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Current Treasury Tobacco excise models

- Tobacco excise forecasting model:
  - Variables:
    - Chain volume tobacco consumption (National Accounts)
    - Tobacco CPI
  - Underlying growth
    - Quarterly trend (-2.9%) x Elasticity effect (PED -0.5)
- TOBIAS: Tobacco costing model
  - Variables:
    - Chain volume tobacco consumption (National Accounts)
    - Tobacco CPI
  - Underlying growth:
    - $\mathrm{PED} = -0.5$
    - Illicit market adjustment using ATO Tax-gap

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Literature review

- Price elasticity of demand
  - Most international and domestic studies indicate that tobacco is inelastic PED ~ -0.5
- Cross price elasticity
  - There is a low number of cross-price elasticity estimates in the literature
  - One of the only papers comes from studies of Brazil's illicit market which finds very low cross price elasticities due to lack of substitutivity between markets
- Excise reductions
  - Canada 1992 (Arbitrage between US and Canada)
    - Excise reduction got rid of the black market at the expense of increased smoking rates

Simple illicit transfer model, linear symmetric setup, single period

Given volumes V_L , V_I

Cross price elasticity $\epsilon_{lI} = \frac{\%\Delta V_I}{\%\Delta P_L}$

Excise rates $t_0 = \$1.32, t_1$, Markup $m = 0.39$

Legal prices $P_0 = (t_0 + m) * \frac{11}{10}, P_1 = (t_1 + m) * \frac{11}{10}$

Revenue:

$$R_0 = t_0 V_L$$

$$R_1 = t_1 \left[\left(\frac{P_1}{P_0} - 1 \right) V_I * \ \epsilon_{lI} + V_L \right]$$

Other discussion points:

- Should illicit volume transfer be modelled as an elasticity?
  - Structural issues caused by absolute difference in price (tipping point) as opposed to a linear transfer of volume
  - Non-linear asymmetric elasticity modelling
- What type of consumer uses legal products given how widespread the illicit market is
  - High search costs – elderly people, remote areas
  - Consumer attitudes – would consumers actually switch back to legal at price parity? At 10%, 20% more etc.
- New entrants more likely to join illicit market rather than legal
- RAND illicit drug modelling

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Modelling relationships

Relationship	Functional form	Assumptions
Excise rate and retail sales price	$RSP = 0.001\ Excise + 0.387$	• MC Simulation of RSPs using historic markups • Markups are assumed to be normally distributed
Legal to illicit price gap to illicit market shares	$\text{Share} = 0.202\ \text{diff}^3 + 0.244\ \text{diff}^2 + 0.078\ \text{diff} + 0.15$	Cubic regression on historic data
Excise rate and revenue	$Revenue = -0.000006\ Excise^2 + 0.0123\ Excise + 1.0849$	• MC Simulation of revenue given an excise rate • Assumes new legal volume will come from the illicit market. • Assumes xPED ~ N(-2,0.5), market share ~ N(0.48,0.12)