Informal Consumption & Indirect Tax Design: Consumption Diaries Evidence from 15 Countries

Pierre Bachas (World Bank Research)

With Lucie Gadenne (Warwick) & Anders Jensen (HKS)

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Consumption Taxes in Developing Countries

- In OECD countries, large Personal Income Taxes with upward marginal rates do heavy lifting of equity
  - Atkinson-Stiglitz (JPubE 76): consumption tax superfluous if can tax income non-linearly (+ separability leisure-consumption)
Consumption Taxes Represent Large Share of Total Taxes

- Domestic consumption taxes (% Total Tax)
- Log GDP per Capita

N=125 countries in 2012
Source: ICTD for tax revenue, World Bank for current USD GDP in PPP.
Tax Mix over GDP

- **Average Tax Revenue (% GDP)**
- **Log GDP per Capita**

![Graph](Image)

N=128 countries in 2012
Source: ICTD for tax revenue, World Bank for current USD GDP in PPP.
Consumption Taxes in Developing Countries

- in OECD countries, large Personal Income Taxes with ↑ marginal rates do heavy lifting of equity
  - Atkinson-Stiglitz (JPubE 76): consumption tax superfluous if can tax income non-linearly (+ separability leisure-consumption)

- In practice for most developing countries:
  - Domestic Consumption Taxes most important source of revenue but considered regressive/neutral
  - Constrained PIT
  - Expenditure redistribute modestly (Commitment To Equity)

- This paper: revisits the distributional role of consumption taxes in LMICs
Taking into Account Informal Consumption

In LMICs many retailers do not pay consumption taxes
⇒ a share of consumption is informal:

1. Are consumption taxes de facto progressive?

2. Are differentiated commodity taxes as currently designed in LMICs (with many exemptions) useful for equity?

Standard assumption: consumption taxes get fully passed on to consumers through higher prices
This Paper

Use the idea that retailer size is a key determinant of formality:

- Consumption from own production, street selling, markets & corner stores is unlikely to remit taxes
- Compared to supermarkets, chain stores & department stores

**Data**: Representative household expenditure surveys in 15 countries which specify place of purchase for consumption (at term aim to reach ∼ 30 countries)

**Empirics**: Description of informal consumption along the income distribution (“Informality Engel Curves”) and across countries

**Theory**: Ramsey model of optimal commodity taxation with an informal consumption sector ⇒ Under what conditions does informal consumption makes indirect taxes progressive?
## Income & Expenditure Surveys in 15 Countries

Representative country surveys with open diaries of consumption & Place of purchase variable

<table>
<thead>
<tr>
<th>country</th>
<th>survey</th>
<th>year</th>
<th>sample size</th>
<th># TOR</th>
<th>source</th>
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<tbody>
<tr>
<td>Brazil</td>
<td>POF</td>
<td>2008</td>
<td>56,049</td>
<td>753</td>
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<td>Cameroon</td>
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<td>2014</td>
<td>10,303</td>
<td>18</td>
<td>Microdatalib</td>
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<tr>
<td>Chile</td>
<td>EPF</td>
<td>2017</td>
<td>15,237</td>
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<td>Stat. Office</td>
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<td>Colombia</td>
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<td>42,733</td>
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<td>DRC</td>
<td>E123</td>
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<td>14</td>
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<td>Ecuador</td>
<td>ENIGHUR</td>
<td>2012</td>
<td>41,760</td>
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<td>Microdatalib</td>
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<td>Morocco</td>
<td>ENCDM</td>
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<td>Mozambique</td>
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<tr>
<td>Papua NG</td>
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<td>Microdatalib</td>
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<tr>
<td>Peru</td>
<td>ENAHO</td>
<td>2017</td>
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<td>Rwanda</td>
<td>EICV</td>
<td>2014</td>
<td>14,419</td>
<td>14</td>
<td>Microdatalib</td>
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<td>South Africa</td>
<td>IES</td>
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<td>Microdatalib</td>
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<td>Tanzania</td>
<td>HBS</td>
<td>2012</td>
<td>10,168</td>
<td>13</td>
<td>Microdatalib</td>
</tr>
</tbody>
</table>
Consumption classification idea:

