

Carbon Omissions: An Analysis of Carbon Tax Treatment Within Canada's Equalization Program

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Abstract

Carbon taxes are not only an efficient tool to mitigate greenhouse gas emissions, but they are an increasingly important source of government revenue. By 2022, a \$50 per tonne carbon tax has the potential to become the fifth most important source of revenue for provincial governments, which could be used to lower taxes elsewhere, support public services, or deliver household rebates. The uneven distribution of carbon emissions, however, creates significant differences across provinces in terms of their fiscal capacity for such measures, but little is known about how Canada's equalization program and carbon taxes interact. In this paper, we examine and quantify the effect of (1) increasing carbon tax revenues on the allocation of equalization payments, (2) introducing emissions as a distinct tax base within the formula, and (3) the omission of carbon tax revenue under the federal backstop program. We propose various reforms to potentially improve the functioning and effectiveness of both equalization and climate policies in Canada.

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Introduction

Canada's equalization program is, and has always been, controversial. It attracts attention in all provinces in part because there is a large amount of cash at stake, about \$19.8 billion for 2019/20, and because not all provinces receive these transfers. Carbon taxes too face political challenges, especially the new federal backstop policy that implements carbon taxes in provinces without their own sufficiently stringent pricing scheme. The two policies interact in important, though previously unappreciated, ways. As carbon tax rates increase — to \$50 per tonne by 2022, and possibly more afterwards — total carbon tax revenues have the potential to be the fifth most important source of provincial revenue within the equalization formula. And given how unevenly greenhouse gas (GHG) emissions are distributed across provinces, and therefore how unevenly carbon tax revenues per person are, pricing carbon has the potential to significantly affect both the size and allocation of equalization entitlements. The differential application of carbon pricing policies, either through variation in provincial policies or through selective application of the federal backstop program, compounds this issue.

This paper investigates the implications of growing carbon tax revenues and the treatment of this revenue for Canada's equalization program. While there is a large literature examining the design and functioning of fiscal transfers in Canada, reviewed extensively in Boadway and Cuff (2017), no previous work examines the important interactions between a Pigouvian corrective tax, such as a carbon tax, and equalization.

Our paper makes several contributions. We first document the wide dispersion of provincial fiscal capacity associated with carbon taxes. The goal of equalization is to ensure all provinces have comparable capacity to raise revenue at comparable tax rates. And since the distribution of greenhouse gas emissions across provinces is highly uneven, the same carbon tax in one province will raise significantly different amounts than in another. A broad-based carbon tax set at \$50 per tonne, for example, would raise over \$2,300 per capita in Alberta, compared to just over \$300 per capita in Quebec. Only resource revenues are more unevenly distributed. The Schutz Index of fiscal capacity inequality in resources is, in 2017/18, 0.44 — meaning 44 percent of total resource revenues would have to be reallocated to achieve equal per capita allocations across provinces — compared to 0.34 for greenhouse gas emissions, and barely over 0.06 for the personal income tax base.³

Resource revenues were first included in equalization in 1962/63 and have been the subject of much controversy ever since. The uneven distribution of these revenues creates significant challenges to the design and implementation of equalization. The treatment of resource revenues has been the subject of extensive research (Boadway et al., 1983; Boadway, 2004; Locke and Hobson, 2004; Courchene, 2005), but our paper is the first to examine the implications of rising, and unevenly distributed, carbon tax revenues on equalization.

We show that the effects of rising carbon taxes on equalization are modest given the current treatment of these revenues as consumption tax revenues in the equalization formula. As a

³ See Tombe (2018) for a more detailed discussion of fiscal transfers in Canada and the Schutz Index measure of inequality.

result, provinces with smaller than average per capita consumption benefit, and therefore as carbon tax revenues increase in the coming years, this treatment will tend to boost payments to Quebec and Prince Edward Island and decrease payments to other recipient provinces.

The treatment of carbon pricing revenues in the current formula is not ideal, however, given the significant variation in per capita GHG emissions across provinces. We therefore examine and quantify the implications of introducing a unique carbon tax base to evaluate provincial carbon tax fiscal capacity. Our simulations show that this alternative treatment of carbon tax revenues has important implications for the size and allocation of equalization entitlements. Specifically, if GHG emissions are introduced as the carbon tax base — rather than provincial consumer and business expenditures — provinces with relatively high emissions per capita see increases in their calculated relative fiscal capacity, while provinces with relatively low emissions per capita see the reverse. Concretely, we find that non-receiving provinces are not affected, but the re-allocation of equalization across currently have-not provinces can be significant. Quebec, for example, would see its equalization payment increase by nearly \$350 million in a scenario where all provinces priced carbon at \$50 per tonne. Payments to all other have-not provinces would fall.

Our analysis demonstrates that the typically adverse incentives created by equalization payments for provincial governments — such as the incentive to increase tax rates to shrink local tax bases, as documented by Smart (2007) — may become a potentially beneficial carbon abatement incentive. Typically, provincial actions to shrink (or appear to shrink) tax bases would result in higher equalization payments. To the extent that this means lower economic activity and income in the province, this is an adverse incentive that the design of equalization has attempted to mitigate over the years. Greenhouse gas emissions are different. This particular tax base is associated with significant externalities in the form of its contribution to climate change. The inclusion of a specific carbon tax base in equalization would incent provincial actions to shrink emissions, particularly for a smaller province. We show that for national average carbon taxes of \$50 per tonne, the abatement incentive inherent in equalization would be equivalent to between \$30 to \$40 per tonne for Maritime provinces, and nearly \$15 per tonne for Quebec.

We show that the treatment and inclusion of different types of carbon tax revenues also matters for equalization. Under the new *Greenhouse Gas Pollution Pricing Act 2018*, for example, the federal government imposes a carbon tax in provinces that do not have their own sufficiently stringent carbon pricing policy in place. These carbon revenues, about \$11.3 billion of the projected \$16.8 billion in total carbon pricing revenue in 2022/23, are currently excluded from the equalization formula when determining provincial fiscal capacity. The current equalization formula also excludes the value of freely distributed permits and emissions credits under output-based pricing systems, equal to an estimated \$9 billion in 2022/23. These are significant omissions. A decision to include these revenues could have significant implications for the total cost of the equalization program and the allocation of entitlements across provinces.

We find that omitting federal backstop revenue from the equalization formula has two effects. First, excluding revenues from the equalization formula tends to lower payments — both because there is less provincial revenues to be equalized and because carbon tax revenues in particular are unevenly distributed. But second, the federal government allocates a fixed

pool of equalization dollars: any shortfall below the basic entitlement is distributed on an equal per-capita basis among the lower fiscal capacity provinces, and any excess will be clawed back from equalization entitlements on an equal per-capita basis. Overall, we demonstrate that excluding carbon tax revenues from backstop provinces will benefit have-not provinces with relatively higher levels of per capita consumption tax bases — such as Manitoba and the Maritimes — while it will cost Quebec. Under a \$50 per tonne carbon tax, but with backstop revenue in Alberta, Saskatchewan, Manitoba, Ontario, and New Brunswick excluded, we estimate Quebec equalization entitlements fall by \$11 million per year, while Prince Edward Island would see a nearly insignificant reduction and other recipient provinces benefit with higher payments. As carbon prices increase over time, so too will the significance of this issue.

