The TETSiM Model

FCTC WHO FRAMEWORK CONVENTION ON TOBACCO CONTROL SECRETARIAT-KNOWLEDGE HUB

REEP Research Unit on the Economics of Excisable Products

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The Tobacco Excise Tax Simulation Model (TETSiM) is a tool to quantify the likely impact of a change in the excise tax structure and/or the level of the excise tax on a number of variables, including the price of cigarettes, cigarette consumption and excise tax revenue.
Programmed in Excel, it provides a customisable model of the excise tax system for individual countries. The degree of complexity of the model depends on the structure of the excise tax system, and the availability of appropriate data.
In principle, any person with Excel programming skill can develop a TETSiM model for their country. However, some tobacco excise taxation experience is useful, especially if the tax or pricing system is quite complicated. All researchers at REEP have been trained in the TETSiM model and can help officials develop their own country models.

The mechanics of the model

The first step to develop the model for a specific country is to correctly describe the pre-existing tax and price structure (the base scenario). For this, the user requires data about the number of cigarettes consumed in the country by market segment, and the retail price within each market segment.

The model also requires enough data to enable the modeller to subdivide the retail price of a pack of cigarettes into various tax and net-of-tax components. The tax components typically include the excise tax, Value-added Tax, import duties and additional import levies. The net-of-tax components are the non-tax part of the total retail price; typically, the import value (for imported cigarettes), the ex-factory price (for domestic production), the producer mark-up, the wholesale margin and the retail margin.

For most countries there would be at least three market segments (premium, popular and discount), even if the excise tax has a simple structure (e.g. uniform specific tax or single rate). For countries with multiple tax tiers, like Indonesia (which has ten), one would ideally have information about the market segments across the tiers

Total tax and net-of-tax revenues for the base scenario are obtained by multiplying the relevant tax and net-of-tax components per pack of cigarettes by the number of packs of cigarettes produced or consumed.

In the second step, the user changes the level of the excise tax and/or the excise tax structure. For example, the user could reduce the number of tax tiers or change the tax from an ad valorem structure (i.e. based on the value of the product), to a specific tax. Some tax structures and/or industry structures create incentives for tobacco companies to either over-shift (i.e. increase the retail price by more than the tax increase) or under-shift (i.e. increase the retail price by less than the tax increase) the tax increase. The model allows for such industry pricing responses, by allowing the user to change the import or ex-factory value, the producer mark-up, and the wholesale and retail margins. Based on these new price components, the model calculates the new retail price.

The higher retail price reduces the consumption of cigarettes; the magnitude of the reduction is determined by the price elasticity of demand. The price elasticity is user-determined, but a good approximation in the absence of a country-specific estimate is -0.6, based on studies in many countries. For longer-term simulations (i.e. 2 to 5 years), the model is typically programmed to account for consumption changes driven by population growth and growth in average incomes. In countries with multiple market segments, the model can accommodate smokers' substitution towards cheaper cigarettes.

Once the new quantity is estimated, the model calculates the new total tax and net-of-tax revenues by multiplying the new tax and net-of-tax components by the new quantity. The model also has a small module that estimates the health impact of the change in consumption, e.g. the change in smoking prevalence and the number of premature tobacco-related deaths averted.

The model can be programmed to estimate the likely impact of a once-off change in the excise tax from the base scenario, or to estimate the impact of a long-term tax reform strategy (e.g. Philippines, 2012 to 2017).

Strengths of the TETSiM approach

- Because it is programmed in Excel, the model is flexible and can be adjusted easily to the peculiarities of the country concerned.
- The model does not require much data to give reasonably accurate predictions.
- It can be a very useful tool to lobby for higher and/or better excise taxes.

Weaknesses of the TETSiM model

- It demands fairly advanced mathematical and programming skill in Excel.
- The results are driven by the inputs from the user; if the input parameters are wrong or unrealistic, the model will produce wrong or unrealistic outputs.

If you require more information, or if you want help in developing a TETSiM model for your own country, please contact Toughedah Jacobs, the Director of the Knowledge Hub, at toughedah.jacobs@uct.ac.za.

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