are not expected before 2034. However, the detailed data on repayments are incomplete because the companies concerned could claim confidentiality.

³ *Evaluation of the Technology Partnerships Canada Program - Summary Report*, Performance Management Network Inc., Industry Canada, 2003

⁴ Aude Fleurant and Yves Bélanger, *Le Canada et son adaptation à l'ère post-guerre froide*, Groupe ressource sur l'industrie militaire et la sécurité, September 2010.

^{5 &}lt;u>Technology Partnerships Canada (TPC) Repayment Status Report</u>, Industry Canada, November 1, 2017.

Although TPC was not dedicated solely to aerospace, this industry received a significant portion of the funding, about 60% according to a summary census. The major aerospace recipients are shown in the following table.

Chart 1

Main beneficiaries of repayable TPC contributions in millions \$. at November 1, 2017

	Amount received	Amount repaid	
Pratt & Whitney	1 041.8	650.6	
CAE	300.6	116.8	
Bombardier	er 141.8 186.4		
Honeywell	112.5	38.2	
MDA	78.6	6.3	
Siemens	75.2	21.7	
Safran	73.2	12.2	
Bell Helicopter Textron	57.3	_	
Goodrich Aerospace	50.2	14.2	

Source: TPC Repayment Status report

Note that significant contributions have been made to foreign-owned firms operating in Canada, including Pratt & Whitney (U.S.), Honeywell (U.S.), Goodrich (U.S.) and Safran (France), illustrating the degree of integration of foreign firms in the Canadian cluster. It also shows that these firms play a structuring role in the Canadian economy and are investing in R&D in Canada, in contrast to the large automotive producers. We should also note that these repayable loans amount to only a fraction of the R&D efforts of the recipient companies.

By 2017, SADI had supported 33 projects, 17 of which were still in the R&D phase and therefore not yet in the repayment phase. Total authorized assistance was \$1.59 billion. At that time, repayments had only totalled \$236 million. The main recipients are shown in the following table. The federal repayable loans to Bombardier for the C-Series (\$350 million in 2008 and \$120 million in 2017) did not originate from SADI's funds, and are not included in the following chart.

Chart 2

Main beneficiaries of SADI repayable contributions in millions \$, at November 1, 2017

	Amount received	Amount repaid
CAE	500.0	33.8
Pratt & Whitney	387.8	166.2
Bombardier	252.5	_
Héroux-Devtek	75.9	4.9
Westcam	75.0	_
CMC Electronics	52.3	11.2
Magellan Aerospace	43.4	_

Source: Rapport d'étapes sur les remboursements de l'ISAD

The Strategic Aerospace and Defence Initiative (SADI) was launched in 2007 and terminated in 2017. It focused solely on research and development projects for the interrelated aerospace, space, defence and security sectors.⁶ At the same time, in 2013, the federal government launched the much smaller Technology Demonstration Program (TDP), which provided up to \$54 million per year in non-repayable contributions to consortia for long-term research with no marketable applications within a short time horizon.

 In 2017, the Canadian government discontinued SADI and the TDP, as well as an automotive program, and replaced them in 2018 with a new initiative, the Strategic Innovation Fund (SIF), initially with \$1.26 billion over five years, which has since been expanded. As of December 2019, \$2.0 billion in repayable contributions had been awarded.

⁶ Strategic Aerospace and Defence Initiative (SADI) Repayment Status report, Industry Canada, November 1, 2017.

This new program reflects a major shift differing from previous ones in two ways. On the one hand, it is not just for aerospace, but for all industries. Projects already announced range from Alzheimer's treatment, to pipelines, to increased steel production, to petrochemicals and software. For example, it is through the SIF that the Government of Canada has come to the aid of the steel and aluminum industries hit by U.S. tariffs, offering \$250 million to support their modernization.

It also supports not only R&D, but also a number of other economic objectives, such as "attracting and retaining large-scale investment in Canada" (sic) or "facilitating the growth and expansion of businesses in Canada." These objectives are typical of traditional development programs. The SIF presentation appears to illustrate this point: "One of the government's key priorities is to ensure that Canada is a destination of choice for business to invest and grow, and to create jobs and prosperity for Canadians. The objective of the SIF is to stimulate innovation for a better Canada by providing these funds to large projects that will help to create jobs and prosperity for Canadians."⁷

It should also be noted that the SIF site, in the presentation of the projects it supports, includes references to the jobs created and supported. In addition to the fact that the concept of supported jobs is more a matter of political marketing than economic science, the federal government's use of this concept as a measure of the success of the SIF shows that it has moved away from the spirit that characterized the programs that preceded it.

It is clear that with these policy changes, the level of financial support available to aerospace will be significantly reduced, which is a source of discontent for the industry itself. But beyond monetary considerations, the architecture of the SIF indicates a paradigm shift. Innovation is no longer the sole objective, as in the programs that preceded it, and aerospace is losing the special treatment it received under the Trudeau government and is becoming, in terms of economic policy, an industry like any other, which constitutes a break with the strategic choices of previous governments.

In addition to these four federal intervention programs, there are provincial programs. In 2013, Ontario established the \$2.7 billion Jobs and Prosperity Fund to help "Ontario businesses improve their productivity, innovation and export activities." The fund had been heavily criticized by Conservative leader Rob Ford, who promised to end the program, which he called "corporate welfare." However, after his victory, the fund's activities were maintained.

In Québec, the Couillard government announced in May 2016 the Québec Aerospace Strategy 2016-2026, which is an extension of the strategy launched in 2006 by the Charest government.⁸ The planned budget of \$250 million for the first five years reflects the importance that the Québec government attaches to this industry. This strategy is not structured in the same way as federal programs, which for decades have focused on business research and development projects. It seeks more to strengthen the industry and have a structuring effect on its activities: attract prime contractors and major suppliers, encourage certain components such as drones, invest in the workforce, promote the transition of SMEs to Industry 4.0, encourage mergers and acquisitions, stimulate exports, and support innovation, particularly in SMEs, etc.⁹ Aerospace is one of Investissement Québec's priority sectors of intervention.

⁷ Innovation, Science and Economic Development, Strategic Fund for Innovation.

⁸ Québec Aeronautical Industry Development Strategy, Government of Québec, July 2006.

⁹ Québec Aerospace Strategy, Horizon 2016-2026, Government of Québec, 2016.

2-Research tax credits

A range of tools and programs are available to all industries, but are also available to the aerospace industry. This is especially the case for tax credits.

The federal government provides a tax credit for investment in scientific research and experimental development. It is 30% of eligible expenditures for the first \$3 million, and 15% thereafter,¹⁰ and is partially refundable. This is a major program. For 2019, the cost of this tax expenditure was estimated at \$1.375 billion for the non-refundable portion and \$1.460 billion for the refundable portion.¹¹ In addition, there are tax credits awarded by all the provinces.¹² These vary from 10% to 15% and are partially refundable. They can even reach 30% in Québec. In 2018, the Québec tax credit cost \$491.6 million and was the main tax expenditure for businesses after the partial inclusion of capital gains.¹³

Even though these research tax credits are intended for all industries, aerospace has benefited greatly, because of its size, of course, but also because of the scope of its R&D activities, as we have already described.

Given that aerospace industry research spending accounted for 3.7% of total research spending in 2018 (StatCan 10-0333-01), a rough calculation, applying a simple rule of three, suggests that the credits obtained by aerospace companies would be around \$100 million. Note that in some years, the share of aerospace R&D in total spending has been higher, for example, 7.3% in 2017. At the Québec level, aerospace R&D spending accounted for 25.9% of total R&D in 2018 (StatCan 27-10-0024-01), which would suggest that its share of \$491.6 million in tax credits would be around \$127 million.

3-Exceptional measures

In addition to the various programs described above, two major interventions by the Québec government in favour of Bombardier helped to reinforce the perception that the aerospace industry was heavily subsidized. This justifies a small digression.

Philippe Couillard's government, through Investissement Québec (IQ), invested \$1.3 billion (US\$1.0 billion) in 2015 to become a 49.5% partner in the C Series. The objective was to support Bombardier at a critical time in its history when the program was at an impasse. When Airbus became the program's majority shareholder, Québec's holding was reduced to 16.4%. However, when Bombardier withdrew entirely from the program in February 2020, it transferred part of its shares to IQ. Québec thus holds 25% of the program and Airbus 75%. The value of the Crown corporation's interest was then estimated at \$700 million. This is equivalent to a notional loss of \$600 million, which must be recorded in the government's budget. The loss remains theoretical since this amount may be lower when this interest is resold, which is expected in 2026, if the aircraft sales forecasts materialize. If there is still a loss at that time, it could be considered the equivalent of a subsidy.

On another issue, which has nothing to do with aeronautics but has been associated with it in the public debate, the Caisse de dépôt et placement du Québec invested in Bombardier Transportation in November 2015, injecting US\$1.5 billion. The value of this investment, based on performance objectives, was between US\$2.1 billion and US\$2.3 billion in February 2020, at the time of the agreement on the sale of Bombardier Transport to Alstom.

12 <u>CRA</u>

^{10 &}lt;u>CRA</u>

¹¹ Report on Federal Tax Expenditures 2019, Department of Finance Canada.

¹³ Tax expenditures 2018, Québec Ministry of Finance.

Putting support into context

In the pages that follow, we will first show that government support for the aerospace industry is relatively low when compared to other industries. We will also show that this support, in terms of economic policy, can be justified by the special nature of the aerospace industry. Finally, we will illustrate how modest this support is compared to that provided by other countries that have aerospace activities.

1-Reasonable Aid?

In summary, the three successive major federal programs for industry that we have reviewed have required total disbursements of \$6.76 billion. While this is a significant amount, it is spread over more than 60 years, from 1956 to 2019, and has been provided to a large industry. The amounts of these contributions, in real terms, has also tended to diminish over the years. For example, the total \$1.59 billion in loans provided between 2007 and 2017 under SADI represents an average of \$159 million per year.