We also show that the effect of including the value of free permits and credits on total equalization and individual province entitlements depends on the tax base used to equalize carbon tax revenues, on the large emitters' share of total priceable emissions in the province, and on whether carbon tax revenues in backstop provinces are included in equalization.

Finally, our paper informs the ongoing discussion on equalization reform in a world with significant carbon pricing revenues. We show that a decision to remove the cap on aggregate entitlements can significantly increase the total cost of the equalization program. This is particularly the case when carbon prices are rising and if carbon pricing revenues are equalized using a distinct GHG base.

The paper proceeds as follows. The next section provides an overview of the carbon pricing policies in place in Canada before and after the introduction of the federal government's backstop policy in 2019. Following this, the basic mechanics of equalization given the current treatment of provincial carbon pricing revenues are presented in a stylized form to ground intuition and highlight key issues. We then move to consider the full equalization program and the precise implications of various carbon pricing issues. We specifically consider the implications for the size and allocation of equalization if carbon pricing revenues are treated as coming from a distinct GHG emissions tax base, highlighting the carbon abatement incentives under this approach. Finally, we provide an analysis of the federal government's carbon backstop, and the implications for equalization.

Carbon Pricing in Canada

Provincial carbon pricing policies first appeared in the mid 2000s. British Columbia introduced a broad-based carbon tax in 2008 at an initial rate of \$10 per tonne. The tax increased annually until reaching \$30 per tonne in 2012. Six years later, the rate increased to \$35 and, as of April 1, 2019, the province's carbon tax is \$40 per tonne. Quebec and Ontario opted for a cap and trade approach to pricing carbon. Quebec's scheme was introduced in 2013. Ontario followed suit four years later, introducing a cap and trade program in 2017 and then cancelling it in 2018. Alberta has a hybrid system. The province introduced a broad-based carbon levy at \$20 per tonne targeting fossil fuels used for transportation and heating in 2017. The levy was subsequently increased to \$30 in 2018. An

output-based pricing system (OBPS), introduced in 2018, regulates large emitters.⁴ Covered facilities receive emission credits based on an industry-specific benchmark and on their output. The facility must pay the \$30 per tonne carbon levy on emissions in excess of credits or cover the excess using surplus credits or eligible offsets. Finally, Manitoba introduced an emissions tax on coal and petroleum coke in 2011.

Prior to 2019, carbon prices varied across provinces and emission sources. The federal government was not directly involved in carbon pricing and there was no uniform, Canada-wide carbon price. This matters not only for efficient national climate policy and meeting our climate objectives in the least-cost manner, but it also inhibits interprovincial trade. The Senate of Canada went so far as to include variation in carbon tax prices, and climate policy generally, as one of Canada's "Top-Ten Weirdest Barriers to Trade" in its 2016 report *Tear Down These Walls: Dismantling Canada's Internal Trade Barriers*.

The carbon pricing landscape changed abruptly in 2019. With the implementation of the federal government's new carbon price backstop, the provinces and the federal government now jointly occupy the carbon pricing field. Under the federal plan, provinces are free to implement their own broad-based carbon pricing policies as long as these policies fully align with the federal government's benchmark requirements for the scope of emissions coverage and a minimum carbon price of \$20 per tonne in 2019/20, rising to \$50 per tonne in 2022/23. The federal backstop will apply in any province that requests it or in provinces that do not have fully compliant policies in place. The backstop, outlined in detail later, is similar in design to Alberta's hybrid system. It consists of a \$20 per tonne carbon levy rising to \$50 per tonne in 2022/23 and an OBPS for large emitters.

Effective April 2019, a minimum carbon price on a broad base of GHG emissions is now achieved in each province using either a provincial policy, a federal policy, or a combination of federal and provincial policies. The federal backstop applies in full in Ontario, New Brunswick, and Manitoba because these provinces have not adopted compliant policies. In Saskatchewan, the carbon levy component of the federal backstop fully applies while the OBPS component applies only to those facilities not covered by the province's own OBPS. Prince Edward Island is implementing a compliant fuel charge but has requested the federal OBPS. And following its recent provincial election campaign, Alberta is slated to see the fuel levy portion of the federal backstop imposed sometime in summer 2019. The federal backstop will not apply in the other provinces. British Columbia and Quebec have compliant policies already in place and the federal government has indicated that the new carbon pricing policies coming into effect in 2019 in Nova Scotia (cap and trade) and Newfoundland and Labrador (carbon levy) satisfy its benchmark requirements.

Table 1 summarizes carbon pricing policies before and after implementation of the federal backstop.⁵ Compared to the earlier province-only approach, Canada's new carbon pricing landscape is arguably more complex from an intergovernmental standpoint, involving a

⁴ The Carbon Competitiveness Incentive Regulation (CCIR) introduced in 2018 replaced the Specified Gas Emitters Regulation (SGER) system, in place since 2007.

⁵ Although the federal carbon pricing plan applies to both provinces and territories, equalization is a program aimed at the provinces. As a result, we focus on provinces only.

federal presence in some provinces but not others. As we shall see, this has important implications for equalization.

Table 1: Carbon Pricing in Canada

	Pre-2019 No Federal Backstop	2019 with the Federal Backstop	2019 Policy Type
Provincial Carbon Pricing Only	British Columbia	British Columbia	Carbon Tax
	Quebec	Quebec	Cap and Trade
	Ontario		
	Alberta	Nova Scotia	Cap and Trade
	Manitoba	Newfoundland and Labrador	Carbon tax + performance standards for large emitters
Federal Carbon Backstop Only		New Brunswick	Federal carbon levy + OBPS
		Ontario	Federal carbon levy + OBPS
		Manitoba	Federal carbon levy + OBPS ^a
Federal + Provincial Policies		Saskatchewan	Federal carbon levy + OBPS + provincial OBPS
		Prince Edward Island	Federal OBPS (at the province's request) + provincial carbon levy
		Alberta	Federal carbon levy + provincial OBPS ^b

Source: Authors' construction.

^a Manitoba is planning to phase out its current provincial emissions tax on coal and petroleum coke in favour of the federal OBPS.

^b Alberta's new government committed to replacing the current large-emitter system (known as the CCIR) with another program that is unlikely to be compliant with federal backstop requirements. Effective January 1, 2020, Alberta may therefore see the federal OBPS imposed.

