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Methods

Modelling Other Excise Taxes and Duties

OFFICE OF THE PARLIAMENTARY BUDGET OFFICER
BUREAU DU DIRECTEUR PARLEMENTAIRE DU BUDGET

The Parliamentary Budget Officer (PBO) supports Parliament by providing economic and financial analysis for the purposes of raising the quality of parliamentary debate and promoting greater budget transparency and accountability.

This report outlines a model developed to project other excise tax and duty revenues as part of the Economic and Fiscal Outlook (EFO). It is intended to help Parliamentarians understand the components of other excise tax revenues and their impact on budgetary revenues.

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Summary

As part of the Economic and Fiscal Outlook, the Parliamentary Budget Officer (PBO) projects federal excise tax and duty revenue. Our model projects line-by-line to match the Public Accounts of Canada to estimate the revenue impact of changes in specific excise tax and duty rates.

In fiscal year 2023-24, the federal government collected $12.4 billion in other excise taxes and duties. Our March 2025 Economic and Fiscal Outlook projects these revenues to increase steadily over the next five years, reaching $13.4 billion by fiscal year 2029-30.

The model enables the PBO to produce analyses for other excise taxes and duties, including:

- Fuel taxes: gasoline, aviation fuel and diesel fuel;
- Tobacco duties: cigarettes, cigars and manufactured tobacco;
- Alcohol duties: spirits, beer, wine and spirit coolers;
- Air traveler's security charge; and
- Additional excise taxes and duties.

Introduction

In fiscal year 2023-24, the federal government collected $12.4 billion in other excise taxes and duties, representing 2.7 per cent of budgetary revenues. Other excise taxes and duties are a collection of taxes applied to specific products, unlike the Goods and Services Tax (GST), which applies to most product sold in Canada. In fiscal year 2023-24, the largest components of other excise tax and duty revenues came from fuel taxes ($5.6 billion), tobacco duties ($2.6 billion), and alcohol duties ($2.0 billion).

The model projects other excise tax and duty revenues using historical revenues and economic data from Statistics Canada. The model produces detailed projections for each component within the broader category of other excise taxes and duties and serves as a framework to estimate the impact of changes in excise tax and duty policy.

The Details by Tax and Duty section provides specific details on each excise tax or duty, lists data sources and elasticities (if applicable) used in the model and outlines whether that component of the model is static or behavioural. The Fiscal Sensitivities section provides estimates of the impact that changing rates have on revenues for taxes and duties that use behavioural model components.

