

Introduction to Micro-simulation Modeling of Corporate Income Tax

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Part I - Introduction to Micro-simulation Modeling

Macro- versus micro-simulation models

- Macro forecasting models, using aggregate *National Accounts* data, typically relied upon to estimate future tax revenues for main taxes (e.g. PIT, CIT, VAT).
- PIT and CIT micro-simulation models, relying on taxpayer-level data from tax returns, required to assess the distributional impacts of tax changes across taxpayer groups, regions, sectors.
 - Computer program (e.g. Excel spreadsheet) links taxpayer-level data to tax parameters and tax equations. Generates results for tax policy analysis.
 - Tax equations capture inter-relationship of main tax parameters (e.g. tax rates) and taxpayer data, as specified under tax rules.
 - Once constructed, the computer program ('tax model') enables rapid analysis of results (e.g. distribution of tax burden, effective tax rates) under alternative tax policy configurations.

Income tax micro-simulation models

- Income tax (PIT,CIT) micro-simulation models use disaggregate data drawn from representative sample of taxpayer population.
- Main use – assessment of distributional effects of tax reform. Also used to estimate overall revenue impacts (to be checked against macro forecasts).
- Database consists of information needed for tax assessment, for representative sample of taxpayer population (individuals (PIT), corporations (CIT)) – tax rules are applied to the sample, and tax liabilities calculated – results for the sample are then weighted to derive economy-wide estimates.
- Micro-simulation models have been used extensively in the field of tax reform analysis.

Data Limitations

- Significant resources involved in developing, implementing, and maintaining data retrieval and data transcription systems.
- Resource costs in extracting data from tax returns typically limit the coverage of the database.
 - Typically use a sample (rather than population), with sampling techniques applied to obtain representative sample that can be weighted to generate population-wide estimates.
 - Transcription of key data (not all data) required for tax calculations.
 - Certain key information recorded for all taxpayers (final tax liability, total income), which provides a check against estimates based on sample data.
- Need for checking/correcting transcription/programming errors.
- Privacy laws may restrict access to certain confidential taxpayer information.

Challenges in micro-simulation modeling in economies in transition

- Tax modeling is difficult in economies in transition:
 - lack of data (resource costs, incomplete tax returns, non-filing)
 - uncertain application of the tax law, uncertain administration of the tax law, uncertain lags between tax policy changes and their taking effect.
- Frequent changes to tax laws create difficult conditions for tax modeling. Modeling environment improves once tax system has had time to consolidate.
- Perhaps best to begin with CIT micro-simulation model covering medium-sized and large corporations – include all large corporations in sample, and selected medium-sized firms.

Part II – Modeling of Corporate Income Tax (CIT)

Basics of CIT micro-simulation modeling

- Broad objectives.
- Relative advantages.
- Framework considerations.
- Basic construct of a CIT micro-simulation model.

Broad objectives of CIT micro-simulation modeling

- Estimating the total CIT revenue impact of changes to CIT law.
- Estimating the distributional CIT impact of changes to CIT law:
 - Number of firms affected
 - Industry analysis
 - Firm-size analysis
 - Identification of ‘winners’ and ‘losers’
 - Analyze other issues of concern to policy makers.
- Establishing a “baseline” forecast of tax receipts.

Relative advantages of CIT micro-simulation modeling

- Takes advantage of detailed taxpayer-level data.
- Disaggregation maximizes flexibility of analysis.
- Enables analysis of revenue impact (total and distribution) of (detailed) changes to the tax base and rate structure.
- Provides a basis for key imputations:
 - Behavioural responses
 - Missing information.

Framework considerations in CIT micro-simulation modeling

- Key questions to be answered.
- Main constraints:
 - Time
 - Resources
- Available data to answer the key questions.
 - How reliable are the data?
- Possible methods to answer questions.
 - Simple and quick, versus detailed, complicated and slow.
- Possible future benefits:
 - Building a modeling ‘infrastructure’.
- High-level diagnostics required as check on results:
 - Cross check aggregated results with aggregate data.

Basic construct of CIT micro-simulation model

- DATA →MODEL→OUTPUT
- DATA: information obtained from a sample of CIT returns.
- MODEL: tax calculator, based on:
 - key tax parameters (e.g. CIT rate, depreciation rates)
 - key relationships in corporation's tax calculation.
 - weights to estimate population results based on sample results.
- OUTPUT: tables based on model output, that report main results of policy interest:
 - estimated CIT revenues under actual tax policy (base tax system), versus estimated CIT revenues under revised tax policy (hypothetical system).

Thank you