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4 November 2024

Eric Crampton

By email: eric.crampton@nzinitiative.org.nz
Ref: H2024053063

Tēnā koe Eric

Response to your request for official information

Thank you for your request under the Official Information Act 1982 (the Act) to the Ministry of Health – Manatū Hauora (the Ministry) on 4 October 2024 for information regarding Heated Tobacco Products (HTP) and Tobacco Excise loss. You requested:

> *"I'm keen to see the workings underpinning the estimate of a potential $216m loss in overall tobacco excise with half-rate excise on heated tobacco products*
> *It would seem to require an enormous shift from smoked tobacco to heated tobacco.*
> *Please supply those workings."*

I have identified one document in scope of your request, titled '*Final draft Technical Report: Modelling the Fiscal Impact of Reducing the Excise Duty on Heated Tobacco Products'*. The document is attached to this letter and has been released to you with some information withheld under section 9(2)(k) of the Act, to prevent the disclosure or use of official information for improper gain or advantage. I have considered the countervailing public interest in release in making this decision and consider that it does not outweigh the need to withhold at this time.

It is important to note some information in the document requested has been withheld as its release might influence market behaviour, and thereby prejudice the Government's 12-month evaluation of this policy. These redactions are limited to how the fiscal impact of the policy was derived and either preliminary fiscal impacts or those related to alternative policy settings.

I trust this information fulfils your request. If you wish to discuss any aspect of your request with us, including this decision, please feel free to contact the OIA Services Team on: oiagr@health.govt.nz.

Under section 28(3) of the Act, you have the right to ask the Ombudsman to review any decisions made under this request. The Ombudsman may be contacted by email at: info@ombudsman.parliament.nz or by calling 0800 802 602.

Please note that this response, with your personal details removed, may be published on the Manatū Hauora website at: www.health.govt.nz/about-ministry/information-releases/responses-official-information-act-requests.

Nāku noa, nā

Dean Rutherford
Deputy Director-General
Evidence Research and Innovation | Te Pou Whakamārama

Technical Report: Modelling the Fiscal Impact of Reducing the Excise Duty on Heated Tobacco Products

Date: 16/09/2024

Contents

1. Executive Summary

In preparation for Budget 2024, a bid was submitted which proposed reducing the excise-equivalent duty on heated tobacco products (HTPs) by 50%. To support the development of this proposal we estimated the fiscal impact of such an excise change to the New Zealand Government - this report transparently details how we estimated that fiscal impact whilst also documenting the many sources of uncertainty which might affect that estimate.

Heated tobacco products heat a cartridge of tobacco which releases a smokeless nicotine-containing aerosol. These products differ from both smoked tobacco products, where a nicotine-containing smoke is produced by burning tobacco, as well as vaping products, which vaporizes a nicotine-containing liquid that is free from tobacco. Heated tobacco products were developed during the 2010s but accounted for less than 0.36% of aggregate tobacco tax revenue in New Zealand in 2023.[1]

In New Zealand, excise duty is a tax imposed on the domestic production of alcohol, tobacco and fuel, whilst excise-equivalent duty is an equivalent tax on the importation of these products. Because heated tobacco products contain tobacco they attract an excise-equivalent duty of $1,555.23 per kilo tobacco content. Reducing the excise duty on heated tobacco products would reduce tax revenue on existing heated tobacco sales but could also reduce the price of those products and thereby encourage some current smokers to substitute from smoked tobacco to heated tobacco - our work accounts for both potential impacts on Government tax revenue.

We estimate the fiscal impact of this policy as the difference between (a) forecast aggregate tobacco tax revenue under the proposed policy, and (b) forecast aggregate tobacco tax revenue under the status quo, where the excise tax on heated tobacco products is not changed. Importantly, this ignores additional costs, such as those relating to implementation or monitoring.

The greatest source of modelling uncertainty is in forecasting the consumption of heated tobacco products under the status quo; this is because the product is (i) relatively new and (ii) largely unknown in New Zealand, whilst (iii) there is very little evidence to guide how adoption might evolve in New Zealand over the coming years. To model demand in New Zealand, we rely on the growing market share of heated tobacco products in the years following their introduction in Japan. Whilst we acknowledge there are many differences in the demand for, and regulation of, tobacco between the two countries and across the two time periods, we could not identify any alternative source of real-world evidence.

Given an assumed profile for the market share of heated tobacco under the status quo, we estimate how it would change given the reduction in excise duty – this is dependent on (i) the dollar value reduction in excise duty per product, (ii) the extent to which retail prices respond to the reduction in excise duty, and (iii) how the demand for both heated and smoked tobacco products respond to a change in the price of heated tobacco products. The alternative market shares are weighted and combined to approximate the proportionate reduction in aggregate tobacco tax revenue, which is then used within Treasury's Customs and Excise Model to estimate the dollar value impact.

Our final estimates are presented in Table 1 below. The first row presents Treasury's baseline forecast of annual aggregate tobacco excise tax revenue, which is decreasing from $1,453m in the year to 30 June 2025 to $1,370m in the year to 30 June 2028; a decrease of 5.71% over the period

[1] New Zealand Customs Service stated the excise-equivalent duty charged on the importation of heated tobacco products during the year to 30 June 2023 was $5.98m (NZ Customs, personal communication, 4 April 2024), whilst all tobacco excise and excise-equivalent duty totalled $1,666m in 2023 (New Zealand Government, 2023).

which is driven by reduced demand for tobacco. The second row presents the forecast of annual tobacco tax revenue under the proposed policy, whilst the third row presents the difference between the two; we estimate that this policy will reduce the aggregate tobacco tax revenue by $11m in the year to 30 June 2025 to $1,441m, and by $211m over the four-year forecast period.

