Commodity taxation and the case for uniformity: empirical evidence from Mexico

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- Push from institutions like IMF and World Bank for broad base and single rate of VAT to raise revenue, and improve economic and administrative efficiency.
- But many countries operate reduced and zero rates for basic goods as form of redistribution (e.g. Mexico, UK).
- And economic theory provides a number of efficiency reasons for differentiated VAT rates.
- One that has attracted relatively little attention is VAT evasion (e.g. informal economy) which differs across commodities.
- Of particular relevance in developing countries.
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  - Need to increase tax take further: Non-oil revenues 14% of GDP, among lowest in OECD
  - VAT only accounts for 20% of revenues, low by regional standards - base broaden, or raise rate?

    - 2010 proposed (base broaden, CCP) and approved reforms (raise rate, 15% to 16%, maintain structure)
This Presentation

- Analyses the merits of using VAT rate differentiation for redistribution in contexts such as Mexico
  - Compare an increase in VAT standard non-uniform rate vs. alternative introduction of additional 2% commodity tax on all goods complemented with more targeted cash transfers
- Looks at efficiency implications of VAT non-uniform structure, in the context of informality
- Using QUAiDS model, estimate efficiency gain from revenue-neutral uniform VAT system
- Discuss how differential VAT evasion may affect validity of results and optimal VAT rate structure
- Discuss next steps to model VAT evasion decisions and estimate parameters to inform tax design
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Merits of using VAT rate differentiation for redistribution?

- MEXTAX - household microsimulation model
  - Simulates distributional, revenue and some behavioural effect of income tax, indirect taxes, soc. sec. contribs. & cash transfers
  - Data: ENIGH 2008 (income and expenditure hh survey)
    - Informal expenditure defined using type of vendor (1 Street market; 2 Mobile Stall; 3 Hawker)
  - Assume full incidence of indirect taxes on purchase price of formal sector goods only
    - No tax evasion by formal vendors; no spillover effects on informal prices (segmented markets)
Gains from replacing the CCP (uniform 2%) with a VAT increase
Cash gains from alternative ways of spending the revenue foregone from replacing the CCP with a VAT increase
Efficiency considerations for VAT rate structure

- Two broad arguments for the efficiency of broader/more uniform rates of VAT

  - Admin, compliance, and enforcement is easier with a single rate
  - Economically efficient to redistribute via direct tax/transfers - avoids distortions to consumption, provided that:
    - leisure and consumption weakly separable [e.g. Atkinson and Stiglitz 1976]
    - tastes are uncorrelated with underlying earning capabilities [e.g. Saez 2002]
    - taxed purchases of all commodities equally substitutable with non-taxed procurement [e.g. Kleven et al. 2000]

  - Although unlikely to fully hold in practice, uniformity still recommended [e.g. Mirrlees Review (developed countries), Ebrill et al. (2001) (developing countries)]
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Assess quantitatively the efficiency gains of moving towards uniformity

- The MEXTAX quadratic almost ideal form (QUAIDS, Banks, Blundell and Lewbel (1996,1997)) household demand model
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  - Imposes other 'standard' demand assumptions (weak separability, uncorrelated tastes, etc.), which together imply uniformity is economically efficient
Overview of QUAIDS model

- Integrable quadratic logarithmic expenditure share equation system (goods \( i=1\ldots n \))

\[
w_i = \alpha_i + \sum_{j=1}^{n} \gamma_{ij} \ln(p_j) + \beta_i \ln\left(\frac{x}{a(p)}\right) + \frac{\lambda_i}{b(p)} \left(\ln\left(\frac{x}{a(p)}\right)\right)^2
\]

- Demographics enter as taste-shifters as part of \( \alpha_i \) so that

\[
\alpha_i = \alpha_0 + \sum_{k=1}^{K} \alpha_{ik} z_k
\]

\[
\ln a(p) = \alpha_0 + \sum_i \left\{ \alpha_i + \sum_{k=1}^{K} \alpha_{ik} z_k \right\} \ln(p_i) + \frac{1}{2} \sum_i \sum_j \gamma_{ij} \ln(p_i) \ln(p_j)
\]

\[
b(p) = \prod_{i=1}^{n} p_i^{\beta_i}
\]

\[
\ln \lambda(p) = \sum_{i=1}^{n} \lambda_i \ln(p_i)
\]

- Adding-up, homogeneity, symmetry are imposed, non-negativity is tested
Estimation of QUAIDS model

- Use geographic and time variation in prices at the city/region-month level (Bank of Mexico)

- Price and income elasticities make sense:
  - Food on which VAT is not levied (most foodstuffs) is most inelastic and a necessity
  - Food & drinks on which VAT is levied (e.g. soda, luxury foods) & meals out are more elastic and luxuries
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- Use geographic and time variation in prices at the city/region-month level (Bank of Mexico)
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Quantify efficiency gain from moving to a uniform revenue-neutral VAT