Carbon Pricing Revenues and Equalization

Broad-based carbon pricing policies are a market-based approach to incentivizing cost-effective reductions in GHG emissions. But carbon pricing is also a potential source of government revenue. Prior to 2019, all carbon pricing revenues were provincial revenues

and would therefore be included in the determination of equalization entitlements. However, the federal government's entry into the carbon pricing field complicates matters.

Table 2 shows our estimates of carbon pricing revenues by province for 2017/18, 2019/20 and 2022/23. Actual carbon pricing revenues are displayed for 2017/18. For 2019/20 and 2022/23, we construct estimates using 2016 provincial emissions and applying provincial policies, and the federal backstop policy, where applicable.⁶ Federal and provincial governments' shares of carbon pricing revenues and the fraction of total carbon pricing revenue included for the purposes of calculating equalization are also shown.

We distinguish between “gross” and “net” revenues. The net measure includes revenues from carbon taxes, auctioned permits, and large emitter payments for emissions in excess of credits.⁷ Gross revenues include net revenues plus the revenues that would have been generated if all freely distributed permits and emissions credits had instead been subject to the carbon price. The distinction is important. Under the federal OBPS system, for example, covered emitters receive 70 to 90 percent of their emissions credits for free. In Quebec, about 23 percent of permits are freely distributed.⁸ Net revenues are considerably less than would be achieved if all permits and emissions credits were subject to the carbon price. The differential treatment of gross versus net revenues within the equalization formula is an important part of our quantitative analysis to come.

Table 2 highlights several important features of carbon pricing. First, carbon pricing revenues, measured on either a net or gross basis, are considerable. In 2017/18, the five provinces with carbon pricing policies in place raised a combined total of \$5.7 billion. Carbon pricing revenues are expected to increase significantly with the implementation of the federal backstop. An estimated \$8.4 billion in net revenue is expected for 2019/20, which would increase to nearly \$16.8 billion by 2022/23 assuming a \$50 per tonne minimum carbon price. This would make carbon revenues the fifth largest revenue component within the equalization program — more important than all payroll tax revenues combined, for example. And if the value of the output-based subsidies implicit in free credits and permits is included, carbon pricing revenues are much larger, at nearly \$26 billion by 2022/23.

Second, federal and provincial governments' carbon revenue shares depend on whether the federal backstop applies at the request of the province or is imposed by the federal government. For 2019, the federal backstop is imposed in Ontario, New Brunswick, Manitoba, and partially in Saskatchewan and Alberta, so the revenues generated belong exclusively to the federal government. In time, we anticipate Alberta to be fully within the federal backstop program. In contrast, Prince Edward Island has requested the OBPS component of the federal backstop. In this case, 100 percent of carbon revenues collected in the province are classified as provincial revenues even though the federal government collects the OBPS-related revenues.⁹

⁶ Given the uncertainties involved, the revenue estimates are illustrative.

⁷ Table 2 assumes that OBPS-covered emitters pay the applicable carbon price on all emissions in excess of credits, assumed to be 20 percent of covered emissions. In practice, facilities could use surplus credits from previous years or eligible offsets.

⁸ See Dobson, Winter and Boyd (2019).

⁹ Section 4(1) (c) (xiv) of Federal-Provincial Fiscal Arrangements Regulations, 2007, SOR/2007-303.

Table 2: Carbon Pricing Revenues (in millions) and Provincial-Federal Shares

	2017/18	2019/20		2022/23		
	No Federal Backstop	Gross Total	Net Total ^a	Gross Total	Net Total ^a	Prov/ Federal Share
BC	1,255	1,859	1,859	2,254	2,254	100/0
AB	1,292	5,442	2,287	9,070	3,812	0/100 ^d
SK		946	543	2,365	1,358	0/100 ^c
MN	1.2	234	211	585	527	0/100
ON	2,401	2,698	2,107	6,745	5,268	0/100
QC ^b	785	1,252	897	3,131	2,242	100/0
NB		275	151	689	376	0/100
NS ^b		268	268	671	671	100/0
PEI		25	24	62	60	100/0
NL		149	82	372	204	100/0
Total (% in EQ)	5,724 (100%)	13,149 --	8,429 (47%) ^d	25,944 --	16,771 (32%)	

Source: Authors' calculations based on provincial emissions 2016 from Environmental and Climate Change Canada (2018), emissions coverage estimates from Dobson, Winter and Boyd (2019), and provincial plans.

^a Net revenues include revenues from carbon taxes, auctioned permits, and large emitters payments for emissions in excess of credits (assumed to be 20 percent of covered emissions). ^b Price for auctioned permits assumed to be \$20 and \$50 per tonne in 2019/20 and 2022/23, respectively. Free permit share in Quebec is 22%, while it is not yet known for Nova Scotia. ^c To simplify, OBPS revenues in Saskatchewan are assumed to accrue to the federal government. ^d Given commitments made by the new Alberta government in 2019, we presume federal backstop policy will eventually be applied. The large-emitter system in Alberta, however, will be compliant through 2019, so we include roughly \$900 million from that system in equalization in 2019 but exclude it in 2022.

Finally, the implementation of the federal backstop affects the fraction of carbon tax revenues included for the purposes of calculating equalization entitlements. In 2017/18, all \$5.7 billion in carbon revenues were included in the calculations for equalization because only the provinces were pricing carbon. In 2019/20, however, only 47 percent (about \$4 billion) of all net revenue from existing and new provincial policies will be included in the calculations for equalization. With Alberta's recent decision to (partially) join the backstop provinces, nearly 70 percent of that carbon tax revenue — \$11.5 billion by 2022/23 — may be excluded from the equalization calculations. We return to this issue later.

The Basic Mechanics of Equalization

To fix ideas, we begin by exploring the basic functioning of Canada's equalization system through a stylized representation of it. Later, we conduct all relevant quantitative analysis on the full formula, including all its complexity.

Though typically portrayed as complex, Canada's equalization system is fairly straightforward. In short, the allocation of equalization entitlements depends on the allocation of tax bases. Provinces with larger (per capita) tax bases will, all else equal, be entitled to less equalization. Specifically, the total equalization entitlements E_i due within a given tax instrument is

$$(1) \quad E_i = (p_i - f_i) \cdot R,$$

where province i 's share of the national population is p_i , its share of the tax base f_i , and the total revenue within this tax base across all provinces R . For example, Quebec had 23 percent of Canada's population in 2016/17 but only 19 percent of the total personal income tax base. If Quebec had tax rates equal to the national average, it would raise less revenue from personal income taxes than the average province would. Equalization entitlements within this tax instrument are therefore 4 percent of the total provincial personal income tax revenue.

Multiple tax instruments complicates the picture somewhat, but not significantly. The above procedure is repeated across personal income taxes, corporate income taxes, consumption taxes, property and miscellaneous taxes, and (with adjustment) natural resources. Previous iterations of Canada's equalization program had a significantly more disaggregated classification of taxes. But this led to a well known incentive problem: if a province could shrink its tax base f_i then it would receive more equalization.¹⁰ To mitigate this, five broader categories were adopted in the 2007 reform.¹¹ As the base for carbon taxes (that is, greenhouse gas emissions) is qualitatively distinct from other bases in many important ways, it deserves special attention.