Table 1: Estimated Fiscal Impact of the Proposed Policy, $m, by Financial Year

Year (Ending 30 June)	2025	2026	2027	2028	Total
BEFU 2024 (Prelim) Forecast of Annual Aggregate Tobacco Excise Tax Revenue under Status Quo	1,453	1,426	1,398	1,370	5,647
Best Estimate of Annual Aggregate Tobacco Excise Tax Revenue Under Proposed Policy	1,441	1,382	1,324	1,288	5,435
Best Estimate of Change in Annual Aggregate Tobacco Excise Tax Revenue Due to Proposed Policy	-11	-44	-74	-82	-211

Source: NZ Treasury (2024).

The work outlined in this paper was undertaken iteratively as new insights were requested, rather than scoped and planned from the beginning. This means that aspects such as the impact on the number of smokers are constrained by previous analytical decisions, and subject to considerable uncertainty. The work was also undertaken in extremely short timeframes, again increasing the uncertainty since analytical decisions had to be taken quickly and with little consultation.

The uncertainty is magnified by the limited available data and evidence to inform how the demand for heated tobacco products will evolve in New Zealand under either the status quo or the proposed policy, as well as how this might affect the demand for smoked tobacco.

Because of this uncertainty we have written up the steps and assumptions as completely as possible, so that stakeholders can see the conditions under which the estimates will hold.

2. Introduction

The work reported in this paper supported preparation for Budget 2024 proposing reducing the excise-equivalent duty on heated tobacco products (HTPs) by 50%. To support the development of this proposal we estimated the fiscal impact of such an excise change to the New Zealand Government - this report transparently details how we estimated that fiscal impact. It is intended for a specialist audience, providing an exact representation of how the results were obtained and the assumptions made.

We approximate the fiscal impact of reducing the excise duty on heated tobacco products as the difference in aggregate tobacco tax revenue between that which would be received under (a) the status quo, i.e. without any changes to tobacco excise duties, and (b) that which would be received if excise duty on heated tobacco is reduced by 50% (hereafter, the proposed policy). We consider the impact to aggregate tobacco tax revenue, rather than the change in tax revenue from heated tobacco products only, because this policy could encourage some consumers to switch between tobacco products, and as a result the change in the excise duty revenue from heated tobacco products alone may understate the fiscal impact to the government. It might be the case, for example, that cigarette smokers switch to heated tobacco products, reducing excise revenue from cigarettes. Importantly, however, this definition of fiscal impact omits the costs of implementation, as well as the goals or potential benefits of the proposed policy.

Estimating the fiscal impact of this policy was a complex task. Because heated tobacco products are a relatively recent innovation there was very little evidence which could directly inform our estimates. As such we developed our estimates using a wide array of data and multiple methodologies, which are described in detail in the forthcoming sections. However, these estimates rely on multiple assumptions, many of which were not able to be tested in the time available. As such, our estimates should be viewed with considerable uncertainty, and we suggest revisiting the modelling when more data or evidence is available.

3. Background and Context

3.1. Current Government Revenue from Tobacco Excise

NZ Treasury estimates that aggregate tobacco tax revenue, which combines GST and excise (or excise-equivalent) duty on tobacco products will be $1,453m in the year to June 2025, decreasing by about 2% per year to $1,370m in 2028. This reduction is driven by forecast reductions in the demand for tobacco, although it is partially offset by inflation in retail prices which generates increases in the GST on tobacco products.

Table 2: Estimated Fiscal Impact of the Proposed Policy, $m, by Financial Year

Year (Ending 30 June)	2025	2026	2027	2028	Total
BEFU 2024 (Prelim) Forecast of Annual Aggregate Tobacco Excise Tax Revenue under Status Quo	1,453	1,426	1,398	1,370	5,647

Source: NZ Treasury (2024).

3.2. Current Excise Duty Levels

Excise duty is a tax levied on the domestic production of specific goods, such as alcohol, tobacco and fuel. When excisable items are imported, duty is imposed (known as excise-equivalent duty) which is

equivalent to the excise liability that would apply if the goods were manufactured in New Zealand (New Zealand Customs Service, 2023a). The current rates of excise on tobacco products include: (i) $1,773.02 per kilogram of tobacco content for manufactured cigarettes exceeding 0.8 kg of tobacco content per 1,000 cigarettes, or smoking tobacco, homogenised or reconstituted tobacco, (ii) $1,244.23 per kilogram of tobacco content for manufactured cigarettes not exceeding 0.8 kg of tobacco content per 1,000 cigarettes, and (iii) $1,555.23 per kilogram of tobacco content for other tobacco products, e.g., snuff, cigars, cheroots and cigarillos (New Zealand Customs Service, 2023b). Heated tobacco products attract an excise level equal to that in this third category.