“Big picture” classification:

- **Not marketed**: Self-production, in-kind gifts
- Marketed **non “brick-and-mortar”**: Street selling, markets
- Marketed **small stores**: Convenience stores, specialized shops
- Marketed **large stores**: Supermarkets, department stores
Number of Employees & Formality

Combine Enterprise, micro & informal surveys (Retailers only)

(a) DRC

(b) Rwanda
Mexico: Store Type & Number of Employees

Note: Sample of stores in the merged CPI-Census data
Definition of Consumption for Today:

- Consumption net of housing
- **Informal consumption := convenience stores & smaller**
- The ‘residual is large & specialized stores + unspecified
  - Unspecified consumption: 21% of total consumption, of which 46% utilities, telecom & gas

Limitations:

- Ignore production chains which remit part of VAT
- Can’t break down chain convenience stores from stand alone
Consumption classification: Mexico

<table>
<thead>
<tr>
<th>Sector</th>
<th>TOR Original</th>
<th>TOR Recode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal</td>
<td>Supermercados</td>
<td>Large Stores</td>
</tr>
<tr>
<td></td>
<td>Tiendas departamentales</td>
<td>Large Stores</td>
</tr>
<tr>
<td></td>
<td>Tiendas con membresía</td>
<td>Large Stores</td>
</tr>
<tr>
<td></td>
<td>Compras fuera del país</td>
<td>Large Stores</td>
</tr>
<tr>
<td></td>
<td>Restaurantes</td>
<td>Restaurants</td>
</tr>
<tr>
<td></td>
<td>Tiendas específicas del ramo</td>
<td>Specialized shops</td>
</tr>
<tr>
<td>Informal</td>
<td>Tiendas de abarrotes</td>
<td>Corner shop</td>
</tr>
<tr>
<td></td>
<td>Persona particular</td>
<td>From a household</td>
</tr>
<tr>
<td></td>
<td>Mercado</td>
<td>Street &amp; Markets</td>
</tr>
<tr>
<td></td>
<td>Tianguis o mercado sobre ruedas</td>
<td>Street &amp; Markets</td>
</tr>
<tr>
<td></td>
<td>Vendedores ambulantes</td>
<td>Street &amp; Markets</td>
</tr>
<tr>
<td></td>
<td>Loncherías, cocinas económicas</td>
<td>Cafeterias</td>
</tr>
<tr>
<td>Unspecified</td>
<td>No aplica</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
Informality Engel Curves Across Countries (GDP pc sorted)
Average Informal Consumption on GDP per capita

Average Level of Informal Consumption vs. Log GDP per capita (PPP adjusted)
Top decile has 27% less informal consumption than bottom decile
For each country $\hat{\beta}$: \[ \text{Share Informal}_i = \beta \ln(\text{income pp})_i + \Gamma X_i + \epsilon_i \]
Controlling for Product Composition

How much is driven by the type of products being consumed at \( \neq \) incomes? Important since indirect taxes often based on commodities

- Run: \( Share \ Informal_{ip} = \beta \ln(\text{income pp})_i + \alpha_p + \Gamma X_i + \varepsilon_{ip} \)
  - Weights for product importance in household consumption
  - Control at several COICOP levels, shown sequentially
Product Composition: No controls to COICOP1

Change in Slopes: COICOP0 to COICOP1

Slope of informal consumption vs. Log GDP per capita (PPP adjusted).
Product Composition: COICOP1 to COICOP3

Change in Slopes: COICOP1 to COICOP2

Change in Slopes: COICOP2 to COICOP3
Product Composition Summary

Product Composition reduces slopes by 45%:
- 30% with COICOP1, 8% COICOP2 and 7% COICOP3
What Explains the Informality Engel Curves Slope?

Do poor households not have access to modern retailers or do they choose not to go?