These contributions are also repayable. Of course, repayments for newer programs, such as SADI, are just beginning. And they can be spread out over a very long period of time. For example, for TPC contributions between 1996 and 2006, \$1.54 billion was repaid on a total of \$3.17 billion in loans, and Industry Canada forecasts that repayments will extend to 2034. It is therefore difficult to know precisely what the final rate of repayment will be. However, if past experience is any indication, it will be high.

We have more precise data for two large companies. Bombardier received \$586 million in repayable contributions for programs initiated following the acquisition of Canadair and de Havilland, including the Dash-8, Challenger and CRJ. To date, its repayments have exceeded the original amount of the loans, totaling \$760 million. This does not fully cover the financial costs incurred by Industry Canada (measured here by the yield on Treasury bills for the years in question). As a result, the company has benefitted indirectly from a subsidy, in the form of reduced interest charges, which can be roughly estimated at a modest \$10 million per year. In the case of Pratt & Whitney Canada, its parent company, the U.S. giant United Technologies, elected in 2016 to quickly repay all Canadian government contributions in full and to pay, in four equal annual instalments, all amounts due, i.e. \$146 million to Investissement Québec and \$1.163 billion to Industry Canada. In the case of CAE, repayments of the TPC loans went up from \$116.8 million to \$132.9 million between 2017 and 2019.

In summary, over the past 15 years, the Canadian aerospace industry has been able to obtain, on average, just over \$150 million per year in contributions, a significant portion of which will be repaid. It also benefits from research tax credits, to the tune of about \$100 million a year from Ottawa and \$125 million from Québec City. In this case, it does not enjoy any special treatment since these credits are also available to other economic sectors.

To take a specific example, which has caused a lot of ink to flow, Bombardier received a total of \$470 million in repayable loans from the federal government in 2008 and 2017 for the development of the CSeries, as well as a \$117 million loan from the Québec government in 2008. Is that a lot? Knowing that these loans will be repaid through royalties on aircraft sales, now A220s, the amounts do not seem unreasonable for a program that required investments of US\$6.5 billion by the company, according to a PwC study released by Aéro Montréal.¹⁴ The same is true of the Global 7500 program, which received a \$252 million federal repayable loan to support development costs that easily exceeded US\$2 billion.

The same conclusion is reached when comparing these figures with those of support measures for other industries. This is in contrast to the general perception that this industry is living off the public purse.

¹⁴ Economic footprint of the A220 program in Québec and Canada, PwC, 2020.

2-Aid to other industries

Moreover, assistance to the aerospace industry is part of the context of a country, Canada, whose economic development policies rely heavily on assistance to businesses, which is even more true for Québec. According to Manaf Bouchentouf, Executive Director of the Institut d'entrepreneuriat Banque Nationale - HEC Montréal: "In Québec, there are more than 250 business assistance programs delivered by 145 government agencies or supported by public, parapublic or private funds."¹⁵

It is when we look at the support given to other economic sectors that we can see that aerospace assistance is relatively modest and, above all, inexpensive for taxpayers. Here are a few examples of government assistance to certain industries. We do not wish to criticize the relevance of these interventions, but rather to provide a basis for comparison and to highlight the multiplicity of forms of direct and indirect government support.

- In the automotive sector, at the time of the financial crisis, the governments of Canada and Ontario injected \$13.7 billion in GM and Chrysler share purchases and loans. However, it is still impossible to take stock of this massive intervention because of a lack of accountability, criticized by the Auditor General of Canada, who examined the issue in 2014.¹⁶ CBC News journalists reporting on the issue estimate the loss to the Governments of Canada and Ontario at \$3.7 billion. This is in addition to the write-off of a loan from Ottawa to Chrysler, administered by Export Development Canada (EDC), recorded in the Public Accounts of Canada published in 2018, which could amount to as much as \$1.6 billion. This loss clearly becomes a cost to governments and taxpayers.
- The Caisse de dépôt et placement du Québec supported Québecor in its purchase of Vidéotron, with a view to preventing the sale of the telecommunications and cable giant to a non-Québec company, Ontario-based Rogers. This is a case where this independent Crown corporation was responding to an issue that was more about identity than financial considerations. According to calculations made for La Presse by a former Caisse CEO, Richard Guay,¹⁷ the initial investment of \$3.2 billion in 2000 enabled the company to raise a total of \$4.2 billion in 2018, taking into account dividends and income from the resale of its shares. This represents a profit of approximately \$1 billion over an 18-year period. This gives a very low average annual return of 2%. The shortfall is between \$2.9 billion and \$3.8 billion, depending on the normal measure of return one chooses. It can therefore be said that this support to Québecor deprived the Caisse and its depositors of earnings of between \$2.9 and \$3.8 billion, which constitutes a form of assistance that is comparable to a subsidy.
- The multimedia titles industry benefits from a tax credit equivalent to 37.5% of the payroll for eligible jobs. This policy, established some 20 years ago, sought to attract video game production companies. The annual amount of these tax credits is high, at \$215 million in 2018, according to the Department of Finance. These are refundable tax credits that companies can receive even if they do not make a profit and are therefore real subsidies. The program has been successful in that these credits support 10,000 high value-added jobs, although this is often job displacement rather than net job creation. Québec's tax credits are therefore more generous for video games than for aerospace, at \$215 million versus \$127 million. Moreover, since there are four times fewer jobs in video games than in aerospace, 10,000 jobs compared to 42,000, the value of the tax credit per job is seven times higher.

^{15 &}lt;u>BNC</u>

¹⁶ Chapter 5-Support to the Automotive Sector, 2014 Fall Report of the Auditor General of Canada.

¹⁷ Vincent Brousseau-Pouliot, Québecor média: Une perte de presque 3 milliards pour la Caisse, La Presse+, May 15, 2018.

- We could also talk about the shipbuilding industry, structured in such a way that it is essentially dependent on a single buyer – the federal government – both for civil, such as ferries and icebreakers, and for defence, thanks to substantial orders from the Canadian Armed Forces. This creates a risk that choices may be driven more by regional considerations than by need, and that the lack of a market may affect costs
- There is also the ease with which governments are prepared to disburse funds for emergency response. This is the case, for example, for the \$1.75 billion made available to dairy producers to compensate for the loss of market caused by the signing of free trade agreements. Or, again, for the massive intervention of the federal government in the oil industry, with the purchase of the Trans Mountain Pipeline project, at a cost estimated at \$4.4 billion by the Parliamentary Budget Officer. Or the loan of \$650 million to General Dynamics for support related to its problems with Saudi Arabia, as part of an armoured vehicle contract.

This non-exhaustive overview does not seek to justify aid to aerospace on the pretext that other industries also benefit from support. This would be a game of one-upmanship that cannot lead to informed choices. Rather, the purpose of the exercise is to provide orders of magnitude that give a more accurate idea of the scope of this support. And to show that, all in all, this support, apart from the fact that it is far smaller than what has been observed in other sectors, has relatively little impact on public finances and the contribution of citizens.

3-Fewer pernicious effects

Beyond the sums involved, the economic impacts of aid policies and their possible undesirable consequences must be taken into consideration. The forms of aid from which the aeronautics industry has benefited, apart from the fact that they were low cost, avoid some of the pernicious effects associated with business support programs.

The first pitfall is that of the "open bar," where programs are automatically accessible to companies and public funds are granted in a mechanistic way based on certain criteria, often the number of jobs, regardless of the real need of the company or the added value of this support. Repayable loans for the aerospace industry have been made according to a completely different philosophy: on a project-by-project basis, according to specific standards, based on thorough reviews and with accountability requirements.

Another pernicious effect is the "slippery slope," the irreversibility of an assistance program once it has been implemented because the sector is structured around these subsidies and it can no longer be terminated without jeopardizing the maintenance of jobs created in this subsidized environment. In the case of video games, for example, there is a concern, no doubt well-founded, that the lack of subsidies for this highly mobile industry could lead to its relocation to other jurisdictions. This irreversibility effect also occurs indirectly, albeit to a lesser degree, in the aerospace field, since the absence of R&D support programs would undoubtedly have the long-term effect of encouraging companies to relocate these activities to more generous jurisdictions.

The other major perverse effect is the distortions that aid can cause to the functioning of markets and competition. A company that has been supported by the state does not compete on a level playing field with those that have not received such support. In the video game industry, this distortion does not manifest itself in the sale of products, but in the labour market, where employment subsidies drain skilled workers who are also in demand in other sectors which do not have the same incentives to attract them. In other cases, state support may affect normal competition mechanisms. This element plays little role in the case of aeronautics because of its international character; since a very large part of its production is exported, this does not affect the functioning of the domestic market.

4-Compensating for long cycles

Conversely, an economic argument can help to give legitimacy to support policies in aeronautics. These are the long product development cycles and the high level of project risk which can far exceed the financial capacities of even large companies. This mainly affects original equipment manufacturers who have to invest very large sums without the possibility of earning revenue over long periods of time. It can take up to 20 years from the development of a new aircraft to its profitability, and just as much for the development of an engine. The very principle of repayable public contributions is intended to offset the effects of this constraint through the temporary injection of cash.

These various forms of government support make it possible to bridge the gap between the start of a project and the launch of products, in order to mitigate the effects of the cycles specific to this industry. Without this support, aerospace development, here and elsewhere in the world, may not be possible, and projects, although ultimately profitable and socially useful, would not see the light of day.

This constraint, particularly marked in the case of aerospace, is seen by some economists as an illustration of the phenomenon of market failure, in this case innovation market failure, whereby natural market mechanisms do not lead to an optimal allocation of resources. Thus, development cannot be sustained because firms cannot make the necessary financial efforts and because financial markets are not prepared to assume the level of risk and the associated delays.