<table>
<thead>
<tr>
<th>Expenditure category</th>
<th>Share of good in total expenditure</th>
<th>2008 VAT rate structure</th>
<th>Uniform 7.86% VAT rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Food on which no VAT is levied</td>
<td>26.9%</td>
<td>28.3%</td>
<td></td>
</tr>
<tr>
<td>2) Food on which VAT is levied and meals out</td>
<td>12.9%</td>
<td>12.7%</td>
<td></td>
</tr>
<tr>
<td>3) Alcoholic Drinks and Tobacco (VAT and duties levied)</td>
<td>0.6%</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>4) Clothing and footwear (VAT levied)</td>
<td>7.2%</td>
<td>7.0%</td>
<td></td>
</tr>
<tr>
<td>5) Household goods, services and communications (VAT levied, duties sometimes levied)</td>
<td>21.6%</td>
<td>21.4%</td>
<td></td>
</tr>
<tr>
<td>6) Household goods, services and communications (no VAT levied)</td>
<td>1.6%</td>
<td>1.6%</td>
<td></td>
</tr>
<tr>
<td>7) Transport and vehicle fuels (VAT levied, duties sometimes levied but not modelled)</td>
<td>7.3%</td>
<td>7.1%</td>
<td></td>
</tr>
<tr>
<td>8) Public Transport and other transport on which no VAT levied</td>
<td>6.3%</td>
<td>6.2%</td>
<td></td>
</tr>
<tr>
<td>9) Health and Education goods (no VAT levied)</td>
<td>3.2%</td>
<td>3.2%</td>
<td></td>
</tr>
<tr>
<td>10) Health and personal goods and services (VAT levied)</td>
<td>7.6%</td>
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</tr>
<tr>
<td>11) Leisure and hotel services (VAT sometimes levied)</td>
<td>4.1%</td>
<td>4.0%</td>
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<td>12) Other services</td>
<td>0.6%</td>
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Notes: Reported shares are shares of aggregate household expenditure.  
Source: ENIGH 2008 and authors’ calculations using Bank of Mexico price indices and MEXTAX
Gains/losses across the income distribution under a revenue neutral uniform VAT
Informality and tax evasion and optimal VAT rate structure

- A number of studies have examined implications of non-separability, preference correlations, and home production

- Focus on the implications of the ability to purchase from informal markets and evade taxes (work in progress)

- Substitutability between formal and informal markets may vary across goods

- If so, tax more (less) substitutable at lower (higher) rates, as distorts taxable spending less, allowing lower average tax rate

- Significant variation in share of informal monetary expenditure across goods in Mexico

- E.g. food (20%) and clothing (24%) much higher than other goods
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Simple example with 3 goods

- Assume there are 3 goods: formal telecoms, formal food and informal food
  - Substitutability between formal and informal food
  - No substitution options for telecoms

Revenue requirement: £1bn, which is raised at a uniform 20% rate on all formal expenditure

£10bn total spending
- £4bn formal food, £2bn formal telecoms, with £4bn informal food untaxed

Suppose now reduce rate to 10% on food, and raise it to 25% on telecoms
- Substitution means now purchase £6.6bn formal food, £2bn telecoms, £1.4bn informal food
- Raises £1bn, at an average tax rate of ~13.2% on taxed goods
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Summary of results

- Distributional results
  - Amendments to 2010 reforms were relatively progressive (% of expenditure); but not absolutely (cash terms).
  - Poorly targeted at poorer households: universal cash transfers or expanding existing instruments much more progressive
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  • Amendments to 2010 reforms were relatively progressive (% of expenditure); but not absolutely (cash terms).
  • Poorly targeted at poorer households: universal cash transfers or expanding existing instruments much more progressive

• Efficiency results

  • Under standard assumptions: deviation from uniformity only a very small effect on aggregate welfare (0.1% of total expenditure)
  • Differential propensity to tax evasion over goods would mean uniformity not optimal
Conclusions

- Zero-rates for food difficult to support from a distributional perspective in Mexico
  - Revenue raised from a broader VAT could be used, in part, for better targeted redistribution
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- However, applying lower rates to food may be supported by efficiency considerations if more prone to informality/VAT evasion
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- Turns usual policy arguments (IMF, World Bank) on their head
Next steps

• Model evasion as a consumer choice over 'formal' and 'informal' goods
  • Simulate impact using assumed elasticities of substitution
  • Estimate impact by estimating elasticity of substitution between the formal and informal goods for different commodities
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- Two main empirical challenges:
  - Exogenous variation in formal/informal prices
  - Defining informal expenditure - only a rough proxy in data
Formal and informal prices

- Our data includes expenditures AND quantities for food
  - Can construct unit values as price proxies

- If (imperfect) substitutes, would expect a negative correlation between formal/informal unit value and formal/informal quantities at local level
  - Coca-cola: -0.38
  - Tortilla: 0.003

- Variation in unit values can reflect quality as well as price

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  - Prior to 2014, lower rate of VAT in border areas (but smuggling)
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- Estimate model in other countries where more plausible variation due to tax variation
  - e.g. Brazil or India