- **Supply factors/access**
  ⇒ Can use proxies from surveys to study importance of urbanization, density, transport, revealed choice set

- **Demand factors:** price, quality, complementarities consumption/leisure, other attributes of modern retailers?
  ⇒ Difficult to study in most surveys
<table>
<thead>
<tr>
<th>Reason</th>
<th>Total</th>
<th>Formal</th>
<th>Informal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td>55.73%</td>
<td>53.65%</td>
<td>56.04%</td>
</tr>
<tr>
<td>Price</td>
<td>24.10%</td>
<td>7.33%</td>
<td>26.62%</td>
</tr>
<tr>
<td>Quality</td>
<td>7.78%</td>
<td>18.35%</td>
<td>6.18%</td>
</tr>
<tr>
<td>Retailer’s Attributes</td>
<td>7.78%</td>
<td>9.64%</td>
<td>7.50%</td>
</tr>
<tr>
<td>Other</td>
<td>4.62%</td>
<td>11.03%</td>
<td>3.65%</td>
</tr>
</tbody>
</table>

Access is defined as a combination of proximity and necessity. Attributes of retailer is defined as a combination of homogeneity of products, offering of credit, and quality of reception.
Rural (Green) vs Urban (Blue) IE Curves Slopes
Set up: Ramsey optimal commodity tax model

Three goods $j$: \{0, 1, 2\}
e.g. 0=street food, 1=supermarket food, 2=non-food supermarket

Constraint: Tax rate $\tau_1$, levied on both goods 0 & 1, $\tau_2$ on good 2

Gov. max social welfare: $W = \int_i G(v(p, y^i)) + \mu \sum_j t_j q_j x_j$

- $x_j = \int_i x^i_j$ total consumption of good $j$, $j \in \{0, 1, 2\}$
- Consumer prices: $q_j = p_j(1 + \tau_j)$

Assumptions:
- Exogenous incomes & producer prices
- Homogeneous price elasticities across hhlds: $\epsilon_j^i = \epsilon_j$, $\forall j$.
- Initially set cross price elasticities to 0 (Relax later)
Optimal Tax: No Informal Sector

No informal sector ⇒ $t_1$ is levied on both goods 0 & 1

Taking the derivative of $W$ wrt to $t_1$ gives:

$$\tau_1^* = \frac{(\mu - g) - \int_i (g_i - g) \frac{x_1^i + x_0^i}{x_1 + x_0}}{-\mu \tilde{\epsilon}} = \frac{(\mu - g) - \int_i (g_i - g) \beta_i \frac{s_1^i + s_0^i}{s_1 + s_0}}{-\mu \tilde{\epsilon}}$$

- $\frac{s_1^i + s_0^i}{s_1 + s_0}$ hhld i’s consumption of good j relative to avg, $\beta_i = \frac{y_i}{y}$

Equity term: $\text{cov}(g_i - g, \frac{s_1^i + s_0^i}{s_1 + s_0})$

- Goods consumed disproportionately by poor face lower rate

With an informal sector ⇒ $t_1$ is levied just on good 1:

$$\tau_{1}^{**} = \frac{(\mu - g) - \int_i (g_i - g) \beta_i \frac{s_1^i}{s_1}}{-\mu \epsilon_1}$$
Optimal Tax With an Informal Sector

How does the tax rate on good 1 compares with/without an informal sector? Depends on sign of: $\tau_{1}^{**} - \tau_{1}^{*}$

- For comparative stats assume: $\epsilon_0 \approx \epsilon_1$.

$\tau_{1}^{**} - \tau_{1}^{*}$ is of the same sign as: $\int_{i}(g_i - g)(\frac{s_{1}^{i} - s_{0}^{i} s_{0}}{s_{1} + s_{0}})$

- Take good with half formal - half informal csption ($s_1 = s_0$) ⇒ Proportional to Informal Engel curve’s slope within product

- e.g. 1 is food ⇒ Existence of Informal sector ↑ optimal rate
Optimal Tax With an Informal Sector

How does the tax rate on good 1 compares with/without an informal sector? Depends on sign of: \( \tau^{**}_1 - \tau^*_1 \)

- For comparative stats assume: \( \epsilon_0 \approx \epsilon_1 \).