This analysis can be found in several studies. In particular, a report prepared for the British government concludes that:¹⁸

Aeronautics presents a useful final example of a transport sub-sector, with a range of barriers to innovation distinct from those outlined here so far. The second highly significant barrier relates to scale and risk. Aeronautical research and innovation is extremely costly, with especially long development cycles. In the first instance, this carries very high risks for the firms themselves. However, it also creates difficulty for funders outside the firm to decide whether the risks in providing finance are worthwhile. The highly competitive market additionally disincentivise long-term gambles.

Another study, also in favour of public support for private innovation, adds an element that applies to aerospace:¹⁹

Complex systems: Only a few sectors, although it is possible to argue that they are vital ones, fall in this category. Firms in these sectors are typically large in an absolute sense, and well able to maintain their own firm-specific pools of technical competence. Sectoral innovation failure arises because the R&D projects involved carrying a cost that is proportionally as large or larger than the absolute size of innovating firms, and because of the nature of the risk associated with failure to stay on the technological front.

¹⁸ The case for public support for innovation, Department for Business Innovation & Skills, UK, 2014.

¹⁹ Stephen Martin, John T. Scott, *The Nature of Innovation Market Failure and the Design of Public Support for Private Innovation*, Research Policy, Volume 29, Issues 4–5, April 2000, pages 437–447.

5-Global support for aerospace

These considerations provide a conceptual basis that may justify a government to support their aerospace industry beyond the primary reflexes of creating employment. In fact, it can be seen that, internationally, every country that relies on an aerospace industry presence supports it because of its strategic nature and its considerable contribution to innovation and value creation.

Canada has few large companies in industrial sectors that are both fully exposed to global competition and have a modest domestic market. This is the case for the aerospace industry, which exports 70% of its production and faces competition from a large domestic market in Europe, the United States, China and Russia.

Consideration of the relevance of public support for aeronautics must take account of this international context. If Canada wants to be able to count on the presence of a strong aeronautics industry, it must ensure that it can compete on a level playing field and have access to fair conditions. We must also take into account the fact that, throughout the world, the aerospace industry is strongly supported by governments.

It is difficult to measure the level of public support for the aerospace industry, let alone make reliable comparisons between countries. This is because institutions, tax regimes and political systems differ, because the preferred forms of support are not the same, because states tend to hide the level of support they provide to avoid recourse from competing countries, because support can come from various levels of government (national, regional, local), and because it can take roundabout forms, such as non-tariff barriers.

Nevertheless, four main mechanisms through which governments assist aerospace can be identified: military spending, tax incentives, repayable loans, and research and development assistance. The extent to which these tools are used varies from place to place. In Canada, the preferred tools are repayable loans and research assistance. There are few specific tax incentives and a virtual absence of military spending. Europe does not offer tax incentives, and intervenes through the mechanism of repayable loans, albeit with greater intensity than Canada, and has policies to support R&D. Military spending is also important there. In the United States, there are no repayable loan mechanisms, as there are in Canada and Europe. However, there are R&D support measures and tax incentives. In addition, there are major defence contracts.

In addition to policy differences, which make comparisons difficult, there is a certain lack of transparency. States, anxious to support their aerospace industry, must deal with international rules designed to ensure healthy competition and regulate practices, under the aegis of the World Trade Organization (WTO). The WTO has become a forum for national aerospace industries to confront each other about the shortfalls and unfair practices of their competitors. Bombardier denounces Embraer which denounces Bombardier; Airbus denounces aid to Boeing, and vice versa.

For example, the United States filed a complaint with the WTO in 2006, claiming that Airbus had obtained \$22 billion in subsidies that were illegal by international standards.²⁰ More than a decade later, the WTO ruled largely in favour of the United States, particularly on the issue of repayable loans to support the launch of projects for the A380 and A350, a practice that is widespread in Europe and Canada but absent in the United States, where it is even condemned. This victory led the Trump administration to impose US\$7.5 billion in tariffs on European products in October 2019, as allowed under WTO rules.

In the same dispute, the European Union replied by presenting a detailed list of the support Boeing had benefited from.²¹ In its representations to the WTO in 2010, the EU concluded that Boeing had received a total of US\$23.7 billion in aid, taking into account the benefits granted by certain US states, their counties and municipalities (Washington, Kansas, Illinois), and by the federal government, notably through defence and NASA contracts. The EU has been partially successful with these claims. In this respect, another unscientific but meticulous assessment by the American lobby Good Jobs First puts total aid to Boeing at US\$73.7 billion since 1994.²²

We cite these incidents to highlight three factors. First, to remind us that government assistance is widespread, and that it is at the heart of the strategies of the various governments to support their aerospace industry. Second, to provide some order of magnitude to show that this support is considerable. Finally, to give an idea of the environment of international competition, dominated by giants supported by governments that are playing a brutal shoving match.

^{21 &}lt;u>Details of the US subsidies to Boeing challenged by the EU</u>, Overview of US subsidies to Boeing's Large Commercial Aircraft division (USD millions).

²² Good Jobs First, Subsidy Tracker Parent Company Summary.

6-The military factor

Another peculiarity of this industry lies in the overlap between the aerospace industry itself and the defence industry. This is largely due to the fact that countries' main military purchases are of aircraft or related systems, such as communications and satellites.

This interrelationship is such that Canada's three major aerospace assistance programs were equally directed to defence. Most international studies also focus on the "aerospace and defence" sector, and therefore include companies that have nothing to do with aviation, such as manufacturers of armoured vehicles or naval ships.

In fact, the largest military suppliers are virtually all aerospace companies or those with significant aerospace activities, as shown in the following chart.²³ Of the top 20 companies in the defence sector, 17 aerospace companies, including giants such as Boeing, Airbus, Lockheed Martin and United Technologies, are in a strong position.

Rank	Name	Country	Sales (\$B US)	Military Sales (\$B US)	Industry
1	Lockheed-Martin	US	51.0	44.9	Aero
2	Boeing	US	93.4	26.9	Aero
3	Raytheon	US	25.3	23.9	Aero
4	BAE Systems	UK	23.5	22.9	Aero
5	Northrop-Grumman	US	25.8	22.4	Aero
6	General Dynamics	US	31.0	19.5	Aero
7	Airbus	FRA	75.2	11.3	Aero
8	Thales	FRA	17.8	9.0	Aero
9	Leonardo	ITA	13.0	8.9	Aero
10	Almaz-Antey	RUS	9.1	8.6	Armament
11	United Technologies	US	59.8	7.8	Aero
12	L-3 Technologies	US	9.8	7.8	Aero
13	Huntington-Ingalls	US	7.4	6.5	Naval
14	United Aircraft	RUS	7.7	6.4	Aero
15	United Shipbuilding	RUS	5.6	5.0	Naval
16	Honeywell	US	40.5	4.5	Aero
17	Rolls-Royce	UK	19.3	4.4	Aero
18	Leidos	US	10.2	4.4	Aero
19	Naval Group	FR	4.2	4.1	Naval
20	Textron	US	14.2	4.1	Aero

Source: *Military spending: 20 companies profiting the most from war,* Samuel Stebbins and Evan Comen, 24/7 Wall St., February 21, 2019.

Conversely, or in a complementary way, a ranking of the main aerospace companies indicates that almost all of them are also active in the military field.²⁴ For example, 29% of Boeing's revenues come from military contracts, while this proportion is 15% for Airbus, 88% for Lockheed Martin, 13% for United Technologies, 29% for Bell Textron, and 23% for Rolls-Royce and Safran. On the other hand, 0% of Bombardier's revenues and a small fraction of those of Pratt & Whitney come from defence, although Heroux-Devtek has important defence contracts and 40% of CAE revenues come from the defence sector.

Chart 3 The 20 largest military suppliers

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²³ Samuel Stebbins, Evan Comen, *Military spending: 20 companies profiting the most from war*, 24/7 Wall St., February 21, 2019. 24 *Top 100 aerospace companies*, 2018, Flight Global.

Such military expenditure, even if based on formal contracts for the provision of goods and services on a commercial basis, represents a form of indirect public support to local companies for four reasons. The first is that these contracts provide companies with a stable revenue stream, insulated from market fluctuations, a very important factor in the cyclical civil aviation industry. So it is a counter-cyclical revenue stream that is not available in Canada. The second is that they are partly insulated from international competition because they generally have preferential provisions, often unspoken, for domestic suppliers. The third is that they are lucrative contracts given the culture of military spending, an area that often escapes the budgetary discipline of governments. Finally, these contracts provide an intangible indirect benefit by enabling aerospace companies to develop military technologies that can subsequently be used for civil aviation. There are several examples of such cross-technologies, such as Embraer's fly-by-wire flight control or the composite materials developed by Airbus and Boeing.

These benefits are not limited to the large companies that are the primary beneficiaries but to the entire value chain, including the subcontractors involved in these activities. Canada is not benefiting from this environment and its industry has little or no access to this market, which provides a significant advantage to the aerospace industry in many countries. This is partly because Canada does not have a military aerospace industry and does not produce military aircraft or major military systems. On the other hand, Canada's military spending is modest. This lack of significant military opportunities is one of the factors that must be taken into account in establishing policies that ensure that the Canadian industry can operate on a level playing field with its international competitors.

7-A more difficult context

Canada is being affected by the major transformations in the global aerospace industry that will make its development more difficult in the future.

First, there is a trend toward consolidation and increased competition, mainly between the two global giants, Boeing and Airbus, and their two hubs, the United States and the European Union. Canada has already felt the effects of this with the takeover of some of Bombardier's business activities by Airbus, which was followed by the absorption of a significant portion of Embraer's portfolio by Boeing.