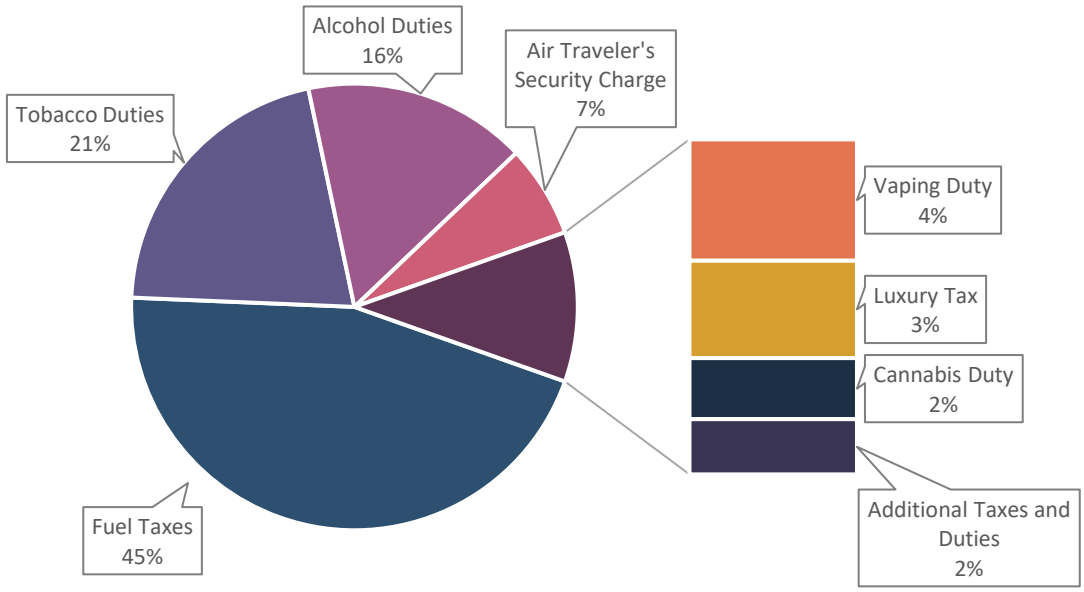
Details by Tax and Duty

In fiscal year 2023-24, the federal government collected $12.4 billion in other excise taxes and duties. Our March 2025 Economic and Fiscal Outlook projects these revenues to increase steadily over the next five years, reaching $13.4 billion by fiscal year 2029-30.[1] Figure 1 shows the contribution of each tax or duty to total revenue in fiscal year 2023-24.

For each excise tax or duty, the model projects revenue with either static or behavioural modelling. The static modelling uses the long-run average growth rate of Public Accounts revenue to project future revenue. The behavioural modelling incorporates the impact of tax changes on consumption patterns and excise tax revenue. For more details on the model components, see the Appendix.

Figure 1

Other excise tax and duty revenues, fiscal year 2023-24



Source:
Public Accounts of Canada and Office of the Parliamentary Budget Officer

Note:
Totals may not add due to rounding

Fuel Excise Taxes

In fiscal year 2023-24, the federal government collected $5.6 billion in excise taxes applied to gasoline, aviation and diesel fuels. The tax rate varies according to the specific type of fuel with rates of 10 cents per litre for unleaded gasoline and 4 cents per litre for aviation and diesel fuel.[2] The tax rates are not indexed and therefore remain constant over time. Gasoline represents the largest source of revenue, accounting for more than three-quarters of fuel excise tax revenues.[3]

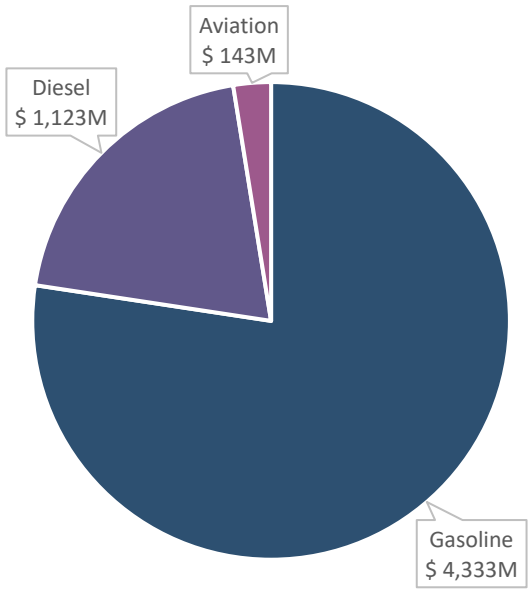
Gasoline excise tax revenue is modelled behaviourally using sales and retail prices from Statistics Canada to account for the impact of holding the excise tax constant over time. From fiscal years 2007-08 to 2022-23, total gasoline consumption increased from 39.5 billion litres to 40.9 billion litres, but per-capita gasoline consumption declined from 1,200 litres per person to 1,046 litres per person.[4] Over the same timeframe, the average retail price of gasoline increased from $1.05 per litre to $1.67 per litre.

The price elasticity of demand for gasoline used in the model is -0.37.[5,6] This means that a one per cent increase in the price of gasoline would result in a 0.37 per cent decrease in gasoline consumption. A behavioural impact of the recent removal of the federal fuel charge and the increased adoption of electric vehicles in its baseline gasoline consumption projection is included.

