Product Tax Modelling in
INFORGE

by

Anke Mönnig
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1 Introduction

◊ Product Tax Modelling is important for the following reasons:
   ➢ Increasing role of Fiscal Policy
   ➢ Taxes are major source of state income
   ➢ Product Taxes (value added taxes, import taxes, excise duties) have distorting effects on purchasers’ prices
     ▪ Effect on consumed volume
     ▪ Effect on structure of consumption

◊ A differentiated and detailed approach to product tax modelling is favourable
2 Taxes on Products

- One important issue of fiscal policy is tax policy
- Taxes are the most important component of total state income
2 Taxes on Products

- Taxes can be split in direct (income) and indirect (consumption) taxes.
- On average, taxes on production and imports increased by 3.2% p.a. from 2000 to 2007. Income and property taxes increased by 0.9% p.a. in the same time.
2 Taxes on Products

- Indirect taxes can be split in three categories: value added taxes, import taxes and other taxes on products.
2 Taxes on Products

Taxes on Products can be categorized into general and specific consumption taxes:

- **General consumption taxes**
  - E.g. value added taxes
  - Levied on the turnover of all consumed products
  - Tax rate and tax base are equal for all products
  - Product price changes have consequences on tax revenue

- **Specific consumption taxes**
  - E.g. excise duties
  - Levied on the consumed quantity of a certain product
  - Tax rate and tax base vary according to the taxed object
  - Product price changes have no direct consequences on tax revenue
3 Product Tax Modelling in INFORGE

INFORGE and the location of taxes on products

- **Unit Costs**
  - Intermediate Goods (domestic and imported)
  - Unit Labour Costs
  - Depreciation
  - Production Fee
  - Nett Taxes on Products

- **Valuation Matrices**
  - 1...1
  - Intermediate Linkage Matrix
  - 59

- **Total Demand**
  - 59 categories of goods at purchasers' prices

- **Total Demand**
  - 59 categories of goods at basic prices

- **Labour Market**
  - (Financial and Non-Financial Corporations, Private Households, State and Rest of World)

- **National Accounts**
  - (Financial and Non-Financial Corporations, Private Households, State and Rest of World)

- **Trade Balance**
- **Gross Fixed Capital Formation in Branches of Production and their activities**
- **Private Consumption in purpose of use**
- **State Consumption**

- **Price Development of Gross Production**
- **Gross production 59 categories of goods**
3  Product Tax Modelling in INFORGE

- In INFORGE, taxes on products are located at the transition point of total demand at purchasers‘ prices and total demand at basic prices.
- Valuation matrices guarantee the correct transformation from purchasers‘ to basic prices.

In INFORGE, taxes on products are located at the transition point of total demand at purchasers‘ prices and total demand at basic prices.

Valuation matrices guarantee the correct transformation from purchasers‘ to basic prices.

<table>
<thead>
<tr>
<th>Purchasers' Prices</th>
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<tbody>
<tr>
<td>+  Subsidies on Products</td>
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<td>-  Taxes on Products</td>
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<td>-  Reallocating Trade and Transport Margins</td>
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<td>-  Reallocating Gas Margins</td>
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| Basic Prices |

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| Basic Prices |
3 Product Tax Modelling in INFORGE

- Each valuation matrix has exactly the same configuration.
- The valuation matrix of taxes on products shows the tax revenue for each \(i=59\) categories of goods and for each of the \(j=8\) components of total demand.

<table>
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<th>product tax revenue (U_ST) 2004, in million Euro</th>
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1. Agriculture, Hunting and related activities
2. Forestry, logging and related service activities
3. Fishing
4. Mining of coal and lignite; extraction of peat
5. Extraction of crude petroleum and gas
6. Mining of uranium and thorium ores
7. Mining of ores
8. Mining and quarrying of stones and earthes
9. Manufacture of food products
10. Beverages
11. Manufacture of tobacco products
12. …
3 Product Tax Modelling in INFORGE

◊ The technical implementation

Daniel Setting

- The setting of the database requires the unbundling of the historical given total product tax matrix (U_ST)
- The process consists of three steps, beginning with other product taxes (U_GST):

$$U_{GST}_{ij} = U_{ST}_{ij} / U_{ST}_{i10} * gsta_i$$

+ Balancing $U_{GST}$ on its basic value of the SNA
3 Product Tax Modelling in INFORGE

◊ The technical implementation
  ↘ Database Setting
    ▪ **Import tax matrix** (U_IAST):

\[
U_{IAST}\,_{ij} = \text{Constant Import Tax Quota} \times U_{ST}\,_{ij} + \text{Balancing } U_{IAST} \text{ on its basic value of the SNA}
\]
3 Product Tax Modelling in INFORGE

◊ The technical implementation

Database Setting

▪ **Value added tax matrix** (U_MST):

\[ U_{MST}^i_j = U_{ST}^i_j - U_{GST}^i_j - U_{IAST}^i_j \]
3 Product Tax Modelling in INFORGE

◊ Modelling Taxes on Products
  ➞ The Method of modelling taxes on products depend on the tax type
    ▪ Specific product taxes: Other product taxes
    ▪ General product taxes: Import taxes and value added taxes
3 Product Tax Modelling in INFORGE

Modelling Taxes on Products

- Total Demand at purchasers’ prices
- Taxes on Products
  - Transition Matrix U_ST
  - Subsidies
  - Transport, gas, service margins
- Total Demand at basic prices

Other Product Taxes U_GST
- Specific Taxes
  - Regression Approach tax base = f(cpvr)
- General Taxes
  - Linkage Approach Δ tax revenues ≡ Δ turnover

Import Taxes U_IAST

Value Added Taxes U_MST

Modelling Taxes on Products in INFORGE
Running a Simulation

It is assumed that the national government in Germany decides on the abolition of the reduced value added tax rate (7%) in 2009. From that time on, a uniform value added tax rate of 13% is set.

Overall result:
4 Simulation on Product Taxes

Running a Simulation

- **Short-term results:**
  - Increase in consumer prices
  - Immediate decline in all components of final demand
  - Immediate increase in product tax revenues

- **Medium-term results:**
  - Unemployment increases
  - Pressure on social security system
  - Further increase in prices
  - Total demand decreases further

- **Long-term results:**
  - Consolidation of state budget
  - Cumulating effects slow down
5 Conclusion

- Empirical modelling helps to analyse FP shocks.
- Their effects on the output and structure of the economy can be interpreted.

- Possible soft spots:
  - Unbundling of taxes on products are subject to certain assumptions (e.g. constant import tax quota).
  - Specific consumption taxes are more complex in reality (e.g. different tax rates for cigarettes or shag).

- Data restriction leads to an insufficient endowment in official data.
- With a more sophisticated historical dataset, the modelling of taxes on products could be improved.
Thank you for your attention

Any Questions?
Any Comments?