GHG Emissions as a Tax Base

Currently, provincial carbon tax revenues are treated as consumption tax revenues. This category includes many taxes — general sales taxes, tobacco taxes, gasoline taxes, vehicle licensing, alcohol, lottery tickets, gambling revenues, and so on. The tax base for these revenue sources is the sum total of consumer expenditures, housing investment, and intermediate input and investment spending by businesses, municipalities, universities, schools, hospitals, and non-profit organizations. Including carbon taxes within this category

¹⁰ See for example Smart (1998, 2007), and the Expert Panel on Equalization and Territorial Formula Financing (2006), Annex 4.

¹¹ The Expert Panel on Equalization and Territorial Formula Financing (2006) report argued that each of the 15 smaller non-resource tax bases be subsumed into one of the five larger tax bases. Specifically, a small tax base (for example, capital tax revenues) should be allocated to a larger tax base if the two are similarly distributed across provinces. For example, capital tax revenues were allocated to the business income tax base and payroll tax revenues were equalized in the personal income tax base.

matters because it implicitly equalizes the yield of carbon tax revenues across provinces according to the distribution of the consumption tax base.

But greenhouse gases are different. The carbon tax base is priceable greenhouse gas emissions which are distributed unevenly across provinces. Table 3 reports the distribution of the five tax bases used for equalization purposes, population, and GHG emissions by province for 2016. For some, there are no significant differences. In Newfoundland and Labrador, for example, 1.5 percent of Canada's consumption tax base, emissions, and population are located there. The choice of carbon tax treatment is therefore irrelevant. For Alberta, though, the story is very different. The province has just under 12 percent of the population, over 14 percent of the consumption tax base, but well over one-third of GHG emissions. Saskatchewan also has a disproportionately high level of emissions, relative to its population.

Table 3: Distribution of Tax Bases, GHG Emissions, and Population 2016/17 (%)

	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
Personal Income	13.6	15.6	3.0	2.9	40.5	19.0	1.5	2.1	0.3	1.4
Business Income	13.2	12.3	2.8	2.4	46.9	18.9	1.0	1.4	0.2	0.8
Consumption	14.3	14.4	3.3	3.3	38.7	19.9	1.9	2.3	0.3	1.5
Natural Resources	23.1	27.7	10.5	1.2	1.6	26.2	0.5	0.3	0.0	8.8
Property and Misc	16.0	13.7	3.2	3.1	40.6	18.5	1.3	2.0	0.3	1.4
Total ^a	14.7	15.0	3.4	3.0	39.0	19.4	1.5	2.0	0.3	1.7
Population Share	13.2	11.7	3.2	3.6	38.7	23.0	2.1	2.6	0.4	1.5
GHG Emissions	8.6	37.5	10.9	3.0	22.9	11.0	2.2	2.2	0.3	1.5

Source: Tombe (2018) and own calculations from Environment Climate Change Canada emissions data for 2016.

^a All resource revenues are included to calculate the revenue-weighted average total per capita fiscal capacity.

In most other provinces, however, the share of national emissions is below their share of the national population. Quebec has 23 percent of the population, but only 11 percent of the emissions. Ontario has 39 percent of the population, but 23 percent of emissions. And so on. The choice over tax bases will therefore have large implications for the allocation of equalization dollars. To see this, consider an expanded (though still stylized) representation of equalization entitlements to province i given by combining all revenue categories j according to

$$(2) \quad E_i = \sum_{j=1}^J (p_i - f_i^j) R^j.$$

If carbon tax revenue is allocated according to the consumption tax base, then it merely increases equalization payments to provinces according to the difference between their population shares and the total fiscal capacity shares. There will be no effect on non-

recipient provinces, and no (first-order) change in the distribution of equalization across recipient provinces. Though there will be a second-order effect for recipients to the extent that individual tax components have negative entitlements. Put another way, the distribution of overall fiscal capacity across provinces depends on the national revenue of each tax component R^j . And therefore, to a first approximation, including carbon tax revenue in the consumption tax base affects payments to each province by $(p_i - f_i^{cons})C$ where C is total provincial carbon tax revenue and f_i^{cons} is province i 's share of the national consumption tax base.

Presuming for a moment that the distribution of priceable emissions mirrors the distribution of total emissions across provinces, the contribution to equalization payments of provincial carbon taxation revenue is twofold. First, it adds to the revenue to be equalized R^j . Second, it is distributed across provinces differently than other tax bases. Specifically, if carbon tax revenue is apportioned according to its own base (i.e., GHG emissions), then total equalization payments become

$$(3) \quad E_i = \sum_{j=1}^J (p_i - f_i^j) \tilde{R}^j + (p_i - g_i)C,$$

where g_i is province i 's share of national emissions and \tilde{R}^j is total non-carbon revenue from other included revenue sources. Differencing the two allocations yields

$$(4) \quad E_i^{in\ Cons} - E_i^{as\ GHG} = (g_i - f_i^{cons})C.$$

Introducing a distinct tax base for carbon taxes therefore increases entitlements to provinces with a relatively small share of national GHG emissions. Thus, to a first approximation, current allocation rules provide smaller payment entitlements to Ontario, Quebec, British Columbia, Manitoba, and Nova Scotia. Alberta, Saskatchewan, and New Brunswick have larger entitlements, and all other provinces are left largely unchanged. Table 4 displays the distribution of provincial consumption tax bases, the distribution of GHG emissions, and the difference between them.

As indicated in equation (2), we can approximate the extent to which equalization entitlements increase with aggregate provincial carbon tax revenues. Summing the difference between population shares p_i and consumption tax base shares f_i^{cons} for equalization-receiving provinces, using data reported in Table 4, we find that for each \$100 in provincial carbon tax revenues included in the formula as consumption tax revenue equalization increases by \$4, with most of the increase going to Quebec.¹² If carbon tax revenue were distributed according to emissions, however, total equalization payments calculated using equation (3) would increase by nearly \$29 dollars per \$100 in aggregate provincial carbon tax revenues, now with Ontario as a significant recipient province. Importantly, Ontario's share of Canada's provincial consumption tax base is equal to its share of the population, while its share of emissions is significantly less. To be sure, whether Ontario receives equalization in this simple case or not depends on carbon taxes' share of

¹² This follows from the difference between population shares and fiscal capacity shares of 3.1 (23.0 - 19.9) for Quebec, 0.3 for Nova Scotia, 0.3 for Manitoba, 0.2 for New Brunswick, 0.1 for Prince Edward Island, and 0 for Ontario.

total provincial revenues to be equalized.¹³ For now, we presume Ontario receives equalization and turn to a complete model of actual equalization payments later in the paper.