Aviation and diesel excise tax revenues are projected using static models. From fiscal years 2007-08 to 2023-24, excise tax revenue from aviation fuel grew from $39 million to $143 million while revenues from diesel fuel remained near $1.1 billion. PBO assumes that aviation and diesel excise tax revenues will continue to grow by their historical rates, with those rates being updated as more recent data becomes available.

Figure 2

Fuel tax revenues by category, fiscal year 2023-24



Source:
Public Accounts of Canada and Office of the Parliamentary Budget Officer

Note:
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Tobacco Excise Duties

In fiscal year 2023-24, the federal government collected $2.6 billion in tobacco excise duties, with the vast majority coming from duties applied to cigarettes. The duty rates vary according to the product with the basic rates being 16 cents per cigarette, 3 cents per cigar and 21 cents per gram for other manufactured tobacco in fiscal year 2023-24.[7] An additional duty of at least 12 cents (or 88 per cent of the sale price) applied to cigars. The duty rates are indexed to changes in the Consumer Price Index (CPI) in addition to a one-time 17 per cent increase in 2024-25.

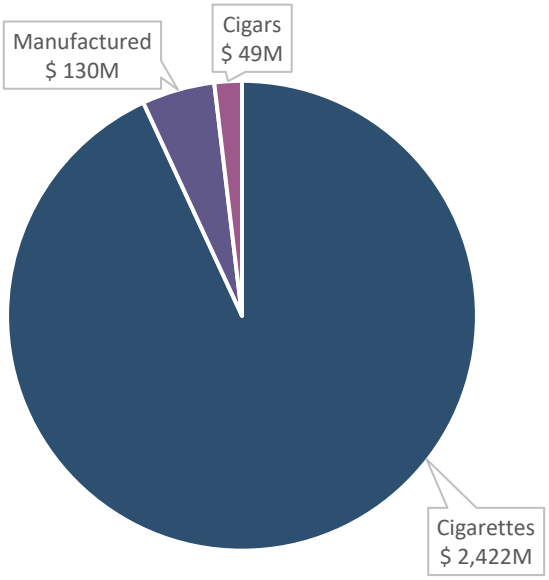
A behavioural modelling component is included for cigarettes using sales and price data from Statistics Canada. It shows that from fiscal years 2007-08 to 2023-24, cigarettes sales have decreased from 17.8 billion to 14.0 billion with prices increasing from 39 cents per cigarette to 76 cents per cigarette.[8]

Most elasticity estimates for cigarettes are focused on the public health effect of cigarette taxes causing consumers to smoke less. However, increases in taxes may cause consumers to substitute toward untaxed cigarettes, leading to a greater elasticity with respect to tax revenue than what is assumed from a public health perspective. The PBO uses an elasticity with respect to tax revenue of -0.71.[9,10]

Excise duty revenues from cigars and other manufactured tobacco are projected using static models. From fiscal years 2007-08 to 2023-24, excise duty revenue from cigars remained near $50 million while revenues from other manufactured tobacco increased from $100 million to $130 million. PBO assumes that excise duty revenues from cigars and other manufactured tobacco will continue to grow by their historical rates, with those rates being continuously updated as more recent data becomes available.

Figure 3

Tobacco duty revenues by category, fiscal year 2023-24



Source:
Public Accounts of Canada and Office of the Parliamentary Budget Officer

Note:
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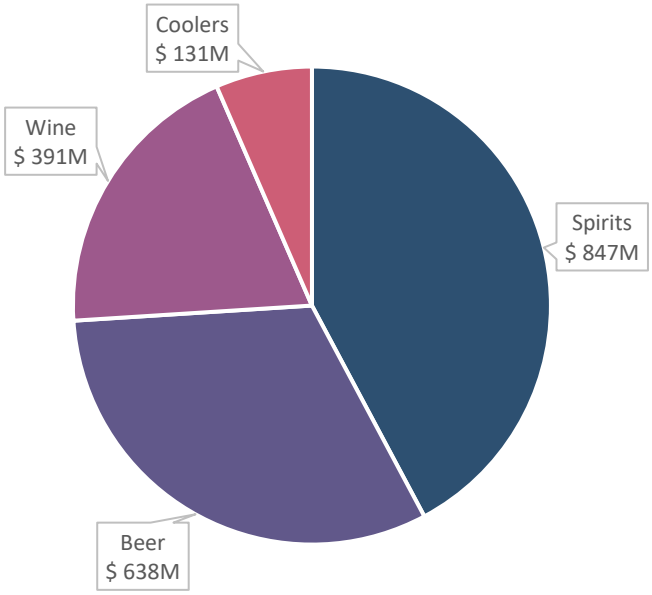
Alcohol Excise Duties