4. Methodology

4.1. Mathematical Derivation of the Fiscal Impact

Under the status quo, i.e. assuming no change to current excise duties, and assuming just two types of tobacco - heated and smoked tobacco - we can express aggregate tobacco tax revenue mathematically in the following equation[2]

$$R_t^{SQ} = Q_t^{H,SQ} T^H + Q_t^{S,SQ} T^S \quad (1)$$

where R_t^{SQ} is aggregate tobacco tax revenue in year t under the status quo, $Q_t^{H,SQ}$ and $Q_t^{S,SQ}$ are the volume of heated tobacco and smoked tobacco units which are expected to be consumed in year t under the status quo (i.e. no change to excise duties), respectively, and T^H and T^S are the excise duty per unit of heated or smoked tobacco, respectively, which we assume do not vary by year.

The parallel expression for aggregate tobacco tax revenue under the proposed policy, which is simplified because the policy proposes a proportional reduction in the excise duty on heated tobacco and no change to the excise duty on smoked tobacco, is as follows

$$R_t^{PP} = Q_t^{H,PP}(1-\theta) T^H + Q_t^{S,PP} T^S \quad (2)$$

where R_t^{PP} is aggregate tax revenue in year t under the status quo, and θ is the proposed proportional reduction in the excise duty on heated tobacco products which must be between 0, which denotes no change to excise duties, and 1, the complete removal of excise duty on heated tobacco.

We define the fiscal impact of the policy as the difference in aggregate tobacco tax revenue forecast under the proposed policy from that under the status quo, which is equal to the difference between equations (2) and (1)[3]:

$$\begin{aligned} FI_t &= R_t^{PP} - R_t^{SQ} \\ &= \left((1-\theta) Q_t^{H,PP} - Q_t^{H,SQ}\right) T^H + \left(Q_t^{S,PP} - Q_t^{S,SQ}\right) T^S \end{aligned} \quad (3)$$

4.2. Practical Application and Approximation

To compute the fiscal cost as detailed in equation (3) we need to apply plausible values for each of the parameters. We know the proposed proportional reduction in the excise duty on heated tobacco

[2] There are 5 groupings of tobacco products, each of which has a different rate of excise and excise-equivalent duty, and the demand for which may be affected by the price and availability of heated tobacco products. However, we assume that we can reasonably approximate the fiscal impact of the proposed policy by restricting attention to heated tobacco products and manufactured cigarettes only.

[3] A full derivation of the intermediate steps is provided in Appendix 1710.2.

and the level of excise duty on both heated tobacco and smoked tobacco under the status quo and the proposed policy, however we do not know - and therefore need to estimate - consumption of both heated and smoked tobacco, under both the status quo and the proposed policy. The latter is the primary analytical challenge of this work. Firstly, we could not identify any up-to-date projections of the volume of smoked tobacco consumed in New Zealand. Secondly, there is currently negligible consumption of heated tobacco in New Zealand but that is likely to change over time given it is a new product and tobacco manufacturers have invested in this technology heavily, and there are no known estimates of future consumption.[4] Further, changing the excise duty on heated tobacco is likely to increase awareness about the product and encourage more tobacco users to substitute from smoked tobacco to heated tobacco. As such, we must forecast demand for what is in effect a new product and consider how it might react to alternative excise settings, which is difficult. Finally, we need to consider how these variables affect each other. Developing such a complex model is a significant undertaking.

To provide timely advice, we simplified the model in several ways. First, we use international evidence on the evolution of the volume share of heated tobacco as a proportion of aggregate tobacco volume. This provides real world evidence about the uptake of heated tobacco products over time, as well as the interaction between heated tobacco consumption and smoked tobacco consumption. Secondly, rather than producing our own forecast of tobacco volumes, The New Zealand Treasury combines our estimates of the changing volume shares of tobacco products with their projections of annual aggregate tobacco tax revenue between 2025 and 2028 to produce forecast impacts.

It is possible to approximate the proportional reduction in aggregate tobacco excise tax with the following expression, which is a function of only (i) the proportional reduction in excise duties, (ii) the current excise duty levels, and (iii) the volume share of heated tobacco under the alternative tax scenarios.[5]

$$\frac{FI_t}{R_t^{SQ}} \approx \left(\frac{Q_t^{H,PP}}{Q_t^{H,PP}+Q_t^{S,PP}}\right)\left((1-\theta)\frac{T^H}{T^S}-1\right)-\left(\frac{Q_t^{H,SQ}}{Q_t^{H,SQ}+Q_t^{S,SQ}}\right)\left(\frac{T^H}{T^S}-1\right) \qquad (4)$$

where $\frac{Q_t^{H,PP}}{Q_t^{H,PP}+Q_t^{S,PP}}$ and $\frac{Q_t^{H,SQ}}{Q_t^{H,SQ}+Q_t^{H,SQ}}$ are the volume shares of heated tobacco under the proposed policy and status quo, respectively.

Using this expression and the data available we can then estimate the proportional reduction in aggregate tobacco excise tax, which can then be applied by the New Zealand Treasury to their projections of future tobacco excise revenue to estimate the dollar-value fiscal impact of this policy.

4.3. Key Parameters

In the subsections below I describe how we estimate the key parameters in equation (4). A table of their values, as well as the source and value for the underlying component series appears in Section 10.1.

[4] Correspondence from New Zealand Customs Service revealed the excise-equivalent duty charged on the importation of heated tobacco products was less than $3.63m during the year to 30 June 2022, and $5.98m during the year to 30 June 2023. (NZ Customs, personal communication, 4 April 2024). These figures represent less than 0.33% of total tobacco excise and duty in those years.

[5] A full derivation of the intermediate steps and an explanation of the individual approximations is provided in Appendix 10.3.

