

## Appendix: Business Tax Burdens in Canada's Major Cities: The 2019 Report Card

By Adam Found and Peter Tomlinson

### METR Definitions: Gross-Base vs. Net-Base

There are two alternative ways to define the METR: gross-base and net-base. Respectively, these definitions correspond to METRs expressed as percentages of gross-of-tax and net-of-tax rates of return on investment. Under the gross-base definition, a change in the burden of a subject business tax affects the METR in two opposing ways. The first of these, the direct effect, is a change in the subject tax's contribution to the METR. The second, of less magnitude, is an opposing change in the contribution of other taxes to the METR, which is the indirect effect. Since tax changes cannot affect the net-of-tax rate of return, the indirect effect does not arise under the net-base definition of the METR. We now provide a proof of these results, with the corporate income tax designated as the subject tax, and further discuss fundamental differences between the two definitions of the METR.

Let  $g$  and  $n$  be the gross-of-tax and net-of-tax rates of return on investment, respectively, meaning  $g > n$  if and only if there is business taxation; otherwise,  $g = n$ . Under the gross-base definition of the METR, which we started using in 2018, the METR is given by  $m = \frac{g-n}{g}$ . This contrasts with the net-base definition, under which the METR is  $m = \frac{g-n}{n}$ . We shall first work with the former definition.

In the presence of a corporate income tax, retail sales tax and business property tax, the gross-of-tax rate of return can be succinctly expressed as  $g = c(1+r) + p$  where  $c$  is the component related to the corporate income tax (i.e.  $c$  combines the effects of the corporate income tax rate and deductibility of debt interest and capital cost allowance from corporate income),  $r$  is the effective retail sales tax rate and  $p$  is the effective business property tax rate.<sup>1</sup> When only the corporate income tax is considered (i.e. when we set  $r = p = 0$ ), the METR is  $m_c = \frac{c-n}{c}$ , which is therefore the corporate income tax's contribution to the METR. Whereas when all taxes are considered, the METR is  $m_{c+r+p} = \frac{c(1+r)+p-n}{c(1+r)+p}$ .<sup>2</sup> Subtraction of the former from the latter yields the contribution of the other taxes to the METR:

$$\begin{aligned} m_{r+p} &= m_{c+r+p} - m_c \\ &= \frac{c(1+r) + p - n}{c(1+r) + p} - \frac{c - n}{c} \\ &= \frac{c[c(1+r) + p - n] - (c - n)[c(1+r) + p]}{c[c(1+r) + p]} \\ &= \frac{c^2(1+r) + cp - cn - c^2(1+r) - cp + cn(1+r) + np}{c[c(1+r) + p]} \\ &= \frac{n(cr + p)}{c[c(1+r) + p]} \end{aligned}$$

1 This simplified expression is equivalent to that for  $g$  derived in Found (2014).

2 Of course, this expression is valid only if there is corporate income taxation (i.e.  $c > 0$ ). A different expression would arise if there were no corporate income taxation.

This lets us rewrite the total METR as the sum of the forgoing contributions:

$$m_{c+r+p} = \frac{c-n}{c} + \frac{n(cr+p)}{c[c(1+r)+p]}$$

Now consider a decrease in  $c$ , reflecting a decrease in the corporate income tax rate or an acceleration of capital cost allowance deductions. The direct effect of this change emanates from the first term of the sum,  $\frac{c-n}{c}$ . Since the proportionate change in the numerator is greater than that of the denominator in response to a change in  $c$ , this term decreases with a decrease in  $c$ . The indirect effect likewise emanates from the second term,  $\frac{n(cr+p)}{c[c(1+r)+p]}$ . Since the proportionate change in the numerator is smaller than that of the denominator in response to a change in  $c$ , this term increases with a decrease in  $c$ . Although not shown here, it can be verified that the indirect effect only partially offsets the direct effect, so that a decrease in  $c$  always reduces the METR on net.

As stated in the main text, and as illustrated by a comparison of Figures 1 and 2 therein, the fact that the indirect effect opposes the direct effect is one reason why, under the gross-base definition, Canada's Accelerated Investment Incentive (AII) provides for such a modest improvement in overall business tax competitiveness. If the METR were instead constructed according to the net-base definition, however, the total METR in our example would be:

$$m_{c+r+p} = \frac{g-n}{n} = \frac{c(1+r)+p-n}{n}$$

Under this definition, only the numerator of the METR is affected by changes in business taxation. Accordingly, such changes have only a direct effect since the indirect effect can only arise if business tax parameters are present in the denominator. This means initiatives such as the AII would show a much greater effect under the net-base definition of the METR. While confining METR changes to direct effects is reason to prefer the net-base over the gross-base definition of the METR, our intention is to maintain our recent adoption of the latter definition in order to keep our results comparable to those of governments and the School of Public Policy at the University of Calgary.