In fiscal year 2023-24, the federal government collected $2.0 billion in alcohol excise duties across four primary categories: spirits, beer, wine, and coolers. The value of the duty depends on the category and alcohol content of the product, with reduced rates for certain smaller producers. For example, the basic rate for spirits was $13.30 per litre of ethyl alcohol in fiscal year 2023-24. Similarly, the basic rate was 36 cents per litre of beer, 70 cents per litre of wine and 34 cents per litre for coolers.[11] The duty rates are indexed to changes in the Consumer Price Index (CPI) with a maximum increase of 2 per cent per year until the end of fiscal year 2025-26.[12]

A behavioural modelling component uses total sales and retail prices for spirits, beer, wine and coolers in Canada.[13] The PBO uses elasticities of -0.65, -0.30, -0.60 and -0.30 for spirits, beer, wine and coolers, respectively.[14,15]

Figure 4

Alcohol duty revenues by category, fiscal year 2023-24



Source:
Public Accounts of Canada and Office of the Parliamentary Budget Officer

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Air Traveller's Security Charge

The Air Traveller's Security Charge (ATSC) is an excise tax on air transportation services in Canada. In fiscal year 2023-24, the federal government collected $826 million from the security charge. The tax rate depends on the origin and destination of the flight with the basic rates being $7.12 for a domestic flight and $25.91 for an international flight in fiscal year 2023-24. The security charge is not indexed, but it was increased by 33 per cent to $9.46 for a domestic flight and $34.42 for an international flight in May 2024.[16]

Estimates for the elasticity of air travel are much less common in the economic literature than elasticities for some other goods. The PBO uses an elasticity of air travel of -1.157, indicating that air travellers are quite responsive to changes in price.[17,18] A behavioural modelling component is included using the number of passenger-flights and the operating revenue for major Canadian airlines.[19]

Recent Taxes and Duties

When new excise taxes and duties are introduced, the PBO projects new revenues in a Legislative Costing Note. Revenues from new excise taxes and duties are included in the PBO other excise tax and duty projection. Once sufficient Public Accounts data is available for these excise taxes and duties, a static or behavioural model will be developed.

With the legalisation of cannabis in 2018, revenues from the cannabis duty grew rapidly from $18 million in fiscal year 2018-19 to $244 million in fiscal year 2023-24. The tax rate varies by the type of product, the value of the product sold and the region in which it is sold. In most provinces and territories, the rate on dried cannabis is the greater of $1 per gram or 10 per cent of the sale price. The duty rate is not indexed to inflation, except through the price of cannabis. As the market for cannabis has developed, the growth in cannabis sales has declined significantly. The PBO assumes that per-capita cannabis sales will remain stagnant and total revenues will grow at the rate of population growth.