In addition, competition is intensifying with the arrival of new players who are clearly driven by geopolitics and the strategic projects of their respective governments. This is the case for China with Comac, for Russia with Sukhoi, and for Japan with Mitsubishi. This competition hits the major customers first, but has repercussions on the entire value chain.

In addition, several companies in the sector benefit from state participation. For example, three European countries - France, Germany and Spain - together hold more than a quarter of the capital of Airbus. In Brazil, although Embraer is no longer a state-owned company, the government still has a veto over its transactions. Some companies in emerging countries are state-controlled, such as Comac in China and Sukhoi in Russia, while Mitsubishi can probably count on the Japanese tradition of synergy between the state and the private sector.

Finally, much of the market growth will occur in emerging countries, a shift that will be a challenge for Canada since it has no competitive advantages there. Not only is Canada competing there with larger economies, but these countries are clearly banking on their aerospace industry and providing it with support that Canada is far from matching, particularly through the defence sector.

There are very few countries with an aerospace industry and those that do are economic powers, either members of the G7 (United States, Europe, Japan, Canada) or rapidly developing countries (China, Brazil, Russia, India, South Korea).

This already difficult environment is likely to become even more difficult in the future with the rise of protectionism, economic nationalism, unilateralism and interventions by governments to protect their economic interests and support their national champions. The industry thus faces significant commercial risks with punitive protectionist measures from competitor countries or sometimes frivolous challenges in international bodies that can have detrimental effects.

Adding to this are domestic factors. First, the risks associated with labour shortages, which are widespread in Canada, but which can be acute in a sector that requires an experienced workforce and extensive training. These shortages could be a hindrance to business development and to Canada's attractiveness to foreign companies wishing to establish themselves here. We also note the uneven nature of the aerospace industry's adaptation to the new rules of the game imposed on the manufacturing industry by the acceleration of technological change, particularly artificial intelligence and what is defined as Industry 4.0.

At the same time, there is a political element, a shift in federal government priorities in aerospace, which is changing the rules of the game and is of great concern to the industry. This concern prompted an initiative by the Aerospace Industries Association of Canada (AIAC), which launched an extensive consultation exercise led by former Québec Premier Jean Charest with industry members and partners. Entitled Vision 2025, it led to the publication of a guidance document, "Charting a New Course," in June 2019.²⁵

In this document, the president of the organization, Jim Quick, states that:

"Around the world, nations are seeing the potential of aerospace to transform their economies and create new opportunities for their citizens. They have watched and learned from countries like Canada that have leveraged aerospace to attain a position of global leadership. They want what we have, and they are acting boldly and strategically to claim it. That's the reality our aerospace industry operates in. If we don't adapt our approach to reflect this reality, we will continue to lose the ground we have worked so hard for so long to gain." (AIAC, pg.3)

For his part, Jean Charest, who led the exercise, adds:

Advanced industrial economies everywhere want a share of that estimated \$10 trillion market. That includes Canada's traditional aerospace competitors such as the U.S., France and the UK. But, for the first time, it also includes new entrants such as India, Vietnam, China, Russia, Singapore and others. They're thinking long-term—as far as 50 years out—and they're moving fast. This is happening while in Canada industry members are expressing concern about the loss of sector-specific programs for aerospace." (AIAC pg. 5)

This pessimism can be found on the union side, in an extensive study conducted for the International Association of Machinists and Aerospace Workers:²⁶

"Our aerospace sector, which is the fruit of a century of evolution, has allowed generations of workers to demonstrate their know-how, ingenuity and competence. Our efforts and successes in the field have brought us international renown and have contributed to the building of a modern and dynamic society. However, without the means to take care of our aerospace ecosystem, we may not be able to enjoy its long-term benefits. It is for this reason that we have written this text on the future of aerospace. By sounding the alarm, we hope that our governments will commit to taking the necessary actions to ensure the future of our aerospace sector."

²⁵ Charting a New Course, Canada as a Global Aerospace Champion, Vision 2025, Association of Aerospace Industries of Canada, June 2019.

²⁶ Propulser le Québec vers de nouveaux sommets, International Association of Machinists and Aerospace Workers, 2019.

AlAC's policy paper proposes courses of action to ensure that the industry can maintain its position and meet certain targets: increase the Canadian industry's share of the world market, increase its contribution to GDP by \$7 billion, increase the number of jobs by 55,000, and add \$4.5 billion in exports. To achieve this, the organization proposes six areas of intervention: increase support for skilled labour and to generate jobs (work-study programs, attractiveness of university programs, immigration); strengthen SMEs (access to public markets, support for digital transformation); focus on innovation, particularly for new sectors (carbon-neutral flights, autonomous aircraft); enhance Transport Canada and its certification mechanisms; focus on space exploration; maximize the benefits of defence procurement. These courses of action are based on collaboration, but also require government intervention, mainly by the federal government. On the whole, the requests made are restrained and do not propose a tax revolution or unusual public financial commitments. However, this intervention needs to be placed in context. The Vision 2025 project was developed with election deadlines in mind to spark debate, and in the hope of making aerospace an economic issue in the fall 2019 federal election. It aimed to get political parties to declare their support for the industry and to propose commitments to this effect.

Conclusion: A cost-benefits analysis

We must avoid giving in to a game of one-upmanship to suggest that we should support the aerospace industry just because other countries are doing it. Rather, it is important to point out that if Canada chooses to rely on its aerospace industry, as many countries are doing very clearly, it will have to find effective ways to support this sector in order to be consistent and to ensure that this strategy is successful.

Having said that, should Canada rely on this industry? We believe we have convincingly demonstrated, in our first study on aerospace, that it is a strategic industry and that it contributes significantly to economic development. As such, it would be a strategic mistake not to support it adequately.

However, policymakers need to conduct a cost-benefit analysis to measure the economic gains of a healthy aerospace sector against the public resources it would require. A traditional tax accounting exercise of comparing the cost of government support to an industry, in the form of foregone expenditures or tax revenues, to the tax revenues generated by the development of that industry, is not sufficient to conclude that the support is low cost, zero cost or even profitable to the government.

A full cost-benefit analysis should focus more on the economic gains from the success of the aerospace industry, rather than on the tax revenues it generates, specifically the gains in relation to the criteria that give it its strategic nature that we have analyzed.

We will see in the second part of this report that it is not always public funds that the aerospace industry needs, but strategic support and a partnership with the government based on a vision rather than on money. In a way, we can say that the aerospace industry certainly needs money, but it also needs a lot of love.

POSSIBLE SOLUTIONS

The second part of this report focuses on approaches that can support the aerospace industry and enable it to play its full strategic role.

The analysis we are proposing, even though it focuses on the specific case of the aerospace industry, is structured in a way that allows for a more global reflection, and the proposals we will make will be designed to be applicable, where possible, to all strategic sectors.

The foundations of a strategic approach

Before making recommendations, we would like to raise a few questions to guide public policy and ensure that interventions are part of a strategic reflection. These questions relate to aerospace, but should arise in any reflection on other strategic industries.

Are the current support tools deployed by governments sufficient and appropriate to help the aerospace industry meet the challenges ahead?

As a starting point, we must remember that the Canadian aerospace industry is not in bad shape. It is not in crisis. On the contrary, it is performing and dynamic. Nor has it been forgotten by the government; it can still count on a wide range of support tools, programs and tax incentives. The problem is not the present, but rather the future. The aerospace sector is facing a new context that may change the game, due to international pressures and internal obstacles to its development. Added to that is the fact that the federal government, rather than strengthening its support for aerospace, has sent signals announcing a withdrawal. It is these threats that we will analyze in more detail in the following pages.

Are these support policies part of a logic that can be described as strategic, i.e. that they set the right targets, that they are based on appropriate objectives, that their results can be evaluated with the right measurements?

A first element in establishing this strategic approach is the time horizon, so that the approach is part of long-term thinking that reflects, among other things, the industry's development cycles.

Furthermore, the objectives pursued must also be strategic. Earlier, we showed how economic policies must disengage from the objective of job creation, which has lost its relevance in this period of tightening labour markets. It will therefore be important to recall that development policies must be based on strengthening the drivers of wealth creation, such as the contribution to innovation, exports and productivity.

Are these policies realistic, in that they set reasonable targets based on industry and market realities?

Support for an industry does not happen in a vacuum. It is based on its potential for success, which in turn is based on objective factors, such as the dynamism of its companies, the nature of the market and competitive advantages. A certain amount of realism must therefore be introduced with respect to the Canadian industry, its potential, and its limits. It is true that Canada is the fifth largest aerospace producer in the world, which makes it a world-class player. But it remains, proportionally speaking, as we have seen, a small player, even if its place far exceeds its economic and demographic weight.

Moreover, Canada is not home to a developed military industry, nor is it home to a large commercial aircraft manufacturer. It plays a largely supporting role, through its versatility, talent and niche specialties. Canada's position in international relations is not unlike that of a member of the G7 without being a power like the other member countries, respected and well represented in multilateral activities because of the bridging role it has been able to play throughout its history.

In a way, Canada's place was partly explained by the fact that it was able to draw on the advantages of its history and geography: the development of a war industry at a time when the state was omnipresent, and Canada's place in an industrialized world dominated by the countries of the North, namely the United States and Europe, with which it had a special relationship. This geopolitical context no longer exists.

To what extent will Canada be able to maintain its position in a changing world with the arrival of players of considerable size and means, such as China, Russia, India and Japan? It will not be easy for Canada to maintain its market share and it may not be appropriate for it to make this a goal. It would be wiser to set more qualitative objectives. These include defining the niches where it can develop based on its comparative advantages, knowing that its industry is required to innovate before others, and to demonstrate an ability to stand out in production areas that can be described as niches in which Canada can outperform competitors with more means.

Have the support policies proven their effectiveness and are they a rigorous and appropriate use of public resources?

