
Economics of household use of bottled gas

Masami Kojima

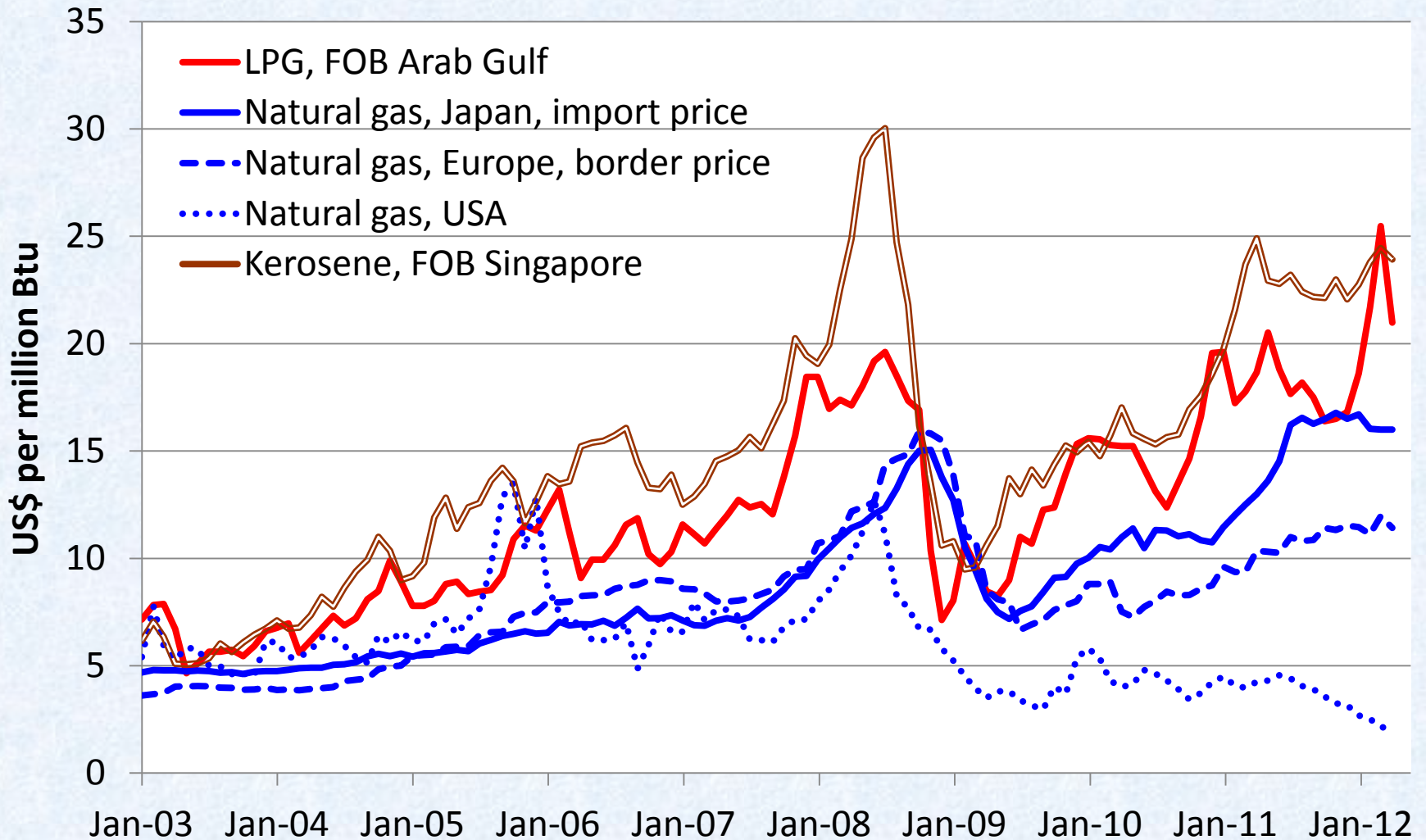
Oil, Gas, and Mining Unit, Sustainable Energy Department

May 8, 2012

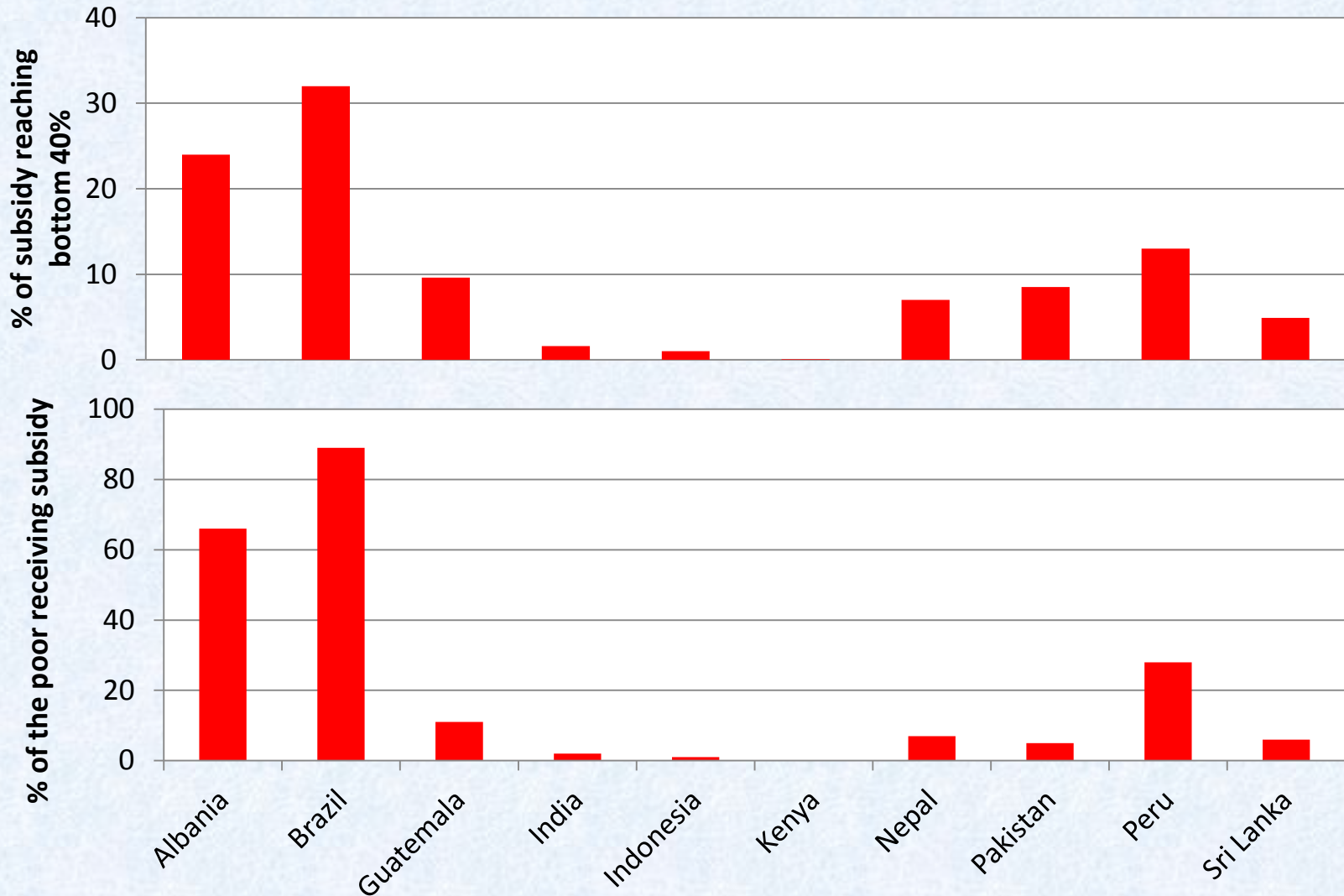
Economics of LPG

- Upfront cost: LPG stove purchase (\$20–50), cylinder deposit fee (\$20–40)
- LPG is cheaper than kerosene, more expensive than natural gas → Given a choice, households will choose natural gas over LPG
- LPG is cheaper than gasoline but needs further additional tax incentives to develop autogas market → equity, diversion, loss of valuable revenue in low-income countries
- Universal LPG price subsidies, which are common, are highly regressive
- World LPG prices have been increasing at 12% per year *in real terms* over last decade, outstripping increase in household income in developing countries.

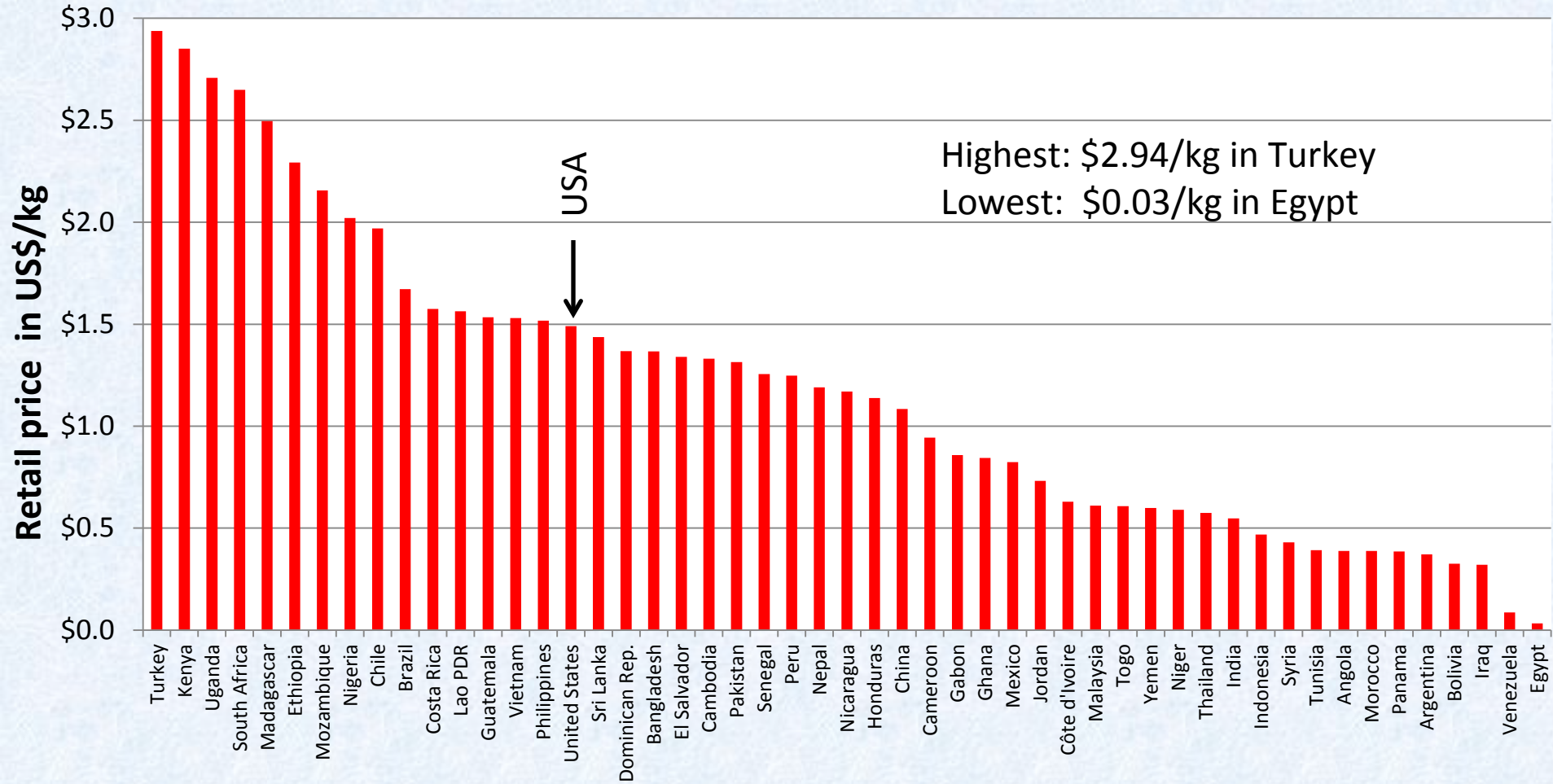
LPG, natural gas, and kerosene prices



Universal price subsidy at \$0.20/kg