Table 4: Distribution of Tax Bases, GHG Emissions, and Population 2016/17 (%)

	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
Consumption Taxes	14.3	14.4	3.3	3.3	38.7	19.9	1.9	2.3	0.3	1.5
GHG Emissions	8.6	37.5	10.9	3.0	22.9	11.0	2.2	2.2	0.3	1.5
Difference	5.7	-23.1	-7.6	0.3	15.8	8.9	-0.3	0.1	0.0	0.0
Receive Equalization	No	No	No	Yes	Yes*	Yes	Yes	Yes	Yes	No
Population Share	13.2	11.7	3.2	3.6	38.7	23.0	2.1	2.6	0.4	1.5

Source: Tombe (2018) and own calculations from Environment Climate Change Canada emissions data for 2016. * Whether Ontario will receive equalization in this simple illustration depends on the total size of carbon tax revenues in the “GHG Emissions” base case. We presume a sufficiently large level of carbon tax revenues for the illustrations described in the text.

This is merely the stylized equalization formula, however. Differences arise when certain ad-hoc aspects of Canada’s actual formula are taken into account. We presume here the same set of six provinces are receivers regardless of treatment, abstracting from interactions between the various tax bases. In particular, total equalization payments cannot increase in aggregate as there is a fixed pool of dollars available that sets a limit in any given year, which grows with a rolling average of national nominal GDP growth.¹⁴ Effectively, the total payments are restricted to a fixed share of Canada’s aggregate GDP. If total payments exceed this limit, as is typically but not always the case, then payments are reduced to each recipient by an equal per capita amount. This is straightforward to incorporate into the simple algebraic representation of the equalization formula above. In particular, among equalization-receiving provinces,

$$(5) \quad E_i^{in\ Cons} - E_i^{as\ GHG} = [(g_i - f_i^j) - (0.04 - 0.288)\tilde{p}_i]C,$$

where 0.04 and 0.288 reflect the \$4 and \$28.80 total increases in basic entitlements for each \$100 in carbon revenue described earlier, and \tilde{p}_i is the population share of province i among provinces receiving equalization.

In Table 5, we display the effect of the aggregate cap on payments under the two different tax bases. The values in the table reflect the change in total equalization payments per \$100 in provincial carbon tax revenue. Ontario and Quebec are both made worse off if carbon revenue is apportioned according to the consumption tax base while other provinces are

¹³ Specifically, if carbon tax revenues exceed 2.5% of total revenues to be equalized then, given the data in Table 3, Ontario will receive equalization payments in the stylized model of this section. This is due to Ontario’s share of total fiscal capacity falling from 39.0 to 38.6. Details available upon request.

¹⁴ In 2009, Ontario, Canada’s largest province, qualified for equalization. Concerns about the affordability of the program led the federal government to introduce the cap in its 2009 budget. The cap will play an important role as carbon tax revenues grow. We explore the implications of eliminating the cap later in the paper.

better off. Ontario gains if the GHG emissions base is used, since its consumption tax base and population shares are the same, yet the growth cap binds tighter.

Table 5: Consumption vs GHG Base for Carbon Tax Equalization, with Cap

	MB	ON	QC	NB	NS	PE
<i>Using consumption tax base, with fixed pool of EQ payments</i>						
\$100 of Carbon Revenue	0.30	0.00	3.10	0.20	0.30	0.10
Growth Cap Clawback	0.20	2.20	1.31	0.12	0.15	0.02
Net Change in Equalization	0.10	-2.20	1.79	0.08	0.15	0.08
<i>Using GHG emissions, with fixed pool of EQ payments</i>						
\$100 of Carbon Revenue	0.60	15.80	12.00	-0.10	0.40	0.10
Growth Cap Clawback	1.47	15.83	9.41	0.86	1.06	0.16
Net Change in Equalization	-0.87	-0.03	2.59	-0.96	-0.66	-0.06
Difference	0.97	-2.17	-0.80	1.04	0.82	0.14

Source: Own calculations for a stylized equalization program. See text for details.

The above were stylized representations of the equalization program, to better clarify the competing pressures it faces as provincial carbon tax revenues increase. In the next section, we simulate the full effect of Canada's actual equalization payments under different apportionment scenarios.

Quantitative Analysis of Carbon Tax Revenue in Canada's Equalization Program

In this section, we quantify equalization entitlements under current and alternative treatments of carbon tax revenues in the equalization formula. We first quantify baseline equalization payments — what payments would be if 2017/18 fiscal capacity estimates and actual 2017/18 carbon tax revenues were used to determine 2019/20 payments and given the current treatment of carbon tax revenues. By neglecting the three-year moving-average component of the actual formula, we can more clearly discern the effect of alternative treatment choices. In all the estimates that follow, British Columbia, Alberta, Saskatchewan, Ontario, and Newfoundland and Labrador do not receive equalization payments so they are excluded from the tables. These baseline estimates are shown in the first row of Table 6.

We then quantify equalization entitlements in five different scenarios. In scenario 1, we simulate the effect on equalization of rising carbon prices over time. Next, we quantify equalization entitlements when a distinct GHG emissions tax base is used to equalize provincial carbon tax revenues in the second scenario. Scenario 3 examines the impact on equalization of excluding carbon tax revenues in provinces where the federal backstop is

imposed. In the fourth scenario we consider the effects of equalizing gross, rather than net, carbon tax revenues. The final scenario considers the effects of removing the cap on equalization given rising carbon prices over time.

Scenario 1: Rising Carbon Prices

We simulate counterfactual equalization entitlements for progressively higher carbon tax rates, up to \$50 per tonne, showing the results in Table 6. Equalization payments are only modestly affected by increasing carbon prices under the current formula. At \$50 per tonne, holding all else equal, Quebec's entitlement would increase from \$12.976 billion under the baseline 2017/18 payment to \$12.986 billion if carbon revenues increased. All other provinces would see lower payments, except Prince Edward Island who experiences a negligible increase.

Table 6: Effect of Apportioning Carbon Tax Revenues According to GHGs (\$ Millions)

	MB	QC	NB	NS	PE
<i>Based on Actual 2017/18 Provincial Carbon Tax Revenues (\$5.7 billion)</i>					
Baseline	2,349	12,976	2,033	2,053	427
With GHG Base	2,304	13,113	1,980	2,017	423
Change	-45	137	-53	-36	-4
<i>If All Provinces Priced GHG Emissions at \$30 per Tonne, Included in Equalization</i>					
Current Formula	2,347	12,978	2,032	2,052	427
With GHG Base	2,283	13,176	1,955	2,000	422
Change	-64	198	-77	-52	-5
<i>If All Provinces Priced GHG Emissions at \$50 per Tonne, Included in Equalization</i>					
Current Formula	2,343	12,986	2,030	2,050	428
With GHG Base	2,236	13,330	1,900	1,962	420
Change	-107	344	-130	-90	-8

Source: Own calculations from Environment Climate Change Canada emissions data for 2016, and applying the current equalization formula to the underlying financial data provided by Finance Canada.

