Analysing tax and social security policy: examples from Mexico and the UK

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Analysing tax, benefits and pensions policy

• Quantitative analysis of tax, benefits and pensions policy is important input in policy-making and evaluation process
  – Assessing the distributional impact of system or reforms
  – Assessing impact on behaviour and economic efficiency

• IFS analysis of tax policy in UK relies a lot on this
  – Analysing distributional impact of government budget measures
  – Suggesting improvements to UK tax system (the Mirrlees Review)

• IFS researchers have also been involved in analysing policy in middle income countries:
  – Study of tax reforms in Mexico and El Salvador (World Bank)
What’s coming up?

• Methodological issues:
  – What kind of models?
  – How to assess the distributional impact of reforms

• A tax-microsimulation model for Mexico: MEXTAX

• Using microsimulation for UK tax system design: TAXBEN
Methodological Issues
A static or dynamic models?

- Static models simulate impact of reform at one point in time
  - Only single cross-section of data required
  - No need to project forward population dynamics
  - But can change the point in time to apply a model

- Dynamic models simulate the impact of a reform over time
  - Simulate population dynamics (e.g. future earnings/employment, fertility, health status, etc)
  - Demographic projections usually require panel data to estimate

- What model to use depends on policies in question
  - e.g. distributional impact of income tax change: static suitable
  - e.g. impact of change in social security contributions and pension entitlement rules on pension costs and payments: dynamic required

- Today, discuss static models
Allow for behavioural response?

• No-behavioural response modelling is most common
  – Easier to do than modelling behaviour
  – Reasonably approximation for many kinds of small reforms
  – Can give upper (lower) bounds on household static welfare costs (gains) from tax increases (cuts)

• But reforms can cause large changes in behaviour
  – Changes in how much people work or the income they generate
  – Changes in what people buy and consume

• Behavioural microsimulation models allow such responses
  – Sometimes very important: e.g. revenues from UK’s 50% income tax
  – Can better investigate ‘good’ policy
  – Important to realise estimated responses are subject to uncertainty
How to assess distributional effects?

• How to rank households as rich or poor: income or expenditure?
  – Both suffer from measurement error and are volatile
  – Borrowing and saving mean rank people differently
  – Probably worthwhile looking at impacts over both income and expenditure distributions

• Relative gains/losses: proportion of income or expenditure?
  – Borrowing and saving mean dividing by income or spending can give very different answers
  – Best to divide gains/losses from direct changes by income, gains/losses from indirect changes by expenditure

• Also look at gains/losses in cash terms
  – Policy may redistribute proportionally but not in cash terms
Analysing Reforms in Mexico
MEXTAX – our simulator (I)

• We developed a tax microsimulation model for Mexico called MEXTAX
  – Included income tax, indirect taxes and social security contributions
  – Simulate these and other reforms to the tax system

• Want to use this to
  – Estimate revenues from tax increases
  – Estimate the distributional impact
  – Model the impact on work, consumption
  – Allow for less-than-full pass through of VAT to consumer prices
  – Take into account the fact that informality means much activity is not taxed
MEXTAX – our simulator (II)

• Built and runs using Stata
  – Widely available econometrics program, but requires some basic knowledge of the language
  – Users edit an ‘interface’ and ‘parameters’ modules
  – No need to edit calculation code unless very major reforms (e.g. Shift from individual to joint taxation)
Parameters module