As discussed in Found (2014), another reason to prefer the net-base definition of the METR is that it aligns with prevailing general intuition of effective taxation. Consider, for instance, the Harmonized Sales Tax (HST) in Ontario, which is levied at a combined federal-provincial rate of 13 percent. Suppose we are interested in determining the HST's METR on consumer goods and services that are fully taxable by HST. For such goods and services, the gross-of-tax price paid by consumers,  $g$ , is the net-of-tax price,  $n$ , scaled up by the tax rate:  $g = 1.13n$ . Under the net-base definition, the HST's METR on consumer goods and services is:

$$\begin{aligned} m &= \frac{g-n}{n} \\ &= \frac{1.13n-n}{n} \\ &= 1.13 - 1 \\ &= 0.13 \end{aligned}$$

Therefore, the marginal effective HST rate is 13 percent, which accords with general understanding of the tax. While the forgoing derivation might seem like a long-winded way to demonstrate something that consumers would readily find obvious in an intuitive sense, it is worthwhile to ensure the rigour of our results.

Under the gross-base definition of the METR, the HST's METR on consumer goods and services would instead be:

$$\begin{aligned} m &= \frac{g - n}{g} \\ &= \frac{1.13n - n}{1.13n} \\ &= \frac{0.13}{1.13} \\ &= 0.115 \end{aligned}$$

This suggests that the marginal effective HST rate is 11.5 percent instead of the intuitive 13 percent derived under the net-base definition. To our knowledge, no government, consumer or economist has claimed that Ontario's effective HST rate is 11.5 percent instead of 13 percent, and for good reason. Such a claim would be inconsistent with the prevailing general intuition of effective taxation, namely that the effective rate of taxation is equal to tax paid as a share of pre-tax expenditure or value. Only the net-base definition of the METR is consistent with such intuition.

## Modelling Parameters and Inputs

Through Tables A1-A25, and generally based on the modelling framework developed in Found (2014), this section of the appendix provides a summary of key inputs used to generate our 2019 METR estimates for the largest municipality in each province.

**Table A1: Maximum Personal Income Tax and Enhanced Dividend Tax Credit Rates by Province**

Parameter	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	Canada
	<i>(percent)</i>										
Maximum PIT Rate on Interest – Federal	33.00	33.00	33.00	33.00	33.00	27.56	33.00	33.00	33.00	33.00	32.16
Maximum PIT Rate on Interest – Provincial	16.80	15.00	14.50	17.40	20.53	25.75	20.30	21.00	18.37	18.30	18.96
Maximum PIT Rate on Interest – Total	49.80	48.00	47.50	50.40	53.53	53.31	53.30	54.00	51.37	51.30	51.12
Enhanced PIT Credit Rate on Dividends – Federal	20.73	20.73	20.73	20.73	20.73	20.73	20.73	20.73	20.73	20.73	20.73
Enhanced PIT Credit Rate on Dividends – Provincial	16.60	13.80	15.18	11.04	13.80	16.26	19.32	12.21	14.49	7.45	14.42
Enhanced PIT Credit Rate on Dividends – Total	37.33	34.53	35.91	31.77	34.53	36.99	40.05	32.94	35.22	28.18	35.15
Net-of-Credit Enhanced PIT Rate on Dividends – Total	31.21	31.43	30.44	34.39	35.05	33.59	31.95	36.21	33.28	36.84	33.15

Sources: Canada Revenue Agency; provincial websites; and authors' calculations.

Table A2: Various Corporate Investment Shares by Province

Parameter	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	Canada
	<i>(percent)</i>										
Share of National Investment	12.78	24.71	6.00	3.72	31.08	15.46	1.62	1.84	0.24	2.55	100.00
Manufacturing Share of Investment – Buildings	2.24	2.01	2.94	5.14	2.92	3.94	2.19	2.41	2.77	0.48	2.77
Manufacturing Share of Investment – Machinery	9.53	10.77	8.60	14.79	17.27	17.88	30.03	8.30	12.86	7.70	13.94
Manufacturing Share of Investment – Total	4.53	3.89	4.44	7.82	9.22	8.71	13.34	5.47	7.07	1.90	6.69
Atlantic ITC-Eligible Share of Investment – Buildings	0.00	0.00	0.00	0.00	0.00	0.00	5.18	5.15	14.77	1.72	0.26
Atlantic ITC-Eligible Share of Investment – Machinery	0.00	0.00	0.00	0.00	0.00	0.00	34.30	12.23	25.73	9.98	1.10

Sources: Statistics Canada; Canada Revenue Agency; and authors' calculations.