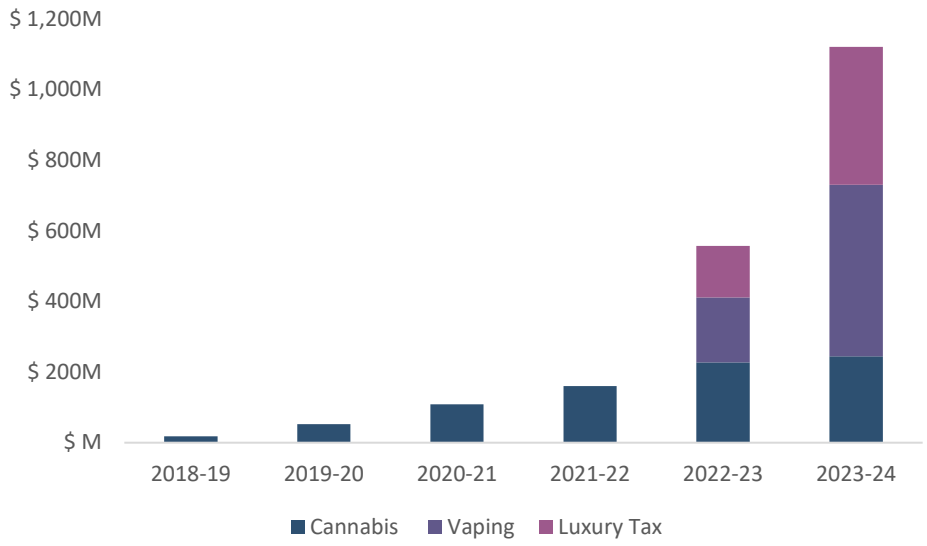
In 2022, the federal government introduced a duty on vaping products sold in Canada. The vaping duty initially applied a basic rate of $1 per 2 millilitres of vaping liquid with the duty being doubled in Ontario, Quebec, the Northwest Territories and Nunavut.[20] In fiscal year 2023-24, the federal government collected $486 million from the vaping duty. The vaping duty is not indexed but it was increased by 12 per cent in July 2024. The PBO

produced a preliminary costing in 2022 which was updated to include the most recent Public Accounts data.[21]

The luxury tax came into effect in 2022 and applies a surtax on the sale of new automobiles and aircraft valued over $100,000 and vessels valued over $250,000.[22] The tax rate is the lesser of 10 per cent of the value, or 20 per cent of the value above the threshold. In fiscal year 2023-24, the federal government collected $390 million through the luxury tax. Since thresholds are not indexed, more vehicles will be above the threshold over time due to inflation. The PBO produced a preliminary costing in 2022 which was updated to include the most recent Public Accounts data.[23]

Figure 5

Recent revenues by category, fiscal years 2018-19 to 2023-24



Source:
Public Accounts of Canada and Office of the Parliamentary Budget Officer

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Additional Excise Taxes and Duties

Additional excise taxes and duties represent 2 per cent of total other excise tax and duty revenues. They include the excise tax on automotive air conditioners, the Green Levy (for fuel inefficient vehicles), the excise tax on insurance premiums and the Softwood Lumber Export Charge. Together, in fiscal year 2023-24, the federal government

collected $221 million in revenue from these taxes and duties. The largest component, $194 million, came from a $100 flat-rate tax on automotive air conditioners designed for use in new cars, vans or trucks.[24] The first three of these taxes are modelled statically, while the Softwood Lumber Export Charge has not generated revenue in recent years.

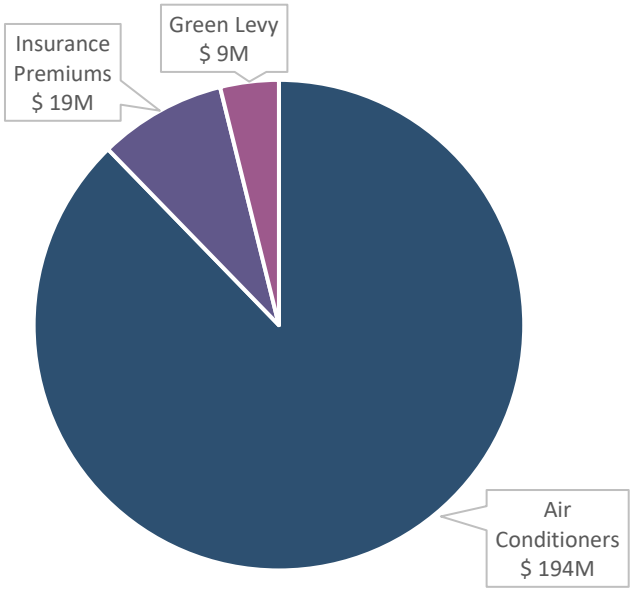
The Green Levy applies a tax of up to $4,000 on new passenger vehicles with a rated fuel consumption that is greater than 13 litres per 100 kilometers.[25] Pick-up trucks and commercial vehicles are exempt from the levy, and the revenue collected has declined from $44 million in fiscal year 2007-08 to $9 million in fiscal year 2023-24 as vehicles have become more fuel efficient.