*********** INCOME TAX ***********

*********** INCOME TAX EXEMPTIONS ***********
scalar NUMSOURCES = 20

**** MONETARY AMOUNTS ****
scalar EXEMPT1 = 0
scalar EXEMPT2 = 0
scalar EXEMPT3 = 1577.7
scalar EXEMPT4 = 1577.7
scalar EXEMPT5 = 788.85
scalar EXEMPT6 = 788.85
scalar EXEMPT7 = 100000000
scalar EXEMPT8 = 0
scalar EXEMPT9 = 100000000
scalar EXEMPT10 = 100000000

foreach X of numlist 11(1)20 {
    scalar EXEMPT'X' = 100000000
}

**** PERCENTAGES ****
scalar PEEXEMPT1 = 0
scalar PEEXEMPT2 = 0.5

foreach X of numlist 3(1)50 {
    scalar PEEXEMPT'X' = 0
}

scalar PEEXEMPT1 = 0
scalar PEEXEMPT2 = 13673.4

foreach X of numlist 3(1)20 {
    scalar PEEXEMPT'X' = 0
}

*********** INCOME TAX THRESHOLDS ***********
scalar NUMBANDS = 8
scalar BAND0 = 0
scalar BAND1 = 5952.84
scalar BAND2 = 50524.92
scalar BAND3 = 60793.04
scalar BAND4 = 103218.00
scalar BAND5 = 123580.20
scalar BAND6 = 245243.48
scalar BAND7 = 392641.95
scalar BAND8 = 100000000

*********** INCOME TAX RATES ***********
scalar RATE1 = 0.0192
scalar RATE2 = 0.064
scalar RATE3 = 0.1088
scalar RATE4 = 0.16
scalar RATE5 = 0.1792
scalar RATE6 = 0.1994
scalar RATE7 = 0.2195
scalar RATE8 = 0.26

*********** INCOME SUBSIDY LIMITS ***********
scalar NUMCRED = 11
scalar LCRED0 = 0.01
scalar LCRED1 = 21227.52
scalar LCRED2 = 33840.55
scalar LCRED3 = 41674.08
scalar LCRED4 = 42454.44
scalar LCRED5 = 53353.80
scalar LCRED6 = 56606.15
scalar LCRED7 = 54025.04
scalar LCRED8 = 74696.04
scalar LCRED9 = 85356.00
scalar LCRED10 = 68587.96
scalar LCRED11 = 1000000000
Running the program

```stata
program set_propwages
  version 11
  global prop_wages = '1'
end

program set_adout_ind
  version 11
  syntax anything
  global outdata_ad_ind "anything"
end

program set_logdec_ind
  version 11
  syntax anything
  global logfiledecac_ind "anything"
end

program set_loghh_ind
  version 11
  syntax anything
  global logfilehhtype_ind "anything"
end

program set_logrev_ind
  version 11
  syntax anything
  global logfilerevtype_ind "anything"
end

end of do-file

set_country "mexico"
set_systems 2010 2011 2012 2013
set_defaults
```
MEXTAX – our simulator (II)

• Built and runs using Stata
  – Widely available econometrics program, but requires some basic knowledge of the language
  – Users edit an ‘interface’ and ‘parameters’ modules
  – No need to edit calculation code unless very major reforms (e.g. Shift from individual to joint taxation)

• Outputs individual, household files and summary distributional and revenue statistics

• Being developed into LATAx
  – Tax simulator for Latin America where choose country
  – Scope for adding additional features like subsidies, cash transfers etc.
MEXTAX: Coping with poor quality income data

- Household surveys often fail to pick up all income sources or all types of spending
  - Especially the case for savings/investments income
  - Or spending on things like alcohol or tobacco

- Researchers in Latin America typically responded by multiplying reported incomes by fixed factors so match National Accounts
  - What if under-reporting is concentrated amongst certain people? (e.g. the rich)
  - What if some people do not under-report but completely forget about a source of income?

- We tested sensitivity of results to these assumptions

- Provides info but not solve problem – need better data
MEXTAX: What happens to behaviour?