The fourth set of considerations relates to the role that the state should play in economic development. The aerospace industry has historically been able to count on government support. But the world has changed, and successful policies in the past do not necessarily guarantee success in the future. Good judgment dictates restraint in seeking government support. For it is necessary to take into account the constraints of a state, the trade-offs involved in ensuring the judicious use of public funds and optimizing the success of the forms of support in achieving the objectives set. It is also necessary to know how to distinguish between the responsibilities of each party, those of the government and those of its industry partners. Finally, it is important to give priority to interventions that take place in the government's natural areas of jurisdiction and responsibility, while taking into account the international context in which the aerospace industry operates.

It is with these considerations in mind that we are proposing seven courses of action.

1- Recognize the strategic nature of aerospace

As a starting point, the most promising government intervention for the future of the aerospace sector lies in the formal recognition by public authorities of the strategic nature of the aerospace industry.

This statement may seem superfluous. But it responds to a palpable unease caused by the change in direction of the Liberal government led by Justin Trudeau, which broke with the traditions of its predecessors of the previous five decades. Indeed, the Trudeau government has taken several actions that might lead one to believe that it does not see aerospace as a priority industry. In and of itself, there is nothing wrong with a government stating new priorities. But in this case, the shift has never been explained, and especially never justified.

In this regard, the abandonment in 2017 of the program designed in 2007 to support aerospace and defence, the Strategic Aerospace and Defence Initiative (SADI), is a very significant move, which we described in the first part of this document. It was replaced as of 2018 by the Strategic Innovation Fund (SIF), initially with an envelope of \$1.26 billion over five years and enhanced since then, but which is intended for all industries. The loss of a specific program intended for it was a shock for the aerospace industry.

More recently, aerospace was not chosen as one of the five sectors the Canadian government is counting on with the creation of "superclusters." This can be explained by the spirit behind this project, which was directly inspired by the recommendations of the Advisory Council on Economic Growth, created by the Trudeau government and headed by Dominic Barton. These superclusters are intended to encourage innovation and collaboration through very long-term projects rather than to support developed and established industries. They are also linked to cross-cutting activities rather than industrial sectors.

Five superclusters have been selected: digital technologies (big data, cloud computing, augmented reality), based in British Columbia; protein industries (plant genomics, crop innovation), based in the Prairies; next generation manufacturing (robotics, 3D printing) in Ontario; Al-based supply chains (Scale.Al), based in Québec; ocean economy in the Maritimes.²⁷ The choices have raised concerns about adequate regional distribution.

But this initiative, as promising as it may be, cannot, on its own, constitute an industrial strategy because of the relatively modest sums devoted to it and the rather distant deadlines. While this support for innovation in areas of the future is essential, the success of existing cutting-edge industries, those that invest, export and innovate, must remain a pillar of government action. All the more so since aerospace is one of the industries that the Barton report cites as one of the promising areas for advanced manufacturing.

The Canadian government's relative indifference to aerospace can be seen from a number of indicators. The industry never received the same recognition as the automotive industry in the Trudeau government's first budget for 2016-2017 (pg. 137):28 "Supporting a Strong and Innovative Automotive Sector: The automotive industry is among Canada's leading employers and exporters, valued at \$17 billion per year and directly employing more than 125,000 Canadians from automotive assembly to parts production."

Similarly, the Government of Canada's site for attracting foreign investment, <u>www.investcanada.ca</u>, under the tab on advanced manufacturing, talks about the automotive and chemical industries, but makes no mention of aerospace.

When we analyze the Canadian government's economic strategy, as set out in the Department of Finance's economic plans, we conclude that, logically, the aerospace industry should be considered a key partner.

We should remember that in the Government of Canada's 2016-2017 budget,²⁸ two drivers of growth were evoked, namely a vast program of infrastructure projects and a more ambitious objective, innovation (pg. 123):

"Canada will be propelled by its creative and entrepreneurial citizens; its leading science and technology; its excellent innovation infrastructure; and its globally competitive companies offering high-quality products and services, thriving within a business environment that supports commercialization and growth."

²⁷ Innovation, Sciences and Economic Development Canada

²⁸ Growth for the Middle Class, Budget 2016-2017, Canada.

The financial plan for 2017-2018²⁹ was also working towards the same goal, "A country of innovators," by placing innovation at the heart of the economic development strategy and introducing the concept of super clusters. Finally, the 2018-2019 financial plan,³⁰ for its part, focused on exports (pg. 71): "Strengthening and diversifying trade, seeking new markets." Finance Minister Bill Morneau took advantage of his Fall 2018 Economic and Fiscal Update³¹ to emphasize this theme and announce new measures to facilitate exports by Canadian companies to other markets, particularly Europe and Asia. It should be noted that the previous (Conservative) government, like the current Conservative opposition, also make export market diversification a top economic priority.

Logically, therefore, a government that focuses on innovation and exports should see aerospace, which stands out in these two areas, as a vector of success. And yet, the strategic role of this industry is not fully recognized, either in public statements or in the policies put in place. There is a gap between the government's objectives and the relatively low level of interest in aerospace. Why is there a disconnect? Because aeronautics is already "sufficiently state supported"? Because the sector is already performing well and we prefer to support industries or activities that are still emerging? Because this industry is too Québec-based for support to be politically acceptable elsewhere in Canada?

This is in stark contrast to the position of the Government of Québec, which, regardless of who runs it, clearly defines aerospace as a strategic industry. The Charest government, with Raymond Bachand as Minister of the Economy,³² put in place a first-ever aviation policy in 2006. Ten years later, the Couillard government, with Dominique Anglade as Minister of Economy, Science and Innovation, continued this approach with a strategic plan for 2016-2026.³³ The document featured the following statement:

"The aerospace industry is a source of great pride for Québec. Its achievements and the place it occupies on the Canadian and international scene illustrate the know-how of Quebecers and their ability to take their place in a high-tech sector. [...] The aerospace sector occupies a strategic place in the Québec economy by constituting one of the main engines of growth and wealth creation for all of Québec."

The Legault government's position is no different, as evidenced by this statement by the Minister of Economy and Innovation Pierre Fitzgibbon:³⁴

"To maintain our position as one of the world's leading aerospace (players), we, as a government, must support the industry so that it can continue to innovate, stand out and become even more competitive. This is what all countries that rely on a world-class aerospace industry are doing."

Of course, it is only natural that Québec should attach particular importance to this industry, given its high relative weight in the Québec economy. Ontario, on the other hand, which is less inclined to intervene in the type of industrial strategies that Québec is fond of, gives the aerospace industry its rightful place in its public documents and interventions, and an important position in its strategies grouped under the theme "Open for Business." which does not seem to have changed under Doug Ford's government.

²⁹ Canada Budget 2017: Building a Strong Middle Class.

³⁰ Canada Budget 2018: Equality and Growth for a Strong Middle Class.

³¹ Canada 2018 Fall Economic Statement: Investing in Middle Class Jobs.

³² Québec aerospace industry development strategy, Government of Québec, July 2006.

³³ Québec Aerospace Strategy: Redefining the Horizon 2016-2026, Government of Québec.

³⁴ Fitzgibbon calls on the federal government to invest in aerospace, Radio Canada, February 22, 2019.

A country like the United Kingdom, where the aerospace industry has a relative weight comparable to Canada's, has set an example of clear commitment to its domestic industry with the announcement in December 2018 of an "Aerospace sector deal".³⁵ Greg Clark, Secretary of State for Business, Energy and Industrial Strategy, in his preface, expressed his government's full support:

"The UK's aerospace sector is a world leader in developing new technologies, generating well-paid jobs and sustainable growth across the country.

The sector is hugely important to the UK economy. It provides over 120,000 highly skilled jobs, most of these outside London and the south east. The sector has an annual turnover of £35 billion, the majority of which comes from exports to the rest of the world. This is a world-leading industry, driving growth and prosperity across the UK, supporting jobs that pay 40 % above the national average...

Developing and taking commercial advantage of the future technologies that will shape the aerospace sector in the years ahead will be key to ensuring this established UK success story continues. Through the Future Flight program, which will receive up to £125 million from the Industrial Strategy Challenge Fund, which industry will match, we will enable innovation in technologies that allow for clean growth and which meet future mobility needs."

In Canada, the aerospace industry is important enough, in terms of economic weight and economic impact, for the Canadian government to recognize its importance as well. The current lack of interest is an anomaly. There is a disproportion between the intrinsic importance of this industry to the Canadian economy and the importance that the Canadian government attaches to it.

That is why we are making the following recommendations.

That the Canadian government recognize the strategic nature of the aerospace industry.

This recommendation may seem symbolic. But it seems to us that it is a necessary first step. There would be nothing artificial about such a recognition. It would allow the Canadian government to be consistent with its own economic strategy, thus forcing it to abide by an internal logic.

Second, in terms of public policy, recognizing an issue as a priority can influence choices and policies, and ensure, in this case, that the future of this industry is part of the decision-making process. This leads to the following recommendation.

That the Canadian government adopt an aerospace strategy.

The natural extension of the recognition of the strategic nature of the aerospace industry should be to provide Canada with a true aerospace strategy. This is a necessary step to fill a glaring void because Canada does not have such a strategy and the central government has not proposed one, although it has done so for one segment of the industry, the space sector. Such a tool would allow Ottawa to develop a vision and a framework to better calibrate its actions. The federal Minister of Transport, Marc Garneau, in an electoral context, at a round table organized by AIAC in September 2019, had welcomed this idea positively, albeit timidly, without giving it any follow-up since then.

The Government of Québec already has such a strategic framework. AIAC has proposed an action plan. But Québec's very elaborate plan, like the relevant industry recommendations, is no substitute for a pan-Canadian strategy.



This is necessary because Ottawa is home to many of the levers that can support the development of this industry: national fiscal policies; a significant proportion of public funds for development; ultimate responsibility for foreign trade and relations between countries; and exclusive federal jurisdiction over two areas closely related to aerospace – air transport and defence. Moreover, because this industry is located in several provinces, this imposes a bridging role on Ottawa.

