Appendix: Flying Below the Radar: The Harmful Impact of Ontario's Business Property Tax

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This Appendix summarizes the modelling inputs and outputs for the results presented in this E-Brief (see Found (2014b) for full exposition of the model). Inputs in Table A1 are taken from Found (2014b), except for the effective tax rate, which is derived in Table 2 of the main text. The formula for each output element in Table A2 is taken from Found (2014b), with the value resulting from the author's calculations based on the inputs in Table A1.[1] The functions illustrated in Figure 1 of the main text are based on the corresponding formulas in Table A2, where the effective tax rate is varied while all other variables are held constant at their values in Table A1.

Table A1: Model Inputs		
Variable	Symbol	Value (*percent*)
Structure Share of Development Value	α	70.50
Discount Rate	r	9.00
Growth Rate of Tax Liability	θ	1.79
Effective Provincial-Municipal Tax Rate	τ	2.30

Source: For the tax rate, source is Table 2 of main text. For all other variables, source is Found (2014b).

Recall that the METR measures the tax burden, while tax elasticity measures the harm associated with that burden in terms of tax-base depression. Combining the formulas in Table A2 demonstrates that the harm can be expressed as a function of the burden, where ε represents the tax elasticity and M is introduced here to represent the METR:

$$\varepsilon = \frac{-M}{(1+M)(1-\alpha)}$$

Similar derivations will express the marginal cost of public funds, share of tax base retained and revenue hill as functions of the METR. While these results reinforce the notion that tax burdens tell only part of the story, they show how a standard measure of tax burden can be translated into a meaningful measure of tax harm. Through calibration of model inputs to a business property tax environment of interest, these results can readily translate business property tax-burden estimates into associated tax-harm estimates.

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1   In Found (2014b), the variable α is implicitly estimated econometrically using 2006-2013 commercial assessment and property tax data at the municipality level. In that study, identification of statistical significance relies on a natural experiment engendered (unintentionally) by the 2007-2014 provincial business-property-tax-reduction program. The experiment is driven by the fact that the program resulted in exogenous variation in the reduction of provincial and, therefore, total commercial property tax rates across municipalities. This exogenous variation resulted from the wide variation in initial 2006 provincial commercial property tax rates across municipalities.

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Table A2: Model Output

Function	Formula	Value
Erosion of Tax Base – Total	$1-\left[\dfrac{r-\theta}{r-\theta+\tau}\right]^{\frac{1}{1-\alpha}}$	60.90%
Erosion of Tax Base – Capitalization	$1-\dfrac{r-\theta}{r-\theta+\tau}$	24.19%
Erosion of Tax Base – Disinvestment	Total Less Capitalization	36.70%
Revenue-Maximizing Effective Tax Rate	$m=\dfrac{(r-\theta)(1-\alpha)}{\alpha}$	3.02%
Proportion of Maximum Revenue Raised	$\dfrac{\tau}{m}\left[\dfrac{r-\theta+m}{r-\theta+\tau}\right]^{\frac{1}{1-\alpha}}$	97.54%
Absolute Value of Tax Elasticity	$\|\varepsilon\|=\left\|\dfrac{-\tau}{(r-\theta+\tau)(1-\alpha)}\right\|$	0.82011
Marginal Cost of Public Funds (MCPF)	$\left\|\dfrac{1}{1+\varepsilon}\right\|$	$5.56
Marginal Effective Tax Rate (METR)	$\dfrac{\tau}{r-\theta}$	31.91%

Source: Author's calculations.