The *Excise Tax Act* imposes a 10 per cent tax on insurance premiums paid to an agent or broker outside of Canada.[26] Some contracts are exempted, including life insurance, personal accident insurance, sickness insurance and insurance against marine risks. In fiscal year 2023-24, the federal tax on insurance premiums collected $19 million with large fluctuations from year-to-year.

The Softwood Lumber Export Charge applies to softwood lumber exports to the United States when the market price of lumber drops below US$355 per thousand board feet. The export charge has varied rates, multiple regional exemptions, and the floor price of US$355 is not indexed.[27] The market price for softwood lumber has not fallen below the floor price since 2015-16, when the federal government collected $130 million. The PBO monitors monthly lumber prices and will include lumber export revenues if softwood lumber prices drop below US$355 per thousand board feet.

Figure 6

Additional revenues by category, fiscal year 2023-24



Source:
Public Accounts of Canada and Office of the Parliamentary Budget Officer

Note:
Totals may not add due to rounding

Fiscal Sensitivities

Fiscal sensitivities measure the impact of changes to one or more behavioural model inputs on the final revenue projection. These sensitivities can help Parliamentarians estimate the impact of economic shocks or changes to excise tax and duty rates.

Some rates are indexed to CPI inflation, so changes in CPI inflation will impact excise tax revenues. For fiscal year 2024-25, the model projects that a one percentage point change in CPI inflation will result in a 0.06 per cent change in total other excise tax and duty revenues. Similarly, changes to the population will impact the number of people that purchase excise-taxed products. The model projects that a one per cent change in the Canadian population will result in a 0.80 per cent change in total other excise tax and duty revenues.

The model also provides fiscal sensitivities with respect to tax rates for gasoline, cigarettes, alcohol and the Air Traveller's Security Charge.

Table 1

Fiscal sensitivities for excise taxes and duties, fiscal year 2024-25

Excise Tax or Duty	Fiscal Sensitivity
Gasoline	0.98
Cigarettes	0.82
Alcohol	0.96
Air Traveller's Security Charge	0.96

Source:
Office of the Parliamentary Budget Officer

Appendix

Elasticities

The price elasticity of demand is a measure of the change in demand in response to a change in price. Elasticities are measured in percentage-percentage form, meaning that the percentage change in demand is calculated by multiplying the percentage change in price by the elasticity.

$$\Delta \text{ Demand} = \Delta \text{ Price} \times \text{Elasticity}$$

where Δ represents the percentage change.

Price elasticities are not the same as tax elasticities. Taxes are only one input into the total price of a product and consumers adjust their behaviour based on total prices. The behavioural component of the model divides the total price of products into tax and non-tax components to ensure that the elasticities are correctly applied.

$$\text{Price}_t = \text{Tax Rate}_t + \text{Non-tax}_t$$

Changes to taxes or duties affect only the tax component but do not affect the non-tax component of the total price, and the PBO assumes that all tax changes are passed-through directly to the total price. The elasticity would then be applied to the percentage change in total price to estimate the change in demand.

$$\Delta \text{ Price}_t = \frac{\text{Tax Rate}_{\text{new, t}} + \text{Non-tax}_t}{\text{Tax Rate}_{\text{old, t}} + \text{Non-tax}_t} - 1$$

The elasticity can also account for changes in demand when the excise tax or duty on a product is held constant for an extended period. Holding the excise tax or duty constant while the price of other products increases with inflation makes the product less expensive relative to other products. Consumers will adjust their behaviour by buying more of the product than they would have bought in a scenario where the excise tax increased at the same rate as other products.