Table A3: Parameters Fixed Across Capital Asset Classes

Parameter	Value <i>(percent)</i>
Nominal Interest Rate on Debt	5.00
Proportion of Investment Financed with Debt	35.35
Proportion of Equity Held as Retained Earnings	37.58
Inflation Rate	2.00

Sources: McKenzie (2016); Statistics Canada; and authors' calculations.

Table A4: Parameters Varying by Capital Asset Class

Parameter	Land	Buildings	Machinery	Inventories
	<i>(percent)</i>			
Share of National Corporate Investment	11.53	38.44	19.00	31.03
Expected Real Economic Depreciation Rate	0.00	3.80	18.70	0.00
Weighted Average CCA Rate – Pre-AII	0.00	6.11	24.18	0.00
Weighted Average CCA Rate – Post-AII	0.00	6.65	31.15	0.00

## Note:

The buildings class corresponds with Class 1 which has CCA rates of 10 percent for manufacturing buildings and 6 percent for other buildings. The Accelerated Investment Incentive (AII) triples these rates for the first year of asset life, which is equivalent to increasing the rates by about 9 percent for all years of asset life. The machinery class corresponds with Class 53 (manufacturing) and Class 8 (general) which have CCA rates of 50 percent and 20 percent, respectively. The AII increases the former rate to 100 percent but leaves the latter rate unaffected. CCA does not apply to non-depreciable assets such as land and inventories.

Sources: Statistics Canada; McKenzie et al (1998); Canada Revenue Agency; and authors' calculations.

Table A5: British Columbia BPT Rates

Property Class	Share of Assessment Base	Statutory BPT Rate	Industrial Property Tax Credit	Effective BPT Rate
<i>(percent)</i>				
Utilities	0.37	1.320	0.000	1.320
Major Industry	0.31	0.370	60.000	0.148
Light Industry	3.05	0.370	0.000	0.370
Commercial	96.27	0.370	0.000	0.370
All Business	100.00	0.373	0.189	0.373

Source: Authors' calculations from government websites.

Table A6: Vancouver BPT Rates

Property Class	Share of Assessment Base	Statutory BPT Rate				Effective BPT Rate
		City of Vancouver	Metro Vancouver	Other Authorities	Total	
	<i>(percent)</i>					
Utilities	0.37	2.423	0.015	0.279	2.717	2.717
Major Industry	0.31	3.040	0.014	0.205	3.258	3.258
Light Industry	3.05	0.427	0.014	0.113	0.555	0.555
Commercial	96.27	0.427	0.010	0.095	0.532	0.532
All Business	100.00	0.443	0.010	0.096	0.549	0.549

Source: Authors' calculations from government websites.

Table A7: Alberta BPT Rates in Calgary

Property Class	Statutory BPT Rate	Effective BPT Rate
	<i>(percent)</i>	
Non-Residential	0.425	0.425

Source: Authors' calculations from government websites.

Table A8: Calgary BPT Rates

Property Class	Statutory BPT Rate	Effective BPT Rate
	<i>(percent)</i>	
Non-Residential	1.778	1.778

Source: Authors' calculations from government websites.

Table A9: Saskatchewan BPT Rates

Property Class	Statutory BPT Rate	Average Appreciation Rate	Appreciation Period	Assessment Lag (Years)	Effective BPT Rate
	<i>Percent (except Appreciation Period and Assessment Lag)</i>				
Commercial / Industrial	0.627	7.99	2011-2015	4	0.461

Source: Authors' calculations from government websites.

Table A10: Saskatoon BPT Rates

Property Class	Tax Rate Multiplier	Statutory Uniform Tax Rate	Average Appreciation Rate	Appreciation Period	Assessment Lag (Years)	Effective BPT Rate
	<i>Percent (except Tax Rate Multiplier, Appreciation Period and Assessment Lag)</i>					
Commercial / Industrial	1.1957	0.751	7.99	2011-2015	4	0.660

Source: Authors' calculations from government websites.

Table A11: Manitoba BPT Rates

Property Class	Share of Assessment Base	Assessment Discount Rate	Statutory BPT Rate	Average Appreciation Rate	Appreciation Period	Assessment Lag (Years)	Effective BPT Rate
	<i>Percent (except Appreciation Period and Assessment Lag)</i>						
Pipeline	0.18	50.00	0.982	2.47	2014-2016	2.75	0.459
Railway	2.15	75.00	0.982	9.87	2014-2016	2.75	0.189
Other Business	97.67	35.00	0.982	5.82	2014-2016	2.75	0.546
All Business	100.00	35.89	0.982	5.90	2014-2016	2.75	0.539

Source: Authors' calculations from government websites.