- People may work less or shift to the informal sector when their taxes go up
  - Tax increase raise less revenue or even reduce revenue

- No good estimates of labour supply responses to taxation for Mexico
  - Assess how much revenue would be raised under different assumptions about how responsive people are

<table>
<thead>
<tr>
<th>Reform</th>
<th>Baseline Revenue</th>
<th>“Low” Response</th>
<th>“Medium” Response</th>
<th>“High” Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>50,550</td>
<td>48,710</td>
<td>46,880</td>
<td>43,180</td>
</tr>
</tbody>
</table>

- Similar approach could be used elsewhere until more evidence on how responsive people actually are
  - Taking account of reductions in work effort can make important differences to results
MEXTAX: analysing 2010 tax reforms (I)

• Increases in tax rates in 2010 to reduce government deficit

• Initial proposals included
  – Substantial expansion in indirect (VAT) base (new 2% uniform VAT on top of existing VAT)
  – Increases in various income tax and duties rates

• Approved reform was a much reduced version of this, in particular replacing new 2% uniform VAT with 1% increase in existing VAT
  – Part of reason proposals rejected is seen as “regressive”
  – Proper quantitative analysis can help assess whether this was the case
MEXTAX: analysing 2010 tax reforms (II)

Proposed reforms: losses measured as % of income

Gain/loss (% of net total income)

-2.00% -1.50% -1.00% -0.50% 0.00%

Poorest 2 3 4 5 6 7 8 9 Richest

Income decile group
MEXTAX: analysing 2010 tax reforms (III)

Proposed reforms: losses measured as % of expenditure

![Diagram showing gain/loss as % of total expenditure across different expenditure decile groups. The graph indicates that losses increase from the poorest to the richest decile groups, with the poorest group experiencing a loss of 2.00% and the richest group experiencing a loss of 2.00%.](image-url)
Utilising behavioural modelling in MEXTAX

• Changes in VAT rates on different goods may cause people to change their spending patterns
  – e.g. buy more food because of lower rate of VAT on it

• We estimated how spending patterns respond to changes in taxes using info on how spending patterns related to changes in prices over time and across Mexico
  – Spending patterns do respond
  – But only a small effect on revenue and distributional impact of reforms

• Also used model to examine a broad uniform VAT in Mexico
  – Efficiency gain equal to 0.1% of aggregate expenditure
  – But evidence of interactions between consumption and labour supply which may undermine case for uniform VAT
Analysing Policy in the UK
TAXBEN

• Long-standing IFS tax/benefit micro-simulation model
  – Historical systems back to 1975, highly detailed
  – Easily make basic changes in graphical ‘front-end’
  – Able to code up major reforms and analyse

• Used to analyse distributional, revenue and work-incentive impact of policy changes and budget measures
  – Day after budget we have full set of results to present to media and stakeholders

• But also used in more fundamental analysis of tax system
  – e.g. the Mirrlees Review
Reforming the UK VAT: analysis with TAXBEN (I)

- One of the key recommendations of Mirrlees Review is to move to single rate of VAT on (nearly) all goods and services
  - But this is regressive
  - And would damage work incentives

- Use TAXBEN to analyse the impact of reform and design compensating cuts in other taxes and increases in benefits
  - On average, distributionally neutral
  - On average, not worsen work incentives

- TAXBEN also used with demand model to look at welfare gains from uniformity
  - Around 0.1 – 0.2% of consumer spending
Reforming the UK VAT: analysis with TAXBEN (II)

• After trial-and-error, following reform looked workable:
  – VAT at 20% on all items
  – Automatic increase of 3.4% in all tax allowances, thresholds, benefit and tax credit rates (because indexation to prices)
  – Further increases in certain benefits
  – Cuts in tax rates, increase in tax-free allowance, slightly lower higher-rate income tax threshold

• Difficult to assess distributional impact of reforms when both direct and indirect taxes are affects
  – By income and expenditure distributions, % of income and spending

• Also calculate marginal tax rates and participation tax rates to look at work incentive effects
Figure 9.1. Effect of reform by income decile
Broadening the VAT Base

Figure 9.2. Effect of reform by expenditure decile
Conclusions

• Quantitative analysis of tax, benefits and pensions policy is useful

• Different ways of building models
  – Relatively simple like MEXTAX
  – Highly detailed like TAXBEN

• But have to be aware of the limitations
  – Data
  – Behavioural response
  – How to decide something is progressive or regressive?