Finally, such a commitment can have more societal consequences, send a more general message about the importance of this sector to citizens, and generate attitudes such as pride and commitment, which are essential for support to be based on social acceptability. The Canadian government has often given its full support to regionally based industries, such as the automotive or oil industries. Aerospace, which has a more balanced geographic distribution, should be entitled to the same treatment.

It should be noted that these two recommendations, the formal recognition of the strategic nature of the industry and the development of a sectoral strategy, are approaches that apply to all strategic industries, whose success must be supported by a clear commitment by governments and consistency in their policies.

2-The importance of specific support programs

The recognition of the strategic nature of the aerospace industry should be followed by a much more concrete measure, namely the reinstatement of an innovation support program specific to the aerospace and defence industry.

This is an initiative desired by Québec Minister Pierre Fitzgibbon: "The Québec and Canadian aerospace industry also needs dedicated support from the federal government. The general funds approach may give good results for certain sectors, but aerospace is supported everywhere in the world by dedicated government funds."³⁶ AIAC, in its Vision 2025, quotes the Québec minister: "It is important that the federal government take concrete action and re-establish a sectoral fund dedicated to innovation, more generous and more flexible for aerospace. If such a fund is created, I will ensure that the Government of Québec follows suit."

This leads us to the following recommendation.

Reinstate a dedicated aerospace innovation support program

Why does it matter? Well, for one thing, arithmetic. SADI distributed \$1.6 billion in repayable aerospace and defence loans between 2007 and 2017. The SIF promises \$2.0 billion over five years, but for all industries. This will lead to a significant reduction in federal funding for aerospace innovation. One wonders whether it makes sense to reduce support for an industry that has historically been by far the main driver of innovation in Canada.

Second, to correct the shortcomings of the SIF, which is not only a catch-all fund aimed at all industries and all types of projects but which is also not specifically dedicated to research and development. The program supports other objectives, such as business growth, attracting foreign investment, or emergency response. This initiative, which the federal government describes as a "flagship platform," in principle intended for innovation, has had an initial effect of reducing the amounts allocated to innovation.

Finally, it matters to ensure the effectiveness of public policies. The aerospace industry requires policies that are very long-term in nature, given the very lengthy development and marketing cycles. Its high degree of technicality and complexity also requires specialized management capable of understanding the needs and rigorously defining the criteria for support, reserving it for projects that are truly based on R&D investments, thereby reducing the risks of an "open bar" approach. It is easier to impose criteria of rigour and efficiency in a specific program than in a one-stop-shop structure.

It is not obvious that the principle of a dedicated program is necessary for each industry. Aerospace is a special case, in a way, because of the size of the public funds it requires, the complexity of its projects, and its very long development cycles. That being said, the project-based support mechanism is appropriate for all strategic sectors.

A recommendation made by the Centre for Productivity and Prosperity - Walter J. Somers Foundation (CPP) concurs with this view:³⁷ "Opt for a project-based approach to support R&D in large companies. According to the latest available data, fewer than 500 large businesses have received nearly 40% of the amounts granted for R&D credit. Given the limited number of recipient companies, the government would generate better results by opting for a project-based approach. This would allow the government to select the activities funded upstream, monitor the impact, and withdraw funding when objectives are not met."

The presence of a dedicated support program, with well-defined criteria, can provide another benefit by acting as a pull factor for R&D to take place in Canada rather than elsewhere. The aerospace industry has a certain degree of mobility, which can be seen in the presence here of many foreign companies. This is the case for production: for example, part of the Airbus 220, ex-CSeries, will be produced in the United States. This is even more true for research: professionals can, in the course of their careers, change employers and countries, which means that companies can choose the place in the world where they carry out these activities. All of the major players present in Canada, whether Canadian or foreign companies, also have a presence in other countries. All of these companies can therefore choose to move their research activities to where they can get the best support, in the environment that will be most favourable to their development.

In addition, Canadian subsidiaries of foreign firms generally compete with other entities in their own group for R&D mandates. A well-designed program and the availability of sufficient public funds can ensure that Canadian companies or foreign companies established in Canada are not forced to perform their R&D outside our borders where conditions would be more advantageous. This was noted by AIAC: "Our participants reminded us very strongly during our Vision 2025 consultations that foreign companies account for a significant proportion of Canada's aerospace R&D investment and exports. R&D investment decisions are competitive within their own group against other divisions operating abroad."

These considerations have a certain urgency in the case of aerospace because aerospace is in a trough in terms of research cycles. The major projects that have resulted in this industry investing heavily in research have been completed. This is the case with the CSeries program and the Global 7500 program at Bombardier, and it is also the case at Pratt & Whitney. The level of R&D spending has already begun to decline and will continue to decline if other major development projects do not take over.

And there doesn't seem to be anything in the pipeline right now to sustain that level of research in the years to come and therefore, by implication, to bring innovative products to market later on that will allow Canada to maintain its technological lead.

³⁷ Jonathan Deslauriers, Robert Gagné, Jonathan Paré, *Des solutions pour stimuler l'innovation au Québec*, Centre for Productivity and Prosperity - Walter J. Somers Foundation, HEC Montréal, 2017.

3-Initiate a review of tax credits

The re-introduction of this dedicated repayable contribution program would ensure that the aerospace industry would continue to be well supported by governments for its investments in R&D and its contribution to innovation.

However, it should not be forgotten that this industry benefits from another major form of support from governments, with the federal scientific research and technological development tax credits and their provincial equivalents. We have seen in the previous section that this tax expenditure generates significant costs for the public treasury: \$3 billion in Ottawa in 2019 and \$400 million in Québec City in 2018. Although these credits are available to all businesses, a significant portion was obtained by aerospace companies because of the size of the industry and the scale of its R&D investments.

However, the tax credit mechanism does not always meet its targets and has pernicious effects. The purpose of this report is not to suggest alternatives to tax credits. We will limit ourselves to mentioning a few weaknesses of this tool that warrant some reflection. This is a field of study that has been examined by a number of researchers and organizations. This global debate goes beyond the aerospace industry but would affect it because of the importance of the credits to which it is entitled. It should therefore, as a precaution, participate in it.

Initiate a reflection on research tax credits for scientific and technological development

Let us note at the outset that, in the case of aerospace, the tax credit tax tool clearly achieves the objectives pursued. The industry obtains a significant share of the tax expenditures granted through this measure and, in return, translates them into significant investments in R&D.

Moreover, this tool has the important advantage of being recognized by international organizations as a measure that does not contravene the rules of international trade, especially when these credits are available to all industries and are therefore not a measure specific to an industry, which is the case for research credits. This is an important element for the aerospace industry, the bulk of whose market is outside Canada.

However, the tool of R&D credits has difficulty reaching all companies. A CPP study on Manufacturing 4.0,³⁸ points out that 40% of the credits go to 500 large companies. On the other hand, it fails to achieve one of its objectives, which is to reach SMEs, convince them to change their practices, and devote resources to research. In other words, for small businesses, the tool does not fully achieve its goals.

In addition, these tax credits become, albeit indirectly, a policy to support job creation, since a significant portion of eligible expenses are salaries. It is the number of jobs and the payroll affected that give rise to the credit. However, government assistance measures related to job creation should be abandoned because of the labour scarcity. The result is that traditional development policies typical of the old economy are being applied to the new economy.

This is not just a theoretical problem. These tax benefits, along with relatively low wages, make Canada an attractive place for foreign companies to conduct research. In many cases, particularly in aerospace, this has had a structuring effect. But in other cases, these tax credits have had the effect of encouraging companies to carry out research here, at lower cost, in Canada in order to fuel development that is then carried out in their home country. So much so that innovation policies could be transformed into job creation policies at a discount, making Canada a destination for offshoring and outsourcing.

³⁸ Jonathan Deslauriers, Robert Gagné, Jonathan Paré, *Manufacturier 4.0 : Dynamiser l'activité manufacturière au Québec*, Centre for Productivity and Prosperity - Walter J. Somers Foundation, HEC Montréal, 2019.

This is a thesis defended by, among others, former Research in Motion CEO Jim Balsillie, who talks about the "race to the bottom":³⁹

"An ad hoc set of programs was introduced to appease the domestic tech sector, but a strategic approach to commercializing Canadian intellectual property (IP) and data in favour of a feverish pursuit of jobs, establishing Canada as a prominent hub of highly skilled but <u>cheap tech branch plants.</u>"

Similar criticisms have been expressed in Québec with respect to video game tax credits by new economy business leaders.

The third, much larger, problem is related to the relative failure of Canadian innovation policies.

Despite significant government spending, the level of direct business expenditure on research and development (BERD) is low in Canada, and firms underperform in innovation, such that Canada is not at the top of the innovation rankings. For example, a report by the Conference Board du Canada⁴⁰ ranks Canada 12th out of 16 peer countries for innovation, noting that the country is losing ground.

These results are disappointing enough to prompt further reflection on the foundations of innovation policies. One line of thought, for example, suggests that the offering should be reversed and that work should be done to stimulate the demand for innovation rather than the supply of innovation, including a study by the IRPP:⁴¹

"Canada's Skills and Innovation Plan is designed to address the country's triple innovation challenge: declining productivity growth, declining investment in R&D, and the need to harness innovation for the benefit of society as a whole. But it addresses only part of the issue. Like its predecessors, it places too much emphasis on the production of knowledge, technology and innovation without directly targeting the readiness of firms and the market's capacity to absorb innovation. To ensure the success of its plan, the government must recognize the importance of stimulating demand to accelerate the diffusion and adoption of innovations and the creation of markets, and implement an action plan."