4.3.1. The proportional reduction in excise duty on heated tobacco

The proposed policy is to reduce excise duty by 50%. As such, we set $\theta = 0.5$ when producing our best estimates of the fiscal impact. We can also vary this parameter to illustrate the range of fiscal costs under different policy decisions; the results from these alternative scenarios are presented in section 5.

4.3.2. The current excise duty rates

To calculate the GST-inclusive excise duty on a packet of 20 tobacco sticks, whether they are heated or smoked, we use the following formula.

$$T^i = 23 g^i X^i \quad (5)$$

where $i \in \{H, S\}$ indicates heated or smoked, T^i is the corresponding GST-inclusive excise duty on a packet of 20 tobacco sticks, g^i is the grams of tobacco per stick and X^i is the current rate of excise and excise-equivalent duty per gram of tobacco (excluding GST).[6]

S9(2)(k) [redacted] NZ Customs does not explicitly provide an excise duty for heated tobacco consumption thus we adopt the current rate of excise on "Other Tobacco Products", which is $1.55523 per gram of tobacco content.[8] S9(2)(k) [redacted]

To calculate the GST-inclusive excise duty on a packet of 20 cigarettes we combine equation (5) with the assumed average tobacco content of 0.8 grams per cigarette, and the corresponding excise duty for manufactured cigarettes, which is $1.77302 per gram of tobacco content. Rounding down to nearest dollar yields T^S=32.[9]

4.3.3. The volume share of heated tobacco

The final parameter we need to calculate the fiscal impact of this policy are the volume shares of heated tobacco, both under the status quo and proposed policy settings. This is also the most difficult to establish because heated tobacco products are a relatively recent innovation and thus

[6] The term $g^i X^i$ describes the GST-exclusive excise-equivalent duty per stick. Multiplying this term by 23 therefore describes the GST-inclusive excise-equivalent duty per packet of 20 sticks.

S9(2)(k) [redacted]

[8] New Zealand Customs Service. (01 December 2023). New excise duty rates for tobacco and tobacco products from 1 January 2024. Retrieved 20 May 2024, from https://www.customs.govt.nz/about-us/news/important-notices/new-excise-duty-rates-for-tobacco-and-tobacco-products-from-1-january-2024/

[9] The calculation suggests a value of $32.63, however, we round this value down to $32 to account for the fact that some cigarettes sold in New Zealand contain less than 0.8g of tobacco and a lower excise duty is charged below that threshold ($1.24423 per cigarette). See New Zealand Customs Service. (01 December 2023). New excise duty rates for tobacco and tobacco products from 1 January 2024. Retrieved 20 May 2024, from https://www.customs.govt.nz/about-us/news/important-notices/new-excise-duty-rates-for-tobacco-and-tobacco-products-from-1-january-2024/

there is limited data which can inform how demand in New Zealand for this product will evolve. Further, we need to account for the possibility that demand for heated tobacco and more traditional smoked tobacco products may both depend on the excise duty on heated tobacco.

We propose modelling the volume share of heated tobacco with a general expression which features the potential reduction in excise duty on heated tobacco as a key argument, allowing us to model the volume share of heated tobacco both under the status quo and the proposed policy. The general expression we adopt is as follows

$$h_{2024+j}(\theta) = h_{2015+j}^{Japan} \times A(\theta)^{-1}, \text{for } j \in \{1, \dots, 4\} \quad (6)$$

S9(2)(k)

where j is an index which runs from 1 to 4, $h_{2024+j}(\theta)$ is the volume share of heated tobacco in the year $2024 + j$, which is a function of θ, the proposed reduction in excise duty on heated tobacco, S9(2)(k)

S9(2)(k)

and h_{2015+j}^{Japan} is the volume share of heated tobacco in Japan in the year $2015 + j$.

How does one understand this equation? The first term is the volume share of heated tobacco in Japan between 2016 and 2019, as described in Cummings et al (2020). This is the only real-world evidence we could find from any country which details the annual evolution in the volume shares of heated tobacco following its introduction and we therefore use this data to inform our model, whilst noting that the regulation of and the demand for tobacco products differs substantively between Japan in 2016 and New Zealand in 2025.

Heated tobacco products were launched for sale in Japan in 2014, first with the *IQOS*, marketed by Philip Morris International, followed by *Ploom* and *glo*, which were launched in 2016 by Japan Tobacco International and British American Tobacco, respectively (Cummings et al, 2020). Cummings et al (2020) charted the volume share of heated tobacco products as a proportion of the volume of all tobacco sales between 2014 and 2019; we reproduce those estimates in Table 3 below. Prior to 2016 the sales volume of heated tobacco products as a proportion of all tobacco sales in Japan was 0%, however that had risen to 2.9% by 2016, and to 23.5% by 2019.

Table 3: Volume of Heated Tobacco as Share of All Tobacco Products, in Japan 2016-2019

Year (Ending 30 June)	2016	2017	2018	2019
Volume Share of Heated Tobacco (%), Japan	2.9000	11.8000	20.7000	23.5000

Source: Cummings et al (2020), Table 1.