\( \tau^{**}_1 - \tau^*_1 \) is of the same sign as: \( \int_i (g_i - g) \left( \frac{s_i^{i} - s_i^{s_0}}{s_i^{s_1} + s_i^{s_0}} \right) \)

- Take good with half formal - half informal csption (\( s_1 = s_0 \)) ⇒ Proportional to Informal Engel curve’s slope within product

- e.g. 1 is food ⇒ Existence of Informal sector \( \uparrow \) optimal rate

Allow substitution informal-formal ⇒ equity efficiency tradeoff:

- \( \tau^*_1 = \frac{\mu - g - \int_i (g_i - g) \beta_i s_i^{s_1} + s_i^{s_0}}{-\mu (\tilde{\epsilon} + \alpha)} \) vs \( \tau^{**}_1 = \frac{\mu - g - \int_i (g_i - g) \beta_i s_i^{s_1}}{-\mu \epsilon_1} \)
Conclusion

Literature sees informality as a constraint on tax policy by ↓ the base & ↑ the efficiency cost of taxes. Instead, we consider how an informal retail sector impacts redistribution.

- Empirically: steep Informality Engle curves in 15 countries
- Ramsey model to illustrate equity-efficiency trade-off of commodity taxes with an informal sector

Based on preliminary results, some early policy implications:

- Consumption taxes *De facto* more progressive than assumed
- Important to revisit role of commodity tax exemptions, as currently designed, for equity
- Other policies limiting the size of informal sector could have redistributive impact & shift the tax burden towards the poor
These slides show the country by country graphs
In Progress

Model & Calibrations:

▶ Calibrate commodity taxes starting from current schedule, as function of elasticity of substitution formal & informal
▶ Endogenizing supply decision for firms to formalize
▶ Model the demand side’s preferences

Empirics:

▶ Expand sample of countries
▶ Build from WB Enterprise surveys relation firm size - formality
▶ Understand what drives consumption to types of retailers

“Companion” paper: within country reform in Mexico.

▶ Impact on prices by store type & competition of equalization of border municipalities’ VAT rate to rest of country.

2. Impact of firm size on taxation (Gordon & Li, 2009, Kleven, Kreiner, Saez, 2015) & retailer type with hhld income (Faber & Fally, 2018) ⇒ Methodology: proxying informal consumption with store type


4. Large literature on optimal commodity taxation (Auerbach and Hines, 2002, Cremer and Gahvari, 1993) ⇒ We adapt classic model to provide optimal tax results relevant to LIC/MIC context.
Democratic Republic of Congo

DRC 2005
Mozambique
Mozambique: Rural vs. Urban

MZ 2009

0 10 20 30 40 50 60 70 80 90 100

0 1 2 3 4 5 6 7 8
Rwanda

RWA 2013
Rwanda: Rural vs. Urban

RWA 2013

The graph shows a comparison between rural and urban areas in Rwanda over a period from 2010 to 2014.
Tanzania

TZ 2012

4 5 6 7 8 9

0 10 20 30 40 50 60 70 80 90 100

4 5 6 7 8 9
Tanzania: Rural vs. Urban

TZ 2012
Cameroon
Papua New Guinea

PNG 2010
Papua New Guinea: Rural vs. Urban

PNG 2010

Diagram showing data trends for Papua New Guinea from 2010.
Morocco

MA 2001
Morocco: Rural vs. Urban
South Africa
South Africa: Rural vs. Urban

SA 2011

Diagram showing the comparison between rural and urban areas in South Africa over the years 2011.
Ecuador: Rural vs. Urban

ECU 2011
Colombia
Colombia: Rural vs. Urban
Peru: Rural vs. Urban
Mexico

MX 2014

Graph showing a trend over the years 2007 to 2013.
Mexico: Rural vs. Urban
Brazil
Brazil: Rural vs. Urban

BR 2008

0 10 20 30 40 50 60 70 80 90 100

8 9 10 11 12 13 14 15 16 17
Costa Rica
Chile
Chile: Rural vs. Urban