Static Models

Static models are a group of models that project excise tax revenues when it is not possible to account for the behavioural effect of tax changes. Although is it often

preferable to include behavioural effects, their estimation requires reliable data on average prices, quantities sold and the elasticities.

To project using a static model, the PBO calculates the long-run average growth rate of Public Accounts revenue for each of the taxes listed above. Although long-run average growth is consistent, year-to-year fluctuations mean that projecting based on only the most recent year of data may lead to an over- or underestimation over the projection period. To minimize this, the PBO applies the long-run growth rate to the two most recent years of data and averages the result to get a one-period ahead projection.

$$\text{Revenue}_{t+1} = \frac{\text{Revenue}_t \times \text{Growth}_{LR} + \text{Revenue}_{t\text{-}1} \times (\text{Growth}_{LR})^2}{2}$$

The remainder of the projection period is projected by applying the long-run growth rate to the previous projected year.

$$\text{Revenue}_{t+2} = \text{Revenue}_{t+1} \times \text{Growth}_{LR}$$

Behavioural Models

Behavioural models are a group of semi-structural models that project excise tax revenues, accounting for the behavioural effects caused by tax changes. Increases in tax rates may cause consumers to buy less of a good as it becomes more expensive, the behavioural effect offsets some of the increase in tax revenues associated with a tax increase. In addition to the Public Accounts data, the behavioural models use the Consumer Price Index (CPI) and population projections from the PBO economic model, the retail prices of the goods and the quantity sold of the goods.

The first step in estimating the behavioural model is to calculate the effective tax rate by dividing the Public Accounts revenue by the quantity sold in that year:

$$\text{Tax Rate}_t = \frac{\text{Revenue}_t}{\text{Quantity}_t}$$

It is important to estimate the effective tax rate on a per-unit basis to estimate the impact of tax changes on retail prices. In the projection period, the effective tax rate is assumed to grow by the rate that is specified in legislation for the specific product.

$$\text{Tax Rate}_{t+1} = \text{Tax Rate}_t \times \text{Indexation}_t$$

Next, the quantity sold is divided by the population to calculate the per-capita consumption, which is assumed to grow in the projection period by its long-run growth rate.

$$\text{Quantity per-capita}_{t+1} = \frac{\text{Quantity}_t}{\text{Population}_t} \times \text{Growth}_{LR}$$

The quantity sold per-capita is then multiplied by the population projection from the PBO economic model. These steps allow the model to automatically adjust for changes in population that might impact the total quantity sold.

$$\text{Quantity}_{t+1} = \text{Quantity per-capita}_{t+1} \times \text{Population}_{t+1}$$

To estimate the impact of tax changes on retail prices, the PBO projects retail prices in two scenarios. In the baseline scenario, the retail prices are grown by the rate of CPI inflation. This implicitly assumes that, on average, the components of retail prices (including the excise tax) grow at the rate of CPI inflation.

$$\text{Price}_{\text{baseline, }t+1} = \text{Price}_t \times \text{Inflation}_t$$

In the legislated scenario, the excise tax is removed from the retail price with the remaining components being grown by CPI inflation. Then the projected excise tax is added back to estimate the retail prices under current legislation. This implicitly assumes that 100 per cent of tax changes are passed through to the retail price.

$$\text{Price}_{\text{policy, }t+1} = \text{Tax Rate}_{t+1} + \text{Non-tax}_t \times \text{Inflation}_t$$

To estimate the quantity sold after the behavioural effect is applied, the total quantity sold is projected by the elasticity for that good multiplied by the percentage difference in retail price between the baseline and policy scenario.

$$\text{Quantity}_{\text{final, }t+1} = \text{Quantity}_{t+1} \times (1 - \Delta\,\text{Price}_t \times \text{Elasticity})$$

where $\Delta\,\text{Price}_t = \frac{\text{Price}_{\text{policy, }t+1}}{\text{Price}_{\text{baseline, }t+1}} - 1$.