Equation (6) then divides the Japanese volume shares by an adjustment factor – this is the term inside the parentheses which reflects the potential change in price and consequent change in demand following the change in excise duty on heated tobacco – to estimate the volume share in New Zealand between 2025 and 2028. S9(2)(k)

S9(2)(k)

The volume shares of heated tobacco in Japan between 2016 and 2019, shown in Table 3, underpin our estimates for the volume share of heated tobacco in New Zealand between 2025 and 2028. Using these rates in combination with the adjustment factors, which are described above and provided in Section 10.1, yields the following estimates of the volume share of heated tobacco for New Zealand between 2025 and 2028.

Table 4: Estimated Volume of Heated Tobacco as Share of All Tobacco Products, in New Zealand, 2025-2028, by Excise Duty Policy

Year (Ending 30 June)	2025	2026	2027	2028

S9(2)(k)

Estimations of the fiscal impact of the proposed policy combines these estimated volume shares with the other parameters described in this section, according to equation (4).

5. Results

Table 5 details the estimated proportional reduction in aggregate tobacco excise duty revenue due to the proposed policy, which are computed by combining equation (4) with the values of the parameters which were detailed in section 4.3.

Table 5: Estimated Fiscal Impact of the Proposed Policy, as Percent of Aggregate Tobacco Excise Revenue, by Financial Year

Year (Ending 30 June)	2025	2026	2027	2028
Estimated Total Cost of Proposed Policy, as Percent of Aggregate Tobacco Excise Revenue, Cumulative	-0.7174	-2.9192	-5.1209	-5.8136
Estimated Total Cost of Proposed Policy, as Percent of Aggregate Tobacco Excise Revenue, Incremental	-0.7174	-2.2017	-2.2017	-0.6927

The first row details the proportional fiscal impact of the proposed policy. We estimate that the proposed policy will reduce aggregate tobacco excise by 0.72% in the year to 30 June 2025, 2.92% in 2026, 5.12% in 2027, and 5.81% in 2028. The second row presents the implied incremental fiscal

impact, which is equal to the total estimated percentage reduction in aggregate tobacco excise revenue in a given year, less that in the preceding year.

We provided the estimated incremental percentage reductions in aggregate tobacco excise, as detailed in the final row of Table 5, to the New Zealand Treasury in order to convert these percentage reductions into the dollar-valued fiscal impact of the proposed policy. The New Zealand Treasury incorporated these estimates into their Customs and Excise model, which features projections of future tobacco excise revenue (under the status quo) and projected inflation, the results of which are displayed in Table 6 below.

Table 6: Estimated Fiscal Impact of the Proposed Policy, $m, by Financial Year

Year (Ending 30 June)	2025	2026	2027	2028	Total
BEFU 2024 (Prelim) Forecast of Annual Aggregate Tobacco Excise Tax Revenue under Status Quo	1,453	1,426	1,398	1,370	5,647
Best Estimate of Annual Aggregate Tobacco Excise Tax Revenue Under Proposed Policy	1,441	1,382	1,324	1,288	5,435
Best Estimate of Change in Annual Aggregate Tobacco Excise Tax Revenue Due to Proposed Policy	-11	-44	-74	-82	-211

Source: NZ Treasury (2024).

The first row presents the New Zealand Treasury's estimate of aggregate tobacco excise tax revenue under the status quo, by year, according to preliminary Budget 2024 projections. We observe that the annual aggregate tobacco excise tax revenue is projected to decrease over the period, from $1,453m in 2025 to $1,370m in 2028, at a rate of about 1-2% per year, reflecting The Treasury's baseline projection of declining future tobacco consumption.

The second and third rows present the implied estimate of annual aggregate tobacco excise tax revenue under the proposed policy, as well as its difference from the preliminary Budget 2024 forecasts. We find that our estimates of the proportional reduction in demand in conjunction with the NZ Treasury's projections of tobacco excise revenue imply an estimated reduction in aggregate tobacco excise of $11m in the year to 30 June 2025, increasing to $44m in 2026, $74m in 2027, and $82m in 2028. This represents a total impact of $211m across the forecast period.

6. Supplementary Modelling

Our estimates of the fiscal impact of the proposed policy contain considerable uncertainty, owing to the limited data and evidence which might inform how the demand for heated tobacco products will evolve in New Zealand under either the status quo or the proposed policy, as well as how this might affect the demand for smoked tobacco.

To detail how we estimate the fiscal impact would change under either alternative policy settings or parameter values we present the results of a set of supplementary scenarios in Table 7. The first row reproduces our best estimates of the fiscal impact of the proposed policy, as in Table 6, and is used to frame the size of the fiscal impact of the supplementary scenarios.

The second row details the estimated fiscal impact of a 15% reduction in the excise duty on heated tobacco, S9(2)(k) The lower fiscal impact is the result of two separate effects. First, a smaller reduction in excise duty will necessarily reduce the loss of excise duty revenue on sales which would have occurred under the status quo. Second, a smaller reduction in excise duty is expected to generate smaller changes in retail prices and therefore less substitution from smoked tobacco to heated tobacco (which attracts less excise duty per unit than smoked tobacco).

The third row details the estimated fiscal impact of an 85% reduction in the excise duty on heated tobacco, S9(2)(k) This occurs because a greater proportional reduction in excise increases each of the two effects which were outlined in the previous paragraph.

Finally, the fourth row details the estimated fiscal impact of a 50% reduction in the excise duty on heated tobacco, which is the same as the proposed policy, S9(2)(k) Importantly, the direct cost of the reduction in excise duty, which is equal to the loss of excise duty revenue from sales which would have occurred under the status quo, is only a function of the quantity of sales under the status quo and the reduction in excise. S9(2)(k) S9(2)(k) a careful estimation of the value of this parameter in New Zealand is needed to better understand whether the reducing excise duty on heated tobacco is likely to provide a net benefit to New Zealanders, and how those benefits are distributed between consumers and retailers.

