

How Should Different Countries Tax Fuels to Correct Environmental Externalities?

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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



- = CO_2 damage/ton \times 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 SO₂, NO_x

- = damage/ton × emissions factor (summed over emissions)
 - crediting needed for control technologies at coal plants (can cut emissions ≥ 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 $\sim 50\%$ (mileage portion of fuel response)



Measuring Externalities

Uncertainties/Controversies



- 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)

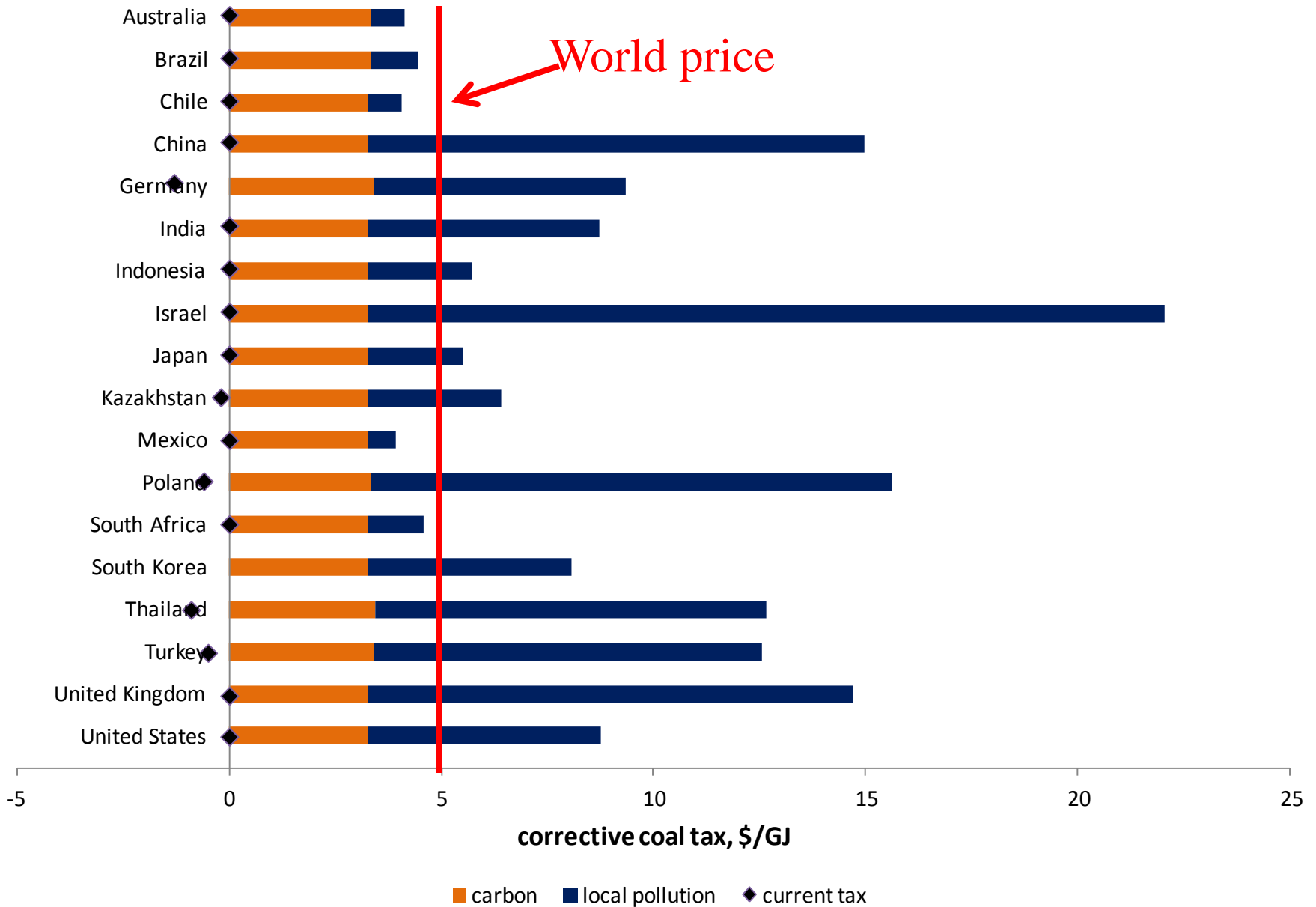
- Damage per unit of fuels
 - country-specific emissions factors

- Drawback
 - does not account for local meteorology

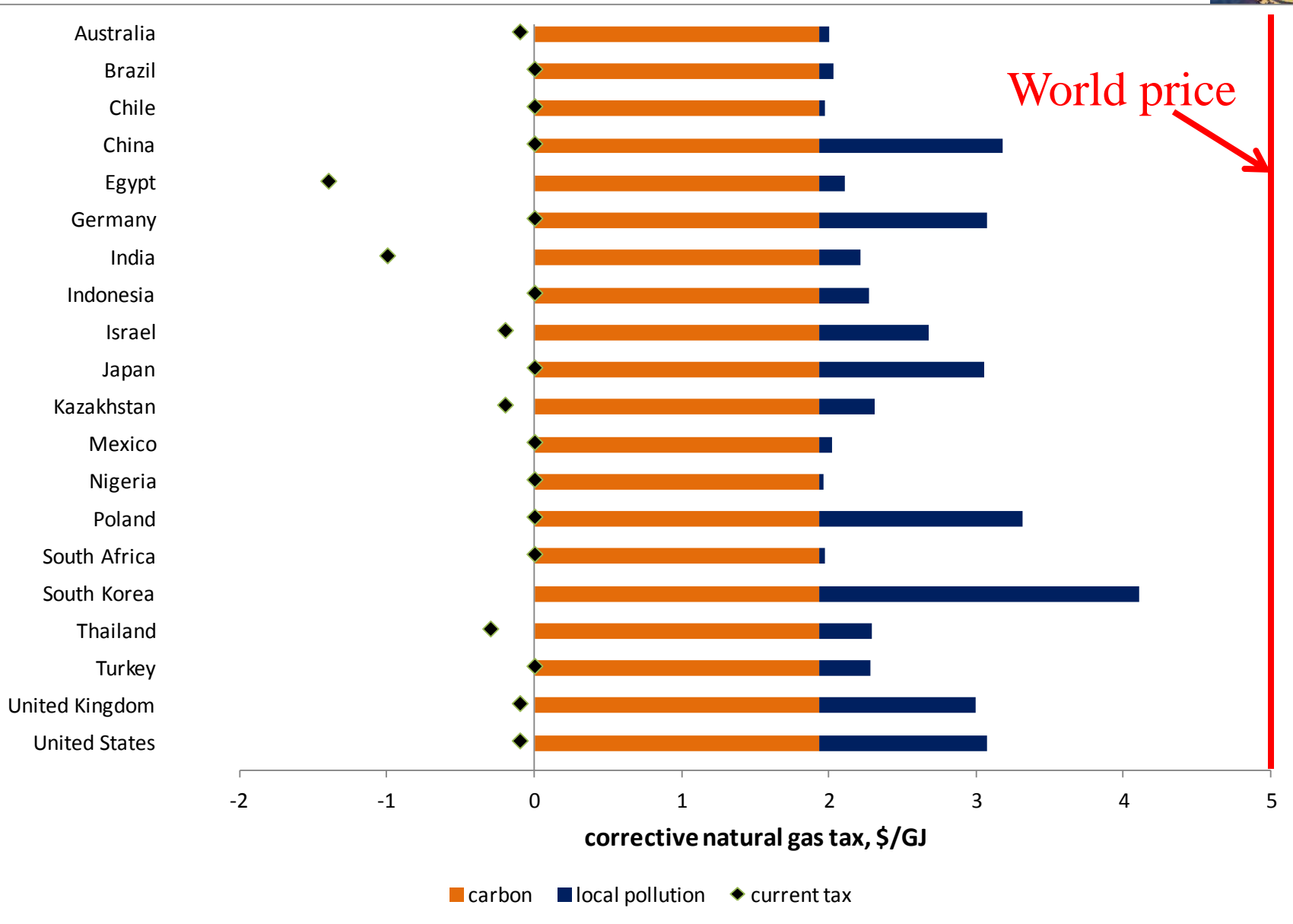


Corrective Taxes

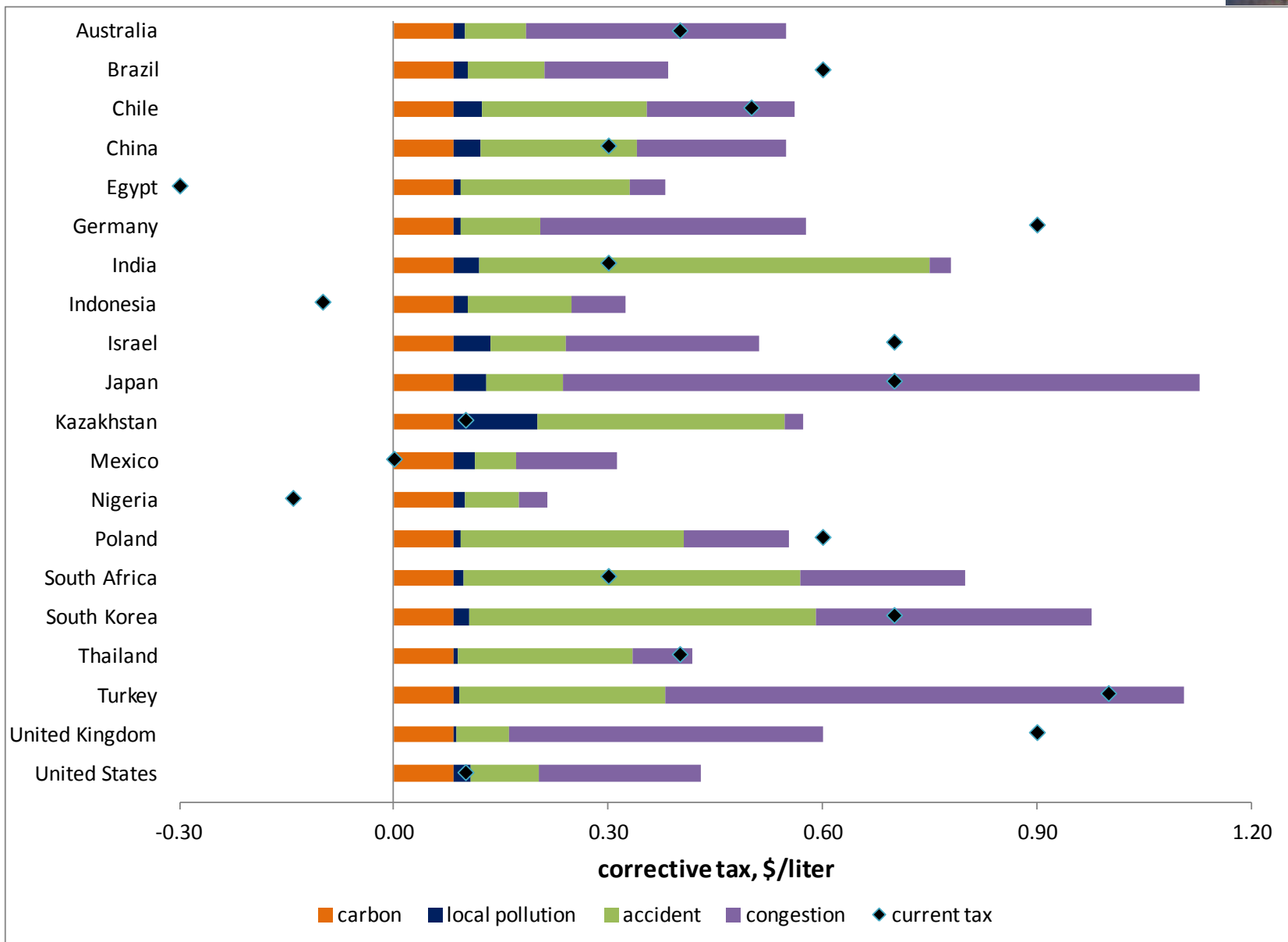
Corrective Taxes on Coal, 2010



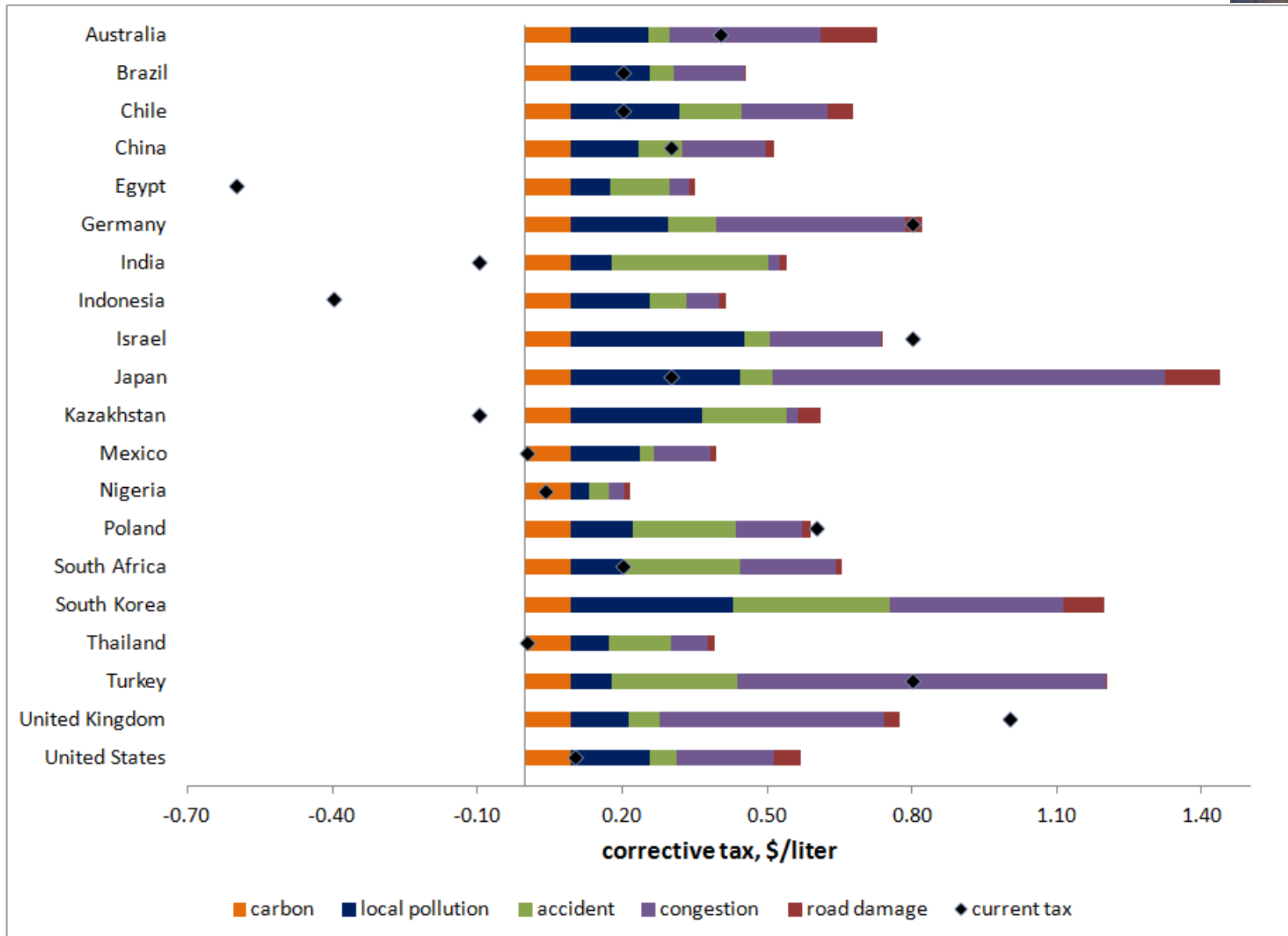
Corrective Taxes on Natural Gas, 2010



Corrective Taxes on Gasoline, 2010



Corrective Taxes on Diesel, 2010



Global Benefits from Getting Energy Prices Right



- Health
 - 63 percent reduction in air pollution deaths

- Environmental
 - 23 percent reduction in CO₂ emissions

- Fiscal
 - 2.6 percent of GDP in new revenue

Concluding



- 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)