**Table A12: Winnipeg Local School Division  
BPT Rates**

Local School Division	Share of Portioned Assessment Base	Statutory BPT Rate
	<i>Percent</i>	
Winnipeg	42.48	1.513
St. James-Assiniboia	14.19	1.343
Pembina Trails	13.91	1.232
Seven Oaks	3.43	1.673
Seine River	1.64	1.461
Interlake	2.48	1.359
Louis Riel	12.39	1.368
River East Transcona	9.47	1.344
All School Divisions	100.00	1.417

Source: Authors' calculations from government websites.

Table A13: Winnipeg BPT Rates

Property Class	Share of Assessment Base	Assessment Discount Rate	Statutory BPT Rate			Average Appreciation Rate	Appreciation Period	Assessment Lag (Years)	Effective BPT Rate	
			City of Winnipeg		Local School Division Average					Total
			General	BOT-Equivalent						
<i>Percent (except Appreciation Period and Assessment Lag)</i>										
Pipeline	0.18	50.00	1.329	0.000	1.417	2.746	2.47	2014-2016	2.75	1.284
Railway	2.15	75.00	1.329	0.000	1.417	2.746	9.87	2014-2016	2.75	0.530
Other Business	97.67	35.00	1.329	0.517	1.417	3.262	5.82	2014-2016	2.75	1.815
All Business	100.00	35.89	1.329	0.505	1.417	3.250	5.90	2014-2016	2.75	1.786

Source: Authors' calculations from government websites.

Table A14: Ontario BPT Rates Levied on New Construction in Toronto

Property Class	Statutory BPT Rate	Average Appreciation Rate	Appreciation Period	Assessment Lag (Years)	Effective BPT Rate
	<i>Percent (except Appreciation Period and Assessment Lag)</i>				
All Business	1.030	7.30	2012-2016	4	0.777

Source: Authors' calculations from government websites.

Table A15: Toronto BPT Rates

Property Class	Share of Assessment Base	Statutory BPT Rate			Average Appreciation Rate	Appreciation Period	Assessment Lag (Years)	Effective BPT Rate
		General	Building Fund	Total				
<i>Percent (except Appreciation Period and Assessment Lag)</i>								
General Commercial	47.70	1.244	0.003	1.247	7.51	2012-2016	4	0.933
Residual Commercial – Band 1	17.03	1.105	0.003	1.107	7.51	2012-2016	4	0.829
Residual Commercial – Band 2	28.69	1.244	0.003	1.247	7.51	2012-2016	4	0.933
Industrial	6.29	1.216	0.002	1.218	4.40	2012-2016	4	1.025
Pipeline	0.29	0.869	0.004	0.873	1.99	2012-2016	4	0.807
All Business	100.00	1.217	0.003	1.220	7.30	2012-2016	4	0.921

Source: Authors' calculations from government websites.

Table A16: Montreal BPT Rates

Property Class	Statutory BPT Rate						Average Appreciation Rate	Appreciation Period	Assessment Lag (Years)	Effective BPT Rate	
	City of Montreal			Borough Average	ARTM <sup>1</sup>	CGTSIM <sup>2</sup>					Total
	General	Water	Roads								
Non-Residential	3.109	0.367	0.024	0.092	0.012	0.150	3.754	2.71	2012-2015	3.5	3.418

*Percent (except Appreciation Period and Assessment Lag)*

<sup>1</sup>ARTM stands for Regional Metropolitan Transport Authority, once translated into English.

<sup>2</sup>CGTSIM stands for Management Committee of the School Tax on the Island of Montreal, once translated into English.

Source: Authors' calculations from government websites.

Table A17: New Brunswick BPT Rates

Property Class	Statutory BPT Rate			Effective BPT Rate
	General	Service New Brunswick	Total	
	<i>(percent)</i>			
Non-Residential	2.186	0.019	2.205	2.205

Source: Authors' calculations from government websites.

Table A18: Moncton BPT Rates

Property Class	Statutory BPT Rate	Effective BPT Rate
	<i>(percent)</i>	
Non-Residential	2.475	2.475

Source: Authors' calculations from government websites.

Table A19: Nova Scotia BPT Rates

Property Class	Statutory BPT Rate					Effective BPT Rate
	Education	Provincial Valuation Services Corporation	Correctional Services	Housing Authorities	Total	
	<i>(percent)</i>					
Commercial	0.314	0.009	0.008	0.007	0.338	0.338

Source: Authors' calculations from government websites.