Scenario 2: Distinct GHG Tax Base to Equalize Carbon Tax Revenues

The story is very different, however, if carbon tax revenues are equalized according to their own tax base. The current formula does not capture the differences across provinces in their ability to raise revenue through carbon pricing — the distribution of consumption tax bases is too even. Emissions-intensive regions have an easier time raising revenues, on a per person basis, at national average carbon tax rates than the formula implies. Based on the shares reported in Table 4, the formula would imply that of the \$16.8 billion in potential carbon tax revenues by 2022/23, Alberta's yield would be \$570 per capita compared to Quebec's \$400 if the consumption tax base was used.¹⁵ But if emissions were the tax base, the formula would imply Alberta's yield would be \$1,484 per capita compared to Quebec's \$223 — which is arguably a more appropriate representation of each province's fiscal capacity from carbon taxes.

Reallocating carbon tax revenues according to the distribution of priceable emissions leads to substantially different equalization entitlements. We display these results in each panel of Table 6. Two results stand out. First, apportioning carbon tax revenue according to GHG emissions increases equalization payments to Quebec and decreases payments to all other recipient provinces. Quebec's gains are sizable. Its entitlements increase, in the case of \$50 per tonne carbon prices, by nearly \$350 million per year. This reflects its relatively low level of per capita emissions, and therefore its limited fiscal capacity in terms of raising revenues through carbon taxation. Second, an increasing carbon price has a large effect on the allocation of equalization across provinces. If all provinces priced at \$30 per tonne, relative to baseline 2017/18 levels, Quebec payments would increase from \$13.113 billion to \$13.176 billion. All other provinces would see reduced payments on account of the more tightly binding aggregate cap on total payments. Increasing carbon tax rates to \$50 per tonne from this level results in further increases to Quebec and decreases elsewhere.

Carbon Abatement Incentives

Incorporating a distinct carbon tax base into equalization does more than simply re-allocate payments across provinces. This is a mechanical, static effect. There is an additional dynamic effect introduced by the incentives that such an equalization formula would create for provincial governments. This is not dissimilar to existing incentive concerns since the equalization formula already creates an incentive for recipient provinces to potentially increase their tax rates, or otherwise shrink their tax bases, in order to increase their entitlements. This equalization "base-effect," as it is known, is a well studied area and one of the core challenges various equalization designs have attempted to overcome, and a motivating factor behind the O'Brien Panel's recommendation that the number of tax bases included in the formula shrink to five from the previous thirty-three. But if carbon emissions are the base for carbon taxes, this equalization base-effect may bring with it external benefits as it will, at the margin, incentivize additional carbon abatement actions by recipient provincial governments. These additional abatement incentives are large.

¹⁵ This is derived from \$16.8 billion times 0.144 (Alberta's share of the national consumption tax base) divided by Alberta's population. The other figures are derived similarly.

If Quebec lowers GHGs by 10 percent, then in the 2022/23 scenario reported above its equalization payments rise by 0.4 percent — equivalent to \$56 million per year. As 10 percent of its priceable emissions is roughly equivalent to 4 MT per year, this means equalization provides \$14 per tonne to abate carbon emissions.¹⁶ To be sure, lower emissions will lower provincial carbon revenues — in this case by roughly \$200 million — so the equalization program here replaces just over one-quarter of the lost revenue.

Smaller provinces see even larger incentives. For New Brunswick, lowering GHG emissions by 10 percent will increase their equalization payments by over \$30 million. This is a 1.1 MT reduction, which implies a nearly \$30 per tonne abatement incentive. With lost revenues of \$34 million, New Brunswick is almost fully buffered. The same is true for Nova Scotia. This province sees \$30 million increase in equalization, from a 10 percent (or 0.7 MT) emissions reduction — a \$43 per tonne abatement incentive. And their lost revenue is \$32 million, meaning they too are almost fully buffered. Smaller provinces are different from Quebec since their small size, and therefore small increased payment, means the growth cap will be clawing back less per capita than when a larger province — such as Quebec — increases its equalization entitlement through carbon abatement.

Though there are environmental gains, there may be a loss in aggregate efficiency in terms of national emissions abatement. Uniform carbon pricing will minimize the national total abatement costs for any given reduction in aggregate emissions, since marginal costs of abatement are equalized. If some provinces receive additional abatement incentives compared to others, they may over-abate relative to provinces that do not receive equalization.

Scenario 3: Excluding Revenues Generated by Federal Carbon Price Backstop

The carbon tax rate and the base used to equalize carbon tax revenues are not the only considerations when examining Canada's treatment of such revenues while determining equalization entitlements. This quantitative exercise explores the asymmetric treatment of carbon tax revenues under provincial policies compared to the federal backstop.

Prior to 2019, some provinces were actively pricing carbon, but there was no carbon pricing policy in place at the federal level. With the introduction of the federal backstop in 2019, provinces and the federal government co-occupy this field. The backstop applies in any province that has not adopted carbon pricing policies satisfying the federal government's benchmark. The benchmark requires a minimum carbon price equal to \$20 per tonne in 2019, rising to \$50 per tonne in 2022/23, and emissions coverage equal to the coverage of British Columbia's broad-based carbon tax. The federal backstop has two components. The carbon levy (or fuel charge) component applies to fossil fuels at the specified minimum price, equal to \$20 per tonne of CO₂e emissions for 2019. The carbon levy will increase by \$10 each year, until reaching \$50 per tonne in 2022/23. The backstop also includes an output-based pricing system (OBPS). This system is similar but not identical to Alberta's OBPS. Large industrial facilities covered under the system receive emissions credits based on their output and a sector-specific, emission intensity performance standard. A covered facility

¹⁶ MT refers to million tonnes.

must pay the carbon levy on excess emissions or cover the excess emissions using eligible offsets or surplus credits.¹⁷

The backstop came into effect in 2019 with the OBPS and fuel charge components starting on January 1 and April 1, respectively. Under the new *Greenhouse Gas Pollution Pricing Act 2018*, the federal government imposes the backstop in provinces that do not have their own sufficiently stringent carbon pricing policy in place. Provinces can also voluntarily opt-into the federal program. If a province either implements its own pricing policy or voluntarily adopts the federal backstop then this carbon tax revenue is included in the equalization formula. The former is explicitly included as a carbon tax, levy, or revenue from auctioning allowances in an emissions trading scheme (i.e., cap and trade, as in Quebec), while the latter is included as “shared revenue” (i.e. as in the case of backstop revenues generated in Prince Edward Island). But if a province does not *voluntarily* accept the federal backstop, as is the case for Ontario, Manitoba, New Brunswick, Saskatchewan, and most recently Alberta, then the carbon tax is imposed, collected, and mostly recycled back to households in that province by the federal government. These carbon revenues are excluded from the equalization formula when determining provincial fiscal capacity. This is a significant omission.