The excise tax revenue is then projected using the effective tax rate from the first step multiplied by the total quantity sold from the final step.

$$\text{Revenue}_{t+1} = \text{Tax Rate}_{t+1} \times \text{Quantity}_{\text{final, }t+1}$$

Notes

[1] Economic and Fiscal Outlook – March 2025, Parliamentary Budget Officer.

[2] For more details, see Current Rates of Excise Taxes, Canada Revenue Agency.

[3] The revenue for gasoline does not include the revenue collected through the fuel charge under the *Greenhouse Gas Pollution Pricing Act*.

[4] Sales of fuel used for road motor vehicles - Table: 23-10-0066-01 and Monthly average retail prices for gasoline and fuel oil - Table: 18-10-0001-01, Statistics Canada.

[5] Anticipation, Tax Avoidance, and the Price Elasticity of Gasoline Demand, Coglianese et al., Journal of Applied Econometrics (2016).

[6] Similar to the elasticity of -0.39 used in The Economic Costs of Fuel Economy Standards Versus a Gasoline Tax, Congressional Budget Office (2003).

[7] For more details, see Excise Duty Rates, Canada Revenue Agency.

[8] Tobacco, sales and inventories - Table: 16-10-0044-01 and Monthly average retail prices for food and other selected products - Table: 18-10-0002-01, Statistics Canada.

[9] Estimating price elasticities when there is smuggling: the sensitivity of smoking to price in Canada, Gruber et al., Journal of Health Economics (2003).

[10] When estimating the public health elasticity, Gruber et al. (JHE, 2003) find an elasticity that is similar to the elasticity of -0.40 estimated in The Economics of Tobacco and Tobacco Control, World Health Organization (2016).

[11] For more details, see Excise Duty Rates, Canada Revenue Agency.

[12] For more details, see Backgrounder: Supporting Canadian businesses with alcohol excise duty relief, Department of Finance Canada.

[13] Value of sales of alcoholic beverages of liquor authorities and other retail outlets - Table: 10-10-0010-01, Statistics Canada.

[14] Prices, taxes and alcohol use: a systematic umbrella review, Guindon et al., Addiction (2022).

[15] These estimates differ slightly from estimates cited by How many alcohol-attributable deaths and hospital admissions could be prevented by alternative pricing and taxation policies?, Stockwell et al., Health Promotion and Chronic Disease Prevention (2020), but minor differences in elasticities would not substantially change PBO estimates.

[16] For more details, see Air Travellers Security Charge (ATSC) Rates, Canada Revenue Agency.

[17] In search of the "Right Price" for air travel: First steps towards estimating granular price-demand elasticity, Perera and Tan, Transportation Research (2019).

[18] This elasticity fits within the estimates of Estimating flight-level price elasticities using online airline data: A first step toward integrating pricing, demand, and revenue optimization, Mumbower et al., Transportation Research (2014), which found an elasticity of -1.89 for the leisure market and -0.38 for the business market.

[19] Operating and financial statistics for major Canadian airlines - Table: 23-10-0079-01, Statistics Canada.

[20] For more details, see Excise Duty Rates, Canada Revenue Agency.

[21] For more details, see Taxation of Vaping Products, Parliamentary Budget Officer (2022).

[22] For more details, see Subject Vehicles Under the Select *Luxury Items Tax Act*, Canada Revenue Agency.

[23] For more details, see Luxury Goods Sales Tax (Update), Parliamentary Budget Officer (2022).

[24] For more details, see Current Rates of Excise Taxes, Canada Revenue Agency.

[25] For more details, see Current Rates of Excise Taxes, Canada Revenue Agency.

[26] For more details, see Current Rates of Excise Taxes, Canada Revenue Agency.

[27] For more details, see Softwood Lumber Export Charge, Department of Justice.

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