How Should Different Countries Tax Fuels to Correct Environmental Externalities?

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Disclaimer: The views expressed herein are those of the author and should not be attributed to the IMF, its Executive Board, or its management.
Plan of talk

- Design of fiscal instruments
- Measuring externalities
- Corrective tax estimates
Design of fiscal instruments
Major Environmental Problems

- Carbon emissions
  - projected warming 3-4°C by 2100 (but tail risks)

- Local air pollution
  - > 3 million premature deaths a year

- Road congestion/accidents
  - London motorists impose congestion cost of $40/gal.
  - accidents cause 1.2 million deaths

- Other externalities beyond our scope:
  - opaque (e.g., energy security, indoor air pollution)
  - smaller in magnitude (e.g., oil spills)
1. Fuel Charges for Carbon Emissions

- $\text{CO}_2$ damage/ton $\times$ $\text{CO}_2$ emissions factor
  - e.g., straightforward extension of motor fuel excises
2. Charges for Local Air Emissions

- Mortality is main damage:
  - >85 percent of total air pollution damages from fine particulates
  - directly
  - indirectly from SO$_2$, NO$_x$

= damage/ton $\times$ emissions factor (summed over emissions)
  - crediting needed for control technologies at coal plants (can cut emissions $\geq 80\%$)
3. Charges for Congestion, Accidents

- Excessive because motorists do not consider
  - congestion costs
  - pedestrian injuries, property damage, etc.

- Ideal policy: mileage-based charges
  - for busy roads (for congestion)
  - varying with driver risks (for accidents)
  - on axle weight of trucks (for road damage)

- Interim: reflect these externalities in fuel taxes
  - but reduce ~50% (mileage portion of fuel response)
Measuring Externalities
No ‘correct’ tax all should agree on, but

- develop conceptual framework accommodating different views (disciplines debate)
- spreadsheet for sensitivity analysis
- benchmark for evaluating other policies to illuminate trade-offs
Air Pollution Damages from Coal

- Population exposure
  - power plant location → number of people in proximity

- Exposure → mortality risk
  - evidence from Global Burden of Disease

- Monetize health effects
  - evidence on inc. elast. of VSL (OECD)

- Damage per unit of fuels
  - country-specific emissions factors

- Drawback
  - does not account for local meteorology
Corrective Taxes
Corrective Taxes on Natural Gas, 2010

Australia
Brazil
Chile
China
Egypt
Germany
India
Indonesia
Israel
Japan
Kazakhstan
Mexico
Nigeria
Poland
South Africa
South Korea
Thailand
Turkey
United Kingdom
United States

World price
Corrective Taxes on Diesel, 2010

- Australia
- Brazil
- Chile
- China
- Egypt
- Germany
- India
- Indonesia
- Israel
- Japan
- Kazakhstan
- Mexico
- Nigeria
- Poland
- South Africa
- South Korea
- Thailand
- Turkey
- United Kingdom
- United States

Corrective tax, $/liter

- carbon
- local pollution
- accident
- congestion
- road damage
- current tax
Global Benefits from Getting Energy Prices Right

- **Health**
  - 63 percent reduction in air pollution deaths

- **Environmental**
  - 23 percent reduction in CO$_2$ emissions

- **Fiscal**
  - 2.6 percent of GDP in new revenue
Mispricing of energy is pervasive and substantial
  - large benefits from policy reform
  - reform need not wait for global action
  - reforms straightforward application of basic tax principles (finance ministry engagement important)