At the very least, these various considerations indicate that Canada needs to reflect on innovation policies given their relative failure to fill Canada's gap in R&D spending, the degree of innovation, and the ability to attract smaller firms to innovate, leading to its inability to catch up with the productivity levels of its competitors. However, this is less true for aerospace, which is one of the few Canadian industries that invests heavily in innovation.

³⁹ Jim Balsillie, Canada is pushing its tech sector into a race to the bottom, Globe and Mail, September 21, 2019.

⁴⁰ How Canada performs: Innovation, Conference Board of Canada, 2018.

⁴¹ Jakob Edler, A Costly Gap: The Neglect of the Demand Side in Canadian Innovation Policy, IRPP Insight, 2019

4-Aiming for the long term

Existing programs focus on support for specific development projects. While cycles can be relatively long in aerospace, repayable loan programs have nevertheless supported projects that targeted a commercial application already in companies' business plans. In a way, they deal with tomorrow.

But we must also look further ahead and prepare for the day after tomorrow, so that Canada and its industry can ensure that it is able to maintain its position, to stand out and stay ahead of the market.

There are a few initiatives that support the innovation cycles that will keep the industry on the leading edge for decades to come. Here are a few examples. The Consortium for Aerospace Research and Innovation in Canada (CARIC), with federal funding of approximately \$5 million per year, relies on collaboration among companies, universities and research centres to explore new technologies and validate others to lead to practical applications. However, the federal government has not renewed funding for this program, which expires in 2020. Another initiative, the Groupement aéronautique de recherche et développement en environnement (GARDN), focuses on environmental aspects and technologies to reduce the carbon footprint. In addition, the Consortium for Research and Innovation in Aerospace in Québec (CRIAQ), funded by the Québec government, is also based on collaborative research and seeks to create new processes and concepts applied to future components and products in the aerospace industry. The defunct technology demonstration program played the same role.

However, these promising initiatives remain modest, especially since CARIC's future is uncertain. The contrast between Canada and its competitors is striking. The European Union is spending massive amounts of money to develop a vision and to ensure that R&D can lead to its realization. For example, the Horizon 2020 program, which focuses on innovation, has been able to count on €70 billion in funding between 2014 and 2020, which has, among other things, financed the SESAR program, €3.7 billion for the modernization of the air traffic management system, and the Clean Sky program, which has a budget of €5.6 billion to develop technologies for CO_2 reduction in air transport. Even more ambitious, the Flightpath program, the European vision for aviation, could lead to public and private investments of €250 billion over four decades.

In the United States, major research programs are more focused on defence. A total of US\$95.9 billion was earmarked for research and development in the 2019 US Department of Defense budget.⁴² This includes US\$71.5 billion for aerospace and defence R&D. NASA, for its part, has an annual budget that will total US\$22.6 billion in 2020, about half of which is devoted to aeronautics and space. A study by the Planetary Society explains:⁴³ "NASA spends its money on Earth, not in space. NASA employs about 17,000 people and supports the employment of tens of thousands more through contracts and grants made in every state of the union. Last year NASA spent 73.5 % of its total budget on contracts with nearly 5,000 businesses, nonprofit organizations, and educational institutions across the United States. NASA's major contractors – Boeing, Lockheed Martin, SpaceX, and Orbital Sciences—are the biggest recipients of NASA funding, though they in turn work with many additional supplies and businesses." This is a tremendous economic lever. Hence the following recommendation.

Invest in long-term research projects that will enable the aerospace industry to maintain its technological lead.

It is in efforts to support this longer-term research, or in technology demonstration initiatives, that the federal government's contribution could make a difference, bearing in mind that the success of such efforts depends on the active participation of the private sector and its willingness to collaborate with higher education and research organizations. A first step could be the revival of the TDP program.

⁴² Military and Space Electronics.

⁴³ The Planetary Society: What is NASA Budget?



Several other areas of intervention have been evoked in this regard. They deal with sectors where Canada already has the know-how and comparative advantages that enable it to stand out and remain at the leading edge of knowledge, and possibly bring products to market. Two of them have already been identified in the Québec Aerospace Strategy and have been taken up in the recommendations of AIAC's Vision 2025 approach.

- First, what the Québec aerospace strategy described as "the greener aircraft mobilizing project." The AIAC talks about carbon neutral aerospace: "The Government of Canada can support research institutes, entrepreneurs and large companies seeking to develop fully electric or hydrogen powered aircraft. By creating clusters of expertise upstream of the development of this technology, Canada will be a leader in the next great aerospace revolution. [...] Developments in robotics, digital technologies, simulation, artificial intelligence and advanced materials can all contribute to carbon-neutral flight with possible technology transfers to other industries."
- The second driver could be what AIAC describes as "autonomous or semi-autonomous vehicles/aircraft." The Québec government has made this one of the elements of its "Developing the UAV sector and its civilian applications" strategy. "The UAV sector is one of the main emerging markets in the aerospace field. Global production of UAVs already represented sales of US\$4 billion in 2015. According to the Teal Group, this production is expected to more than triple to US\$25 billion by 2025. The UAV market is mainly focused on military requirements. However, it is estimated that the civil UAV market will grow the fastest over the next ten years."
- In this same vein innovation with a very distant timeline we can add a well-established segment of the industry, that of space activities. In this case, the federal government is already playing a very important role and, in 2019, it released a comprehensive policy,⁴⁴ which targets a number of objectives and priorities: "Canada recognizes the space sector as a national strategic asset and seeks to ensure that the country remains a space power." This strategy, to which Ottawa is devoting \$2.6 billion, has multiple components, such as participation in the Lunar Gateway mission, broadband satellites, support to private space industries, and practical applications ranging from telemedicine to environmental observation.

5- Making better use of political and institutional levers

Aerospace is a highly regulated industry, as is air transportation. For these reasons, its success will also depend on how governments shape their regulatory and institutional framework. Here, as examples, are some avenues that could be further explored.

- Canada's aerospace industry is globally integrated and exports 70% of its products to destinations around the world. Strong international trade and market access policies are essential to its success. This includes practical and effective trade agreements, as well as airworthiness and maintenance agreements with our trading partners. It also requires greater coherence between international and economic policies. There is currently a lack of harmonization between Canadian development assistance and support for sectors in which Canada has comparative advantages. These initiatives can take the form of training for specialists (e.g. pilots) and government officials (e.g. aviation safety), feasibility studies for financing, development of infrastructure such as airports, support for research and cooperation, etc. Such initiatives would reconcile support for development with Canada's economic development. This is an avenue that Canada is beginning to explore with the creation of FinDev Canada, a new subsidiary of EDC.
- There must also be some degree of coherence between Canada's international policies and those of its partners. Canada, as an advanced democracy, has a duty to impose strict rules of governance and ethics on its companies. Bound by international agreements, the country must also contribute to fighting the scourge of corruption, one of the main obstacles to the development of emerging countries. But there is a thin line between this obligation of rigour and what can become a not very useful form of naivety. This is an issue that Canada will increasingly face with its efforts to diversify its exports, since the growth markets are emerging economies that do not have the same traditions and practices as its traditional partners, the United States and Western European countries. What is needed are clear and consistent rules by which Canada adjusts to international standards and to the practices of its like-minded partners and competitors - OECD members, European countries, the United States. For example, Canada prohibits EDC from financing activities in Russia, while the U.S. State Department accepts exemptions specifically for civil and commercial aviation activities, and the European Union exempts civil and commercial aviation. In SNC-Lavalin's high-profile and highly politicized case, the use of a reparation agreement mechanism has met with resistance in Canada that is not shared by our major partners. Recently, for example, a €3.6 billion fine was imposed by France, the United Kingdom and the United States on Airbus to avoid a corruption trial.⁴⁵ Canada did not use this solution, which was available to several foreign competitors of the Canadian company, which found itself fighting on unequal terms.
- A more concrete intervention, mentioned by the AIAC, would be to strengthen Transport Canada, Civil Aviation, an organization recognized worldwide for the certification of aircraft. "Its regulatory approvals are recognized internationally as the benchmark standard for aircraft certification and airworthiness. [...] this reputation gives the Canadian civil aviation sector a critical advantage in facilitating Canadian trade and export opportunities."

• Another avenue, mentioned in particular by the Government of Québec, is to maintain efforts to ensure that Montréal retains its role as a host for international institutions related to aerospace and aviation, a way of indirectly strengthening its know-how and reputation and consolidating its cluster. This contribution was underscored in September 2019, at the 40th ICAO Triennial Assembly:⁴⁶ "The civil aviation and aerospace sectors occupy a strategic place in the city's economy. ICAO, the only United Nations agency established in Canada, is a pillar of our hub in these sectors," according to Michel Leblanc, CEO of the Chamber of Commerce of Metropolitan Montreal. "If Montreal is recognized as one of the world's aerospace capitals, few people know that it is also here that the biggest decisions in civil aviation are made. And for good reason: the metropolis brings together the most prestigious international organizations in this field. The International Civil Aviation Organization (ICAO), established in Montréal since its creation in 1944, is the centrepiece of this ecosystem that is unique in the world," according to Hubert Bolduc, then CEO of Montréal International.

6- Using the leverage of procurement policies

A government also has natural levers to support or stimulate economic activity. The first of these are procurement policies and public procurements, which allow the government to support, when possible, companies in its own economy.

In the case of aerospace, there are fewer opportunities because governments acquire relatively few products from the civil aviation sector, and because Canadian military spending is relatively limited and the defence portion of the industry is quite modest. We are not, of course, suggesting that Canada should become a military power. However, Canada, as the AIAC proposes, must "make optimal use of the leverage provided by government procurement policies, as has been done for the naval industry, to ensure that spending to meet Canada's defence needs contributes as much as possible to the development of the Canadian aerospace industry." Hence the following recommendation.

The government must make maximum use of the leverage provided by procurement policies.