Table A20: Halifax Regional Municipality BPT Rates

Property Class	Statutory BPT Rate				Effective BPT Rate
	Urban General	Fire Hydrants	Supplementary Education	Total	
	<i>(percent)</i>				
Commercial	2.988	0.037	0.069	3.094	3.094

Source: Authors' calculations from government websites.

Table A21: Prince Edward Island BPT Rates

Property Class	Statutory BPT Rate	Effective BPT Rate
	<i>(percent)</i>	
Commercial	1.500	1.500

Source: Authors' calculations from government websites.

Table A22: Charlottetown BPT Rates

Property Class	Statutory BPT Rate	Effective BPT Rate
	<i>(percent)</i>	
Commercial	2.360	2.360

Source: Authors' calculations from government websites.

Table A23: St. John's BPT Rates

Property Class	Statutory BPT Rate	Average Appreciation Rate	Appreciation Period	Assessment Lag (Years)	Effective BPT Rate
	<i>Percent (except Appreciation Period and Assessment Lag)</i>				
Commercial	2.610	-0.13	2014-2017	2	2.617

Source: Authors' calculations from government websites.

Table A24: Weighted Average Statutory Business Tax and Investment Tax Credit Rates by Province

Parameter	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
	<i>(percent)</i>									
Federal General CIT	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Provincial General CIT	12.00	11.00	11.00	12.00	11.50	11.60	14.00	16.00	16.00	15.00
Provincial M&P CIT	12.00	11.00	9.00	12.00	10.00	11.60	14.00	16.00	16.00	15.00
Federal Atlantic ITC – Buildings	0.00	0.00	0.00	0.00	0.00	0.00	10.00	10.00	10.00	10.00
Federal Atlantic ITC – Machinery	0.00	0.00	0.00	0.00	0.00	0.00	10.00	10.00	10.00	10.00
Provincial M&P ITC – Buildings	0.00	0.00	6.00	9.00	0.00	0.00	0.00	0.00	10.00	0.00
Provincial M&P ITC – Machinery	0.00	0.00	6.00	9.00	0.00	0.00	0.00	0.00	10.00	0.00
Provincial RST	7.00	0.00	6.00	8.00	0.00	0.00	0.00	0.00	0.00	0.00
Provincial BPT	0.373	0.425	0.627	0.982	1.030	0.000	2.205	0.338	1.500	0.000
Municipal BPT – Largest Municipality	0.549	1.778	0.751	3.250	1.217	3.754	2.475	3.094	2.360	2.610
Provincial LTT	3.000	0.000	0.300	2.000	2.000	1.500	1.000	0.000	1.000	0.400
Municipal LTT – Largest Municipality	0.000	0.000	0.000	0.000	2.000	1.000	0.000	1.500	0.000	0.000

Note: The term “M&P” stands for manufacturing and processing.

Sources: Canada Revenue Agency; provincial and municipal websites; and authors' calculations.

Table A25: Weighted Average Effective Business Tax and Investment Tax Credit Rates by Province

Parameter	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
	<i>(percent)</i>									
Federal CIT – Pre-CCA and Debt Financing Adjustment	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Provincial CIT – Pre-CCA and Debt Financing Adjustment	12.00	11.00	10.91	12.00	11.36	11.60	14.00	16.00	16.00	15.00
Federal ITC – Buildings	0.000	0.000	0.000	0.000	0.000	0.000	0.518	0.515	1.477	0.172
Federal ITC – Machinery	0.000	0.000	0.000	0.000	0.000	0.000	3.430	1.223	2.573	0.998
Provincial ITC – Buildings	0.000	0.000	0.177	0.463	0.000	0.000	0.000	0.000	0.277	0.000
Provincial ITC – Machinery	0.000	0.000	0.516	1.331	0.000	0.000	0.000	0.000	1.286	0.000
Provincial RST	5.950	0.000	3.900	6.800	0.000	0.000	0.000	0.000	0.000	0.000
Provincial BPT	0.373	0.455	0.461	0.539	0.777	0.000	2.205	0.338	1.500	0.000
Municipal BPT – Largest Municipality	0.549	1.574	0.660	1.786	0.921	3.418	2.475	3.094	2.360	2.617
Provincial LTT	3.000	0.000	0.300	2.000	2.000	1.500	1.000	0.000	1.000	0.400
Municipal LTT – Largest Municipality	0.000	0.000	0.000	0.000	2.000	1.000	0.000	1.500	0.000	0.000

Source: Authors' calculations.