Table 7: Allocation of Federal Backstop Revenues in Non-Compliant Provinces, 2019/20 (millions)

	SK	MB	ON	NB
Carbon Levy Proceeds				
- Climate Action Incentive Payments to Individuals	378 (70%)	183 (87%)	1,754 (83%)	106 (70%)
- Support for SMEs and other selected groups	64 (12%)	22 (10%)	205 (10%)	13 (9%)
	101 (18%)	5.9 (3%)	148 (7%)	31 (21%)
OBPS Proceeds, Net				
Total, Net	\$543	\$211	\$2,107	\$151

Source: Based on authors' calculations, revenue estimates from Table 1, and the shares of carbon levy proceeds going to selected groups, as specified by the federal government. See https://www.fin.gc.ca/n18/data/18-097_2-eng.asp.

Table 7 shows the size and allocation of carbon backstop proceeds and rebates for 2019/20 and their distribution for backstop provinces excluding Alberta.¹⁸ The federal government will

¹⁷ The federal system covers facilities with annual emissions of 50 kt or more while the Alberta system covers facilities with emissions of 100 kt or greater per year.

¹⁸ Federal government estimates for carbon levy proceeds are available as well as the dollar amounts going to particular groups, such as Climate Action Incentive Payments, small- and medium-sized businesses, etc. for all backstop provinces except Alberta. Revenue estimates for the OBPS component are not available from the federal government. For consistency, in Table 7, we apply the

return most of the revenues from the carbon levy component of the backstop to provincial residents in the form of a Climate Action Incentive payment. The rest of the carbon levy proceeds will be used to support selected groups including small- and medium-sized businesses, remote communities, hospitals, and Indigenous communities. The federal government also intends to return all the proceeds from the OBPS system to the province of origin, but no additional details are available at this time.

In a very important sense, this backstop revenue is as much a part of a province's fiscal capacity as any other revenue source. A province can at any time choose to repurpose the revenue towards any other initiative, by either levying their own carbon price in lieu of the federal price or by acceding to the federal backstop program and taking charge of the revenues. And if a province were to accept the backstop but keep the rebate regime in place, then nothing of any real economic or fiscal consequence would change except that this revenue would now be included in equalization.

What happens to equalization if these backstop revenues are returned to the provincial governments, treated as provincial revenues, and therefore included for the purposes of calculating equalization? This would have been the outcome, for example, if the five non-compliant provinces (including Alberta) had decided to request (rather than oppose) the federal backstop in their province. For 2019/20, this would be equivalent to an additional \$5.3 billion in provincial revenues that would need to be equalized (even more if the value of free emissions credits under the OBSP component of the backstop are taken into account).

The differential treatment of provincial carbon tax revenues and federal backstop revenues affects the current equalization entitlements principally through R in equation (1). That is, if R^{fed} is total federal backstop revenue, then basic equalization entitlements are roughly decreased for recipient provinces by¹⁹

$$(6) \quad \Delta E_i = -(p_i - f_i) \cdot R^{fed}.$$

Table 8 reports the estimated effect of excluding federal backstop revenues on 2019/20 equalization entitlements. A number of interesting results are revealed.

Excluding backstop revenues tends to lower equalization payments to Quebec, while increasing them to other provinces. If, on the other hand, we use GHG emissions as the carbon tax base then Quebec receives much more. At \$30 per tonne, excluding backstop provinces lowers Quebec payments by \$5 million. Manitoba, meanwhile, sees its payments rise by \$3 million. At \$50 per tonne, the effects are larger. Excluding revenues to backstop provinces lowers equalization payments to Quebec by \$11 million relative to a situation where all carbon tax revenues are included. Broadly speaking, excluding backstop carbon

federal government's shares for allocating the carbon levy proceeds to our estimate of carbon levy revenues in each non-compliant province. Our revenue estimates are slightly bigger than those of the federal government.

¹⁹ The actual change in entitlements will differ from this simple expression, as entitlements from the consumption tax portion of the equalization formula may differ in sign from entitlements in other portions. There are also aggregate and province-specific caps applied at different stages in the calculation.

tax revenues modestly lowers Quebec entitlements, while treating carbon tax revenue according to GHG emissions as its tax base benefits Quebec.

Scenario 4: Exclusion of Output Subsidies in OBPS

An important consideration of federal carbon pricing design concerns the use of large-emitter revenues. Currently, a large majority of revenues resulting from a price on carbon emissions within the OBPS regime will be recycled in the form of an output subsidy. No direct cash subsidy is actually provided, however. Rather, each sector is provided with a benchmark level of emissions intensity (tonnes per unit output) and each facility within that sector pays a carbon tax on emissions that exceed a threshold determined by their output times the sectoral benchmark. If their emissions fall below this threshold, they receive credits that can be sold to others. In effect, this is the carbon tax-equivalent of distributing free permits within a cap and trade system, where the free permits are allocated across producers in a manner proportional to their production volumes. It is equivalent to pricing carbon and subsidizing output (Fischer and Fox, 2007).

Table 8: Effect of Carbon Tax Revenues on Equalization (\$ Millions)

	MB	QC	NB	NS	PE
Based on 2017/18 Data	2,349	12,976	2,033	2,053	427
<i>Carbon Price of \$30 per Tonne</i>					
All Provinces Included	2,347	12,978	2,032	2,052	427
Excluding Backstop Provinces	2,350	12,973	2,033	2,053	427
Excluding Backstop Provinces, Use GHG as a Base	2,327	13,045	2,006	2,035	425
<i>Carbon Price of \$50 per Tonne</i>					
All Provinces Included	2,343	12,986	2,030	2,052	428
Excluding Backstop Provinces	2,349	12,975	2,033	2,053	427
Excluding Backstop Provinces, Use GHG as a Base	2,310	13,098	1,986	2,021	424

Source: Own calculations from Environment Canada emissions data for 2016, and adjusting the current equalization formula to the underlying financial data provided by Finance Canada.

Current policy subtracts the value of free permits and OBA allocations from gross potential carbon tax revenue for the purposes of equalization. But, it need not. Providing

counteracting policies to help mitigate competitiveness and leakage concerns is a valid public policy objective, but it is a choice. Other measures exist, and some provinces opt for those. British Columbia, for example, imposes a broad-based carbon tax and does not have the equivalent of OBAs or free permit allocations. The full gross revenues from British Columbia's carbon tax are therefore included in the determination of equalization entitlements. Conceptually, this may be correct. Provinces have fiscal capacity that enables them discretion to make individual policy choices, from lowering taxes to providing public services to offering business subsidies. Equalization is generally agnostic as to how provinces deploy their fiscal capacity, so including gross carbon revenues is defensible. As carbon prices increase, the gap between gross and net revenues grows larger and potentially exceeds \$9 billion by 2022/23. The distribution of large-emitter revenues is also highly uneven. This therefore matters for equalization program design.

If total gross revenues from carbon pricing were included in equalization, three interacting effects are worth noting. First, total pre-cap equalization payments would increase as total provincial revenues to be equalized would increase. Second, provinces with a relatively high share of large-emitter emissions in total priceable emissions would see an increase in their fiscal capacity relative to others. New Brunswick is a good example of this among recipient provinces; we estimate their gross revenues by 2022/23 are 83 percent larger than net revenues. Quebec, meanwhile, has gross revenues only 40 percent higher than net. Third, and finally, the aggregate cap on payments would bind more tightly, leading to larger per-capita clawbacks from equalization-receiving provinces. We report the total effect in Table 9.

Table 9: Effect of Net vs Gross Carbon Revenues on Equalization (\$ Millions)

	MB	QC	NB	NS	PE
<i>Carbon Price of \$50 per Tonne, Net Revenues Only</i>					
All Provinces Included	2,343	12,986	2,030	2,052	428
All Provinces, GHG Base	2,236	13,330	1,890	1,962	420
Excluding Backstop Provinces	2,349	12,975	2,033	2,053	427
Excluding Backstops, GHG Base	2,310	13,098	1,986	2,021	424
<i>Carbon Price of \$50 per Tonne, Gross Revenues Included</i>					
All Provinces Included	2,338	12,996	2,027	2,048	429
All Provinces, GHG Base	2,260	13,321	1,858	1,972	426
Excluding Backstop Provinces	2,348	12,977	2,033	2,053	427
Excluding Backstops, GHG Base	2,298	13,132	1,973	2,012	423

Source: Own calculations from Environment Climate Change Canada emissions data for 2016, and adjusting the current equalization formula to the underlying financial data provided by Finance Canada.

Overall, we find that the effect of including gross revenue versus net revenue depends on the tax base used to equalize revenues and on whether backstop provinces are included or not. If all provinces are included, but carbon revenues count in the consumption tax base, then equalization payments to Quebec and (modestly) to Prince Edward Island are higher if gross revenues are used. This is due to their relatively small consumption tax bases per capita, whereas other provinces see reduced payments on account of the more tightly binding aggregate cap on payments. If carbon tax revenues are equalized according to GHG emissions as their base, however, the result depends on each province's gross-to-net carbon revenue ratios. Manitoba, Prince Edward Island, and Nova Scotia (as seen in Table 2) have the lowest gross-to-net revenue ratios, and therefore see larger payments. Excluding backstop provinces reverses this, as provinces covered by the federal program disproportionately have higher shares of emissions covered by the large-emitter regime and therefore have high gross-to-net revenue ratios.

Scenario 5: Removing the cap on aggregate equalization payments

Since 2009, equalization payments are limited by a cap indexed to nominal GDP growth. Given the uneven distribution of GHG emissions across provinces, the cap is increasingly binding as carbon prices increase. In fact, in a stylized representation of equalization without a fiscal capacity cap or aggregate cap on payments, total equalization payments increase proportionally with the Schutz Index of fiscal capacity inequality. Thus, using more unevenly distributed bases to equalize provincial revenues will therefore increase payments. We explore the implications of rising carbon tax revenues without the cap here.

Table 10: Effect of Carbon Tax Revenues on Equalization, No Cap (\$ Millions)

	MB	QC	NB	NS	PE	Total
Based on 2017/18 Data	2,349	12,976	2,033	2,053	427	19,837

Carbon Price of \$30 per Tonne, No Cap on Aggregate Payments

All Provinces, Current Formula	2,409	13,362	2,067	2,096	434	20,368
All Provinces, GHG Base	2,431	14,097	2,041	2,105	438	21,113

Carbon Price of \$50 per Tonne, No Cap on Aggregate Payments

All Provinces, Current Formula	2,442	13,601	2,086	2,121	439	20,689
All Provinces, GHG Base	2,486	14,880	2,033	2,139	448	21,986

Source: Own calculations from Environment Climate Change Canada emissions data for 2016, and adjusting the current equalization formula to the underlying financial data provided by Finance Canada.

Removing the cap on aggregate payments increases the size of Canada's equalization program significantly. We summarize a set of results in Table 10 to illustrate the effect of various carbon tax rates and bases. At \$30 per tonne, including revenues from all provinces, we find equalization increases to nearly \$20.4 billion compared to \$19.8 billion in the baseline case based on 2017/18 data. At \$50 per tonne, the program increases to nearly \$20.7 billion. As this exercise holds all other tax revenues and bases fixed, the increase of over \$850 million is entirely due to rising carbon tax revenues. If such revenues are equalized according to GHG emissions, payments grow even more. At \$50 per tonne, total payments increase to nearly \$22 billion — an increase of over \$2.1 billion, with over 90% of the increase accruing to Quebec on account of its relatively low GHG share. In no scenario explored here does Ontario become a recipient province.

The objective of equalization is to provide revenues to provinces with below-average fiscal capacity. To fulfill its mandate, the cap may need to be increased or eliminated entirely in future years as the importance of carbon tax revenues increase. If this change is made, the formula would then determine not only the allocation of equalization dollars but also the aggregate size of the program.

Conclusion

As carbon tax rates increase over time, and the corresponding revenues available to provincial governments to use for tax reductions or program spending increase, Canada's equalization program will need to adapt. Carbon emissions are nearly as unevenly distributed across provinces as resource revenues are. The latter has been a continual source of tension and a stubbornly difficult aspect of equalization program design. Carbon tax revenues will require equally close attention in the coming years.

In this paper, we take a cautious first step towards mapping out the potentially important interactions between carbon tax revenues and Canada's equalization program. In particular, we identify the consequences of introducing a distinct carbon tax base into the equalization program. Given equalization payments are meant to ensure comparable taxes yield comparable revenues across provinces, the current approach that implicitly equalizes carbon tax revenues according to the consumption tax base is not ideal. We find a distinct carbon tax base benefits provinces with relatively low per capita emissions (primarily Quebec). We also find a potentially large incentive effect that may encourage further provincial actions to lower emissions. Finally, the current federal backstop program — which will soon account for the overwhelming majority of carbon tax revenues in Canada — is excluded from the calculation of equalization, despite directly affecting provincial net fiscal benefits available to residents. We find excluding such revenues currently shrinks payments to Quebec and increases them elsewhere. In general, provinces with few large-emitters and low emissions per capita benefit from using emissions as the carbon tax base and from including federal gross backstop revenue from all provinces. In most, but not all, reforms, Quebec entitlements increase.

There remain other potentially important design details to explore, including appropriate treatment of output-based allocations within the federal OBPS regime or free-permit

allocations within provincial cap and trade programs. We leave these questions to future research. But as equalization and carbon pricing are increasingly focal stress points between federal and provincial governments in Canada, ensuring their respective designs do not interact in potentially adverse ways will be increasingly important. The tax base and revenue inclusion decisions explored in this paper are a natural first step.

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