In principle, Canada has a historic opportunity with the project to replace its obsolete fleet of 88 F-18 fighters. This contract is expected to be worth \$26 billion. But already, there is a great risk that the economic impact will be limited and that it will be a missed opportunity, if not a fiasco.

The federal government has expressed, on several occasions, its intention to maximize the Canadian spin-offs from this contract and to help industry, particularly its SMEs, take full advantage of it, notably through the Industrial and Technological Benefits (ITB) policy to increase support for SMEs and the Canadian supply chain.

However, there is a long way to go. The potential is limited by the fact that no fighter aircraft manufacturer is Canadian and that Canada is therefore subject to constraints from producing countries.⁴⁷ The main constraint, highlighted by U.S. authorities, is that Canada signed an agreement in 2006 to become one of nine Lockheed Martin F-35 development partner countries, whose signatories agreed to allow companies from the partner countries to compete for subcontracts. An imposition of local content criteria would violate this agreement and cause the F-35 to withdraw from the race.⁴⁸

⁴⁶ La Presse+ XTRA, Avion civile internationale, September 23, 2019.

⁴⁷ *<u>Future Fighter Industry Day Statements</u>*, Public Services and Procurement Canada, January 22, 2018.

⁴⁸ Ottawa changes fighter-jet tender rules to address U.S. pressure over F-35, Globe and Mail, May 9, 2019.

To address these pressures, the Canadian government changed the bidding criteria and dropped the condition that companies must commit to spending 100% of the contract value in Canada. These requirements will still be part of the bid scoring system, but will no longer be mandatory, allowing a company that does not meet its obligations to participate in the process and propose industrial objectives leading to the signing of a non-binding agreement. As a result of these changes, one of the four potential bidders, Airbus (with its Eurofighter Typhoon), withdrew from the race. Dassault (with its Rafale aircraft) had already withdrawn from the process. Only Saab (with its Gripen), Lockheed Martin's F-35 and Boeing's Super Hornet would thus remain in the running.

These incidents illustrate how, in this case, Canada, tied to past agreements and dependent on the United States for its defence, does not control its procurement policy. They also show how there are limits to relying solely on a retroactive industrial policy in the defence sector. The result is the risk of a fiasco. This leads to the conclusion that a procurement policy cannot be based on a *fait accompli* situation, and that it must be planned in advance.

Introduce a dynamic and proactive element in procurement policies so that there is a common development of industrial needs and policies.

A government that wants to make effective use of its procurement policies must therefore inverse the decision-making process to prepare domestic companies to be able to meet its future needs. Defence policies and the assessment of future needs would take into account economic variables, so that the process is proactive and industrial strategy and spending programs are developed in conjunction.

Another pitfall could affect Canada's ability to take full advantage of the leverage represented by procurement policies. This is what could be described as Canadian naivety in its commercial relations, which consists in applying the agreements governing government contracts with a degree of care not found among its competitors.

Ending Canada's Traditional "Angelism".

This "angelism" can be found, among other things, in land transportation. When VIA Rail renewed its fleet, for example, Canada did not impose any Canadian content requirements, citing the terms of the Comprehensive Economic and Trade Agreement (CETA) with the European Union. In addition, many contracts are awarded at the provincial or municipal level without local content rules.

Yet experience shows that within the European Union, rail contracts are invariably awarded by member countries to bidders who will produce in their own country. Similarly, Canada's main partner, the United States, imposes very strict local purchasing rules of 70%. The result is that Canadian producers have no advantage in their own territory while their competitors are assured of a strong preference at home. There is therefore a culture of "realpolitik" among our partners and competitors whereby formal compliance with trade agreements is accompanied, on the ground, by practices of economic nationalism.

Moreover, we also note the same deficiency in ground transportation observed in the renewal of the fighter aircraft fleet: the lack of proactive intervention consisting of directing industrial activities such that they can meet the future needs of public contractors.

7-Bolstering the Canadian industry

There are some areas of weakness in the Canadian aerospace industry that could act as an impediment in the future, as we saw earlier. According to industry stakeholders, but also according to the messages of the Government of Québec's strategy, there are two main clouds on the horizon, and therefore two challenges. The first relates to the ability to train and retain the skilled labour needed to ensure the growth of the industry. The second relates to the importance of strengthening the sector's SMEs, increasing their productivity and competitiveness, helping them integrate into value chains, and compete globally. This largely involves the adoption of new technologies, such as digital tools and intelligent automation, what is described as Industry 4.0, the fourth industrial revolution.

However, these two challenges are widespread problems that are not unique to aerospace; they affect most industries and sectors of economic activity in Canada and Québec. For this reason, we make the following recommendation.

Labour scarcity and adjustment to Industry 4.0 are not issues specific to aerospace. For this reason, governments should address them through general measures that apply to the economy as a whole.

Since these are problems common to all industries, it seems reasonable to believe that the most promising measures that governments can put in place should seek to resolve these problems through comprehensive policies, and not through specific interventions in the aerospace industry.

For example, in the case of worker shortages, these may be general measures to extend the contribution of experienced workers, or to make better use of immigration, policies that encourage continuing training, which is neglected in Canada and Québec, or that ensure a better match between the labour market and the education network, measures to reduce the school dropout rate or encourage scientific vocations. Several of these issues have been addressed by reports from the Institut du Québec. Similarly, in the case of adaptation to Industry 4.0, one can think of tax measures targeting all SMEs.

These two issues have another point in common: in the case of aerospace, the players best able to address industry-specific aspects are not governments, but rather the aerospace companies themselves or the institutions they have set up to build their clusters. Hence the following recommendation.

The aviation industry itself must play a major role in adapting global policies to the specificities of the industry.

To address labour challenges, for example, the Aéro Montréal cluster has developed very close ties with educational institutions. The Québec aerospace strategy, while recognizing the importance of the issue, complements the interventions led by the industry and its partners, because the means to address this problem are already in place. The industry, through its cluster and with its partnerships with educational institutions, is the prime mover.

This ability of industry to take ownership has been demonstrated by a number of recent events. On the one hand, there is the mobilization of the industry around a campaign to encourage vocations in favour of aerospace, Rise to the Future. On the other hand, there was the intervention of the main players in the Québec industry in 2018 to mitigate the effects of the major job cuts announced by Bombardier after the conclusion of the two development programs for the Global 7500 and the CSeries.

This interaction between industry and the education community, which is essential to address the threat of shortages, is also being seen in Ontario and at the national level where AIAC is very active on the issue.

The same reasoning can be applied to the use of new technologies. Aéro Montréal has produced a white paper on the shift to Industry 4.0 which clearly illustrates that the industry is addressing this issue on its own without depending on government support.⁴⁹ The organization also commissioned a study on artificial intelligence from the Boston Consulting Group.⁵⁰

This process will be facilitated, in the case of aerospace, by the very structure of the industry and its high degree of integration. On the one hand, the large companies, which are dominant in the sector, have the technological, managerial and financial skills to initiate their own changes, even if, as we have seen, aerospace is not at the cutting edge of Industry 4.0 and is relatively slow to adapt, in particular because of the long development and production cycles. On the other hand, these large companies are in some way in symbiosis with the network of smaller companies that are their suppliers and can thus stimulate their transformation efforts.

Large companies can thus play a key role in encouraging SMEs to modernize, given the need for harmonization of technologies between suppliers and customers. This is what the Aéro Montréal study notes: "They must therefore take up a double challenge: harmoniously integrate technologies into their own production environment, while convincing their strategic suppliers to commit to 4.0 and to transform their production system. For example, the prime contractor will encourage its subcontractors to review their quality and delivery processes so that the systems are linked and capable of exchanging usable information. So 4.0 is causing disruptions at different levels of the supply chain."

This process can also be driven by cost pressures that may be imposed by prime contractors. An example of this was Airbus' statements when it took control of the CSeries program that it intends to reduce the prices charged by its suppliers by more than 20%.

⁴⁹ From Vision to Reality: Breaking Through the World of 4.0, Aéro Montréal, 2017.

⁵⁰ Aerospace and Al, Bringing together Montreal's distinctive strengths, Boston Consulting Group, 2019.

A review of public support policies for aerospace shows that this industry, contrary to popular belief, does not live off the public purse. This assistance, which consists essentially of repayable loans under federal aerospace programs and research tax credits available to all sectors, is less than what is available to a great many industries in Canada.

However, the nature of the aerospace industry, particularly the costs of research and the very long development cycles, means that the growth of this industry is not possible without government support.

Countries that rely on an aerospace industry devote significant resources to it because of its considerable economic contribution. This support in the United States and the European Union is much greater than in Canada, partly because these countries have defence programs that provide aerospace companies with military contracts and research funds. This leads to an imbalance that puts the Canadian industry at a disadvantage compared to its competitors, jeopardizing its future development.

These considerations lead us to conclude that Canada and Québec must maintain and even improve their support for this industry. The report therefore looks at seven areas of intervention. However, this does not lead us to recommend a significant injection of additional public funds. While the aerospace industry certainly needs money, it needs love above all.

The industry's main problem right now is that it does not seem to be a priority for the federal government. And what the aerospace industry needs most, first and foremost, is for the government to formally recognize its strategic nature and to adopt an aerospace strategy that could provide a framework for its actions and make them more coherent and effective.

Such a prioritization should, as a first step, lead to the reinstatement of a repayable loan program specifically intended for the aerospace industry, which would replace the current formula of a one-stop universal program for all industries, in order to take into account the cycles specific to aerospace and its technical complexity. Canada and Québec must also support long-term research that will enable the industry to continue to innovate and maintain its technological competitiveness in the future. Governments could also make better use of their procurement policies and institutional levers.

These interventions, if properly structured, are justified by the economic impact of the aerospace industry and its strategic nature, particularly its significant contribution to foreign trade and its major investments in research and development, which make it worthy of being considered a national champion.