Table 7: Estimated Fiscal Impact of the Proposed Policy and Supplementary Scenarios, $m, by Financial Year

Year (Ending 30 June)	2025	2026	2027	2028	Total
Estimate of Change in Annual Aggregate Tobacco Excise Tax Revenue Due to Proposed Policy (50% Reduction in Excise Duty, S9(2)(k)	-11	-44	-74	-82	-211
Estimate of Change in Annual Aggregate Tobacco Excise Tax Revenue Due to Supplementary Scenario 1 (15% Reduction in Excise Duty, S9(2)(k)	S9(2)(k)				
Estimate of Change in Annual Aggregate Tobacco Excise Tax Revenue Due to Supplementary Scenario 2 (85% Reduction in Excise Duty, S9(2)(k)					

Estimate of Change in Annual Aggregate Tobacco Excise Tax Revenue Due to Supplementary Scenario 3 (50% Reduction in Excise Duty, S9(2)(k)	S9(2)(k)

Source: NZ Treasury (2024).

7. Extension to impact on the number of cigarette smokers

The preceding sections document the expected fiscal impact resulting from a reduction of excise duty on heated tobacco products based on the volume share of heated tobacco (relative to the total volume of tobacco sold), rather than the explicit number of people consuming cigarettes and heated tobacco products.

After conducting the above analysis, we were asked to estimate the number of smokers likely to convert to HTPs in the years to 30 June 2025 and 30 June 2026. This section describes the approach we took to answer that question, along with the assumptions that underpin the resulting estimate. Further work is needed to test whether the assumptions are reasonable – we note that while this approach gave timely results, there is considerable uncertainty about the estimates.

As detailed in Section 4.3.3, we estimate the proposed policy will increase heated tobacco's volume share of aggregate tobacco sales by S9(2)(k) and S9(2)(k) percentage points in the years to 30 June 25 and 30 June 2026, respectively. We can then estimate the change in the annual number of cigarette smokers by multiplying the increase in volume shares by the estimated annual number of cigarette smokers under the status quo. The implicit assumption here is that proportional reduction in the number of cigarette smokers is equal to the reduction in the volume share of smoked tobacco. This is summarised by the following expression

$$\widehat{N}_t(\theta) = \widehat{N}_t(0) \times \delta_t(\theta) \qquad (8)$$

where t is a year index, $\widehat{N}_t(\theta)$ is the estimated number of cigarette smokers in year t given a proportional reduction in excise of θ and $\delta(\theta)$ is an estimate of the proportional reduction in the number of cigarette smokers.

To estimate the number of cigarette smokers in 2025 and 2026 under the status quo, we first obtained the estimated annual count of current smokers from the New Zealand Health Survey between 2014 and 2023, as reported in Ministry of Health (2023); these values are reproduced in Table A3.[10] S9(2)(k)

S9(2)(k)

[10] A current smoker is defined as someone who has smoked more than 100 cigarettes in lifetime and currently smokes at least once a month.

S9(2)(k) [redacted]

To provide timely advice we assume that the number of smokers will reduce at the same rate as the volume share of smoked tobacco, which was detailed earlier in Table 4 [redacted]

These values appear in the second row of Table 8. This is a strong assumption which implies that substituting between cigarettes and heated tobacco products is uncorrelated with the level of cigarette consumption. For example, out of current cigarette smokers, if those who smoke the fewest (most) cigarettes per year are most likely to give up then we would expect the number of current smokers to decrease by more (less) than the estimated change in the volume share of smoked tobacco. Further work should include analysis to understand the reasonableness of this assumption.

Finally, the third row of Table 8 presents the estimated reduction in the number of current smokers, which is equal to the product of the preceding two series. This suggests that, if the assumptions outlined in this section hold, we would expect the proposed policy to reduce the number of current smokers by 1,553 in the year to 30 June 2025, and by 5,659 in the year to 30 June 2026.

Table 8: Projected Number of Current Smokers, Between Status Quo and Proposed Policy, by Financial Year

Year (Ending 30 June)	2025	2026
Estimated number of current smokers under status quo	S9(2)(k) [redacted]	
Estimated reduction in the number of current smokers due to proposed policy, as a proportion of the number of current smokers under status quo		
Estimated reduction in the number of current smokers due to proposed policy, as a count	1,553	5,659

8. Concluding notes

This work outlined in this paper was undertaken iteratively, as new insights were requested rather than scoped and planned from the beginning. This means that aspects such as the impact on the number of smokers are constrained by previous analytical decisions, and subject to considerable uncertainty. The work was also undertaken in extremely short timeframes, again increasing the uncertainty since analytical decisions had to be taken quickly and with little consultation.

Because of this uncertainty we have written up the steps and assumptions as completely as possible, so that stakeholders can see the conditions under which the estimates will hold.

9. References

Cummings, K. M., Nahhas, G. J., & Sweanor, D. T. (2020). What Is Accounting for the Rapid Decline in Cigarette Sales in Japan? International Journal of Environmental Research and Public Health, 17(10), 3570.

S9(2)(k) [redacted]

Ministry of Health. 2023. Annual Data Explorer 2022/23: New Zealand Health Survey [Data File]. URL: https://minhealthnz.shinyapps.io/nz-health-survey-2022-23-annual-data-explorer/ (Accessed 21 May 2024).

New Zealand Customs Service. (10 July 2023) What is excise? Retrieved 27 June 2024, from https://www.customs.govt.nz/business/excise/what-is-excise/

New Zealand Customs Service. (01 December 2023). New excise duty rates for tobacco and tobacco products from 1 January 2024. Retrieved 20 May 2024, from https://www.customs.govt.nz/about-us/news/important-notices/new-excise-duty-rates-for-tobacco-and-tobacco-products-from-1-january-2024/

New Zealand Government. (05 October 2023). Financial Statements of the Government of New Zealand for the Year Ended 30 June 2023. Retrieved 20 May 2024, from https://www.treasury.govt.nz/sites/default/files/2023-10/fsgnz-2023.pdf

New Zealand National Party & New Zealand First (2023). Coalition Agreement: New Zealand National Party & New Zealand First. Retrieved 20 May 2024, from https://assets.nationbuilder.com/nationalparty/pages/18466/attachments/original/1700778592/National_ACT_Agreement.pdf?1700778592

New Zealand Treasury. (2024). BEFU 2024 (Prelim) estimates of the aggregate tobacco excise tax revenue under the status quo and the estimated tobacco excise tax revenue under the proposed policy. Unpublished. Received 23 April 2024.

S9(2)(k) [redacted]

10. Appendix

10.1. Summary tables all numerical parameters and results

Table A1: Table of all parameters, with values and source and/or derivation, ordered by appearance

Parameter	Symbol	Value	Notes
The proposed proportional reduction in excise duty on heated tobacco products.	θ	{0.15, 0.5, 0.85}	The policy proposes reducing the excise duty on heated tobacco by 50%, and thus 0.5 is our central figure. However, we also adopt the values of 0.15 and 0.85 in our sensitivity tests.
Derived excise duty on 20 units of heated tobacco	T^H	S9(2)(k)	$T^H = 23g^H X^H$, each of which are detailed below.
Tobacco content per heated tobacco unit, in grams	g^H	S9(2)(k)	S9(2)(k)
Current rate of excise-equivalent duty per gram of heated tobacco.	X^H	$1.55523	Because NZ Customs does not explicitly provide an excise-equivalent duty for heated tobacco products we adopt the current rate of excise on "Other Tobacco Products", as provided in New Zealand Customs Service (2023).
Derived excise duty on 20 units of smoked tobacco	T^S	$32	$T^S = 23g^S X^S$, rounded down to the next dollar, each of which are detailed below.
Tobacco content per smoked tobacco unit, in grams	g^S	0.8	Informed by personal communication with a Subject Matter Expert.
Current rate of excise-equivalent duty per gram of smoked tobacco.	X^S	$1.77302	This is the excise duty per gram for manufacturer cigarettes which exceed 0.8 grams of tobacco per cigarette, as outline in New Zealand Customs Service (2023).

S9(2)(k)

Table A2: Table of Results, by Financial Year

Year (Ending 30 June)	2025	2026	2027	2028	Total
Baseline					
Forecast of Aggregate Tobacco Excise Revenue, $m, NZ Treasury (2024)	1,453	1,426	1,398	1,370	5,647
Uptake of HTPs					
S9(2)(k) [redacted]					
Fiscal Impact of Proposed Policy					
Estimated Total Cost of Proposed Policy, as Percent of Aggregate Tobacco Excise Revenue, Cumulative	-0.7174	-2.9192	-5.1209	-5.8136	
Estimated Total Cost of Proposed Policy, as Percent of Aggregate Tobacco Excise Revenue, Incremental	-0.7174	-2.2017	-2.2017	-0.6927	
Best Estimate of Annual Aggregate Tobacco Excise Tax Revenue Under Policy Initiative ($m)	1,441	1,382	1,324	1,288	5,435
Best Estimate of Change in Annual Aggregate Tobacco Excise Tax Revenue Due to Policy Initiative ($m)	-11	-44	-74	-82	-211
Estimated Change in the Number of Cigarette Smokers					
S9(2)(k) [redacted]	S9(2)(k) [redacted]				
Decrease in Number of Cigarette Smokers under Proposed Policy if Equivalent to Proportional Change in HTP sales	1,553	5,659			
Alternative Scenarios					
Supplementary Scenario 1: Estimated Change in Annual Aggregate Tobacco Excise Tax Revenue if Excise Duty on HTPs is reduced by 15%, S9(2)(k) [redacted]	-4	-15	-25	-28	-71
Supplementary Scenario 2: Estimated Change in Annual Aggregate Tobacco Excise Tax Revenue if Excise Duty on HTPs is reduced by 85%, S9(2)(k) [redacted]	-18	-71	-119	-132	-340
Supplementary Scenario 3: Estimated Change in Annual Aggregate Tobacco Excise Tax Revenue if	-8	-32	-55	-61	-156

Year (Ending 30 June)	2025	2026	2027	2028	Total
Excise Duty on HTPs is reduced by 50%, S9(2)(k) [redacted]					

Table A3: Estimated Number of Current Smokers According to NZ Health Survey, by Year

Year (Ending 30 June)	Estimated Number of Current Smokers
2014	630,000
2015	613,000
2016	622,000
2017	615,000
2018	594,000
2019	586,000
2020	559,000
2021	451,000
2022	406,000
2023	350,000

Source: Ministry of Health (2023)

10.2. Deriving Equation (3)

We begin from the difference between equations (1) and (2), and to obtain the desired expression we proceed as follows

$$\begin{aligned} FI_t &= R_t^{PP} - R_t^{SQ} \\ &= \left(Q_t^{H,PP}(1-\theta)T^H + Q_t^{S,PP}T^S\right) - \left(Q_t^{H,SQ}T^H + Q_t^{S,SQ}T^S\right) \\ &= \left((1-\theta)Q_t^{H,PP} - Q_t^{H,SQ}\right)T^H + \left(Q_t^{S,PP} - Q_t^{S,SQ}\right)T^S \end{aligned}$$

where the third line groups terms by the tax type rather than by tax scenario.

10.3. Deriving Equation (4)

We begin by dividing equation (3) by equation (1), and then as follows

$$\begin{aligned} \frac{FI_t}{R_t^{SQ}} &= \frac{\left((1-\theta)Q_t^{H,PP} - Q_t^{H,SQ}\right)T^H + \left(Q_t^{S,PP} - Q_t^{S,SQ}\right)T^S}{Q_t^{H,SQ}T^H + Q_t^{S,SQ}T^S} \\ &= \frac{\left((1-\theta)Q_t^{H,PP} - Q_t^{H,SQ}\right)T^H + \left(Q_t^{S,PP} - Q_t^{S,SQ}\right)T^S}{Q_t^{H,SQ}\frac{T^H}{T^S} + Q_t^{S,SQ}}\frac{1}{T^S} \end{aligned}$$

$$\approx \frac{\left((1-\theta)Q_t^{H,PP} - Q_t^{H,SQ}\right)T^H + \left(Q_t^{S,PP} - Q_t^{S,SQ}\right)T^S}{Q_t^{H,SQ} + Q_t^{S,SQ}} \frac{1}{T^S}$$

$$= (1-\theta)\frac{Q_t^{H,PP}}{Q_t^{H,SQ} + Q_t^{S,SQ}}\frac{T^H}{T^S} - \frac{Q_t^{H,SQ}}{Q_t^{H,SQ} + Q_t^{S,SQ}}\frac{T^H}{T^S} + \frac{Q_t^{S,PP}}{Q_t^{H,SQ} + Q_t^{S,SQ}} - \frac{Q_t^{S,SQ}}{Q_t^{H,SQ} + Q_t^{S,SQ}}$$

$$\approx (1-\theta)\frac{Q_t^{H,PP}}{Q_t^{H,PP} + Q_t^{S,PP}}\frac{T^H}{T^S} - \frac{Q_t^{H,SQ}}{Q_t^{H,SQ} + Q_t^{S,SQ}}\frac{T^H}{T^S} + \frac{Q_t^{S,PP}}{Q_t^{H,PP} + Q_t^{S,PP}} - \frac{Q_t^{S,SQ}}{Q_t^{H,SQ} + Q_t^{S,SQ}}$$

$$= (1-\theta)\frac{Q_t^{H,PP}}{Q_t^{H,PP} + Q_t^{S,PP}}\frac{T^H}{T^S} - \frac{Q_t^{H,SQ}}{Q_t^{H,SQ} + Q_t^{S,SQ}}\frac{T^H}{T^S} + \left(1 - \frac{Q_t^{H,PP}}{Q_t^{H,PP} + Q_t^{S,PP}}\right) - \left(1 - \frac{Q_t^{H,SQ}}{Q_t^{H,SQ} + Q_t^{S,SQ}}\right)$$

$$= \left(\frac{Q_t^{H,PP}}{Q_t^{H,PP} + Q_t^{S,PP}}\right)\left((1-\theta)\frac{T^H}{T^S} - 1\right) - \left(\frac{Q_t^{H,SQ}}{Q_t^{H,SQ} + Q_t^{S,SQ}}\right)\left(\frac{T^H}{T^S} - 1\right)$$

Note, this relies on the following approximations:

1. $\frac{Q_t^{SQ}}{Q_t^{H,SQ}\frac{T^H}{T^S} + Q_t^{S,SQ}} \approx \frac{Q_t^{SQ}}{Q_t^{H,SQ} + Q_t^{S,SQ}}$, and $\frac{Q_t^{PP}}{Q_t^{H,PP}\frac{T^H}{T^S} + Q_t^{S,PP}} \approx \frac{Q_t^{PP}}{Q_t^{H,PP} + Q_t^{S,PP}}$
   These expressions hold with equality only when the excise rates are the same across the two categories, which is not true in our case. However, we believe this is a reasonable approximation given (i) the relatively low level of excise duty on a heated tobacco product, and (ii) the relatively low volume share of heated tobacco, particularly in the early years of adoption. To see this, note that if the market share of heated tobacco products is 2.9% – as we assume under the status quo in the year to June 2025 – then the true value of this term is 0.0297, which we approximate by 0.029, whilst if the market share of heated tobacco products is 23.5% – as we assume under the status quo in the year to June 2028 – then the true value of this term is 0.2896, which we approximate by 0.2350.
2. $Q_t^{H,SQ} + Q_t^{S,SQ} \approx Q_t^{H,PP} + Q_t^{S,PP}$. That is, we assume the policy has a limited effect on the overall tobacco volume but allow consumers to switch between products. This assumption is consistent with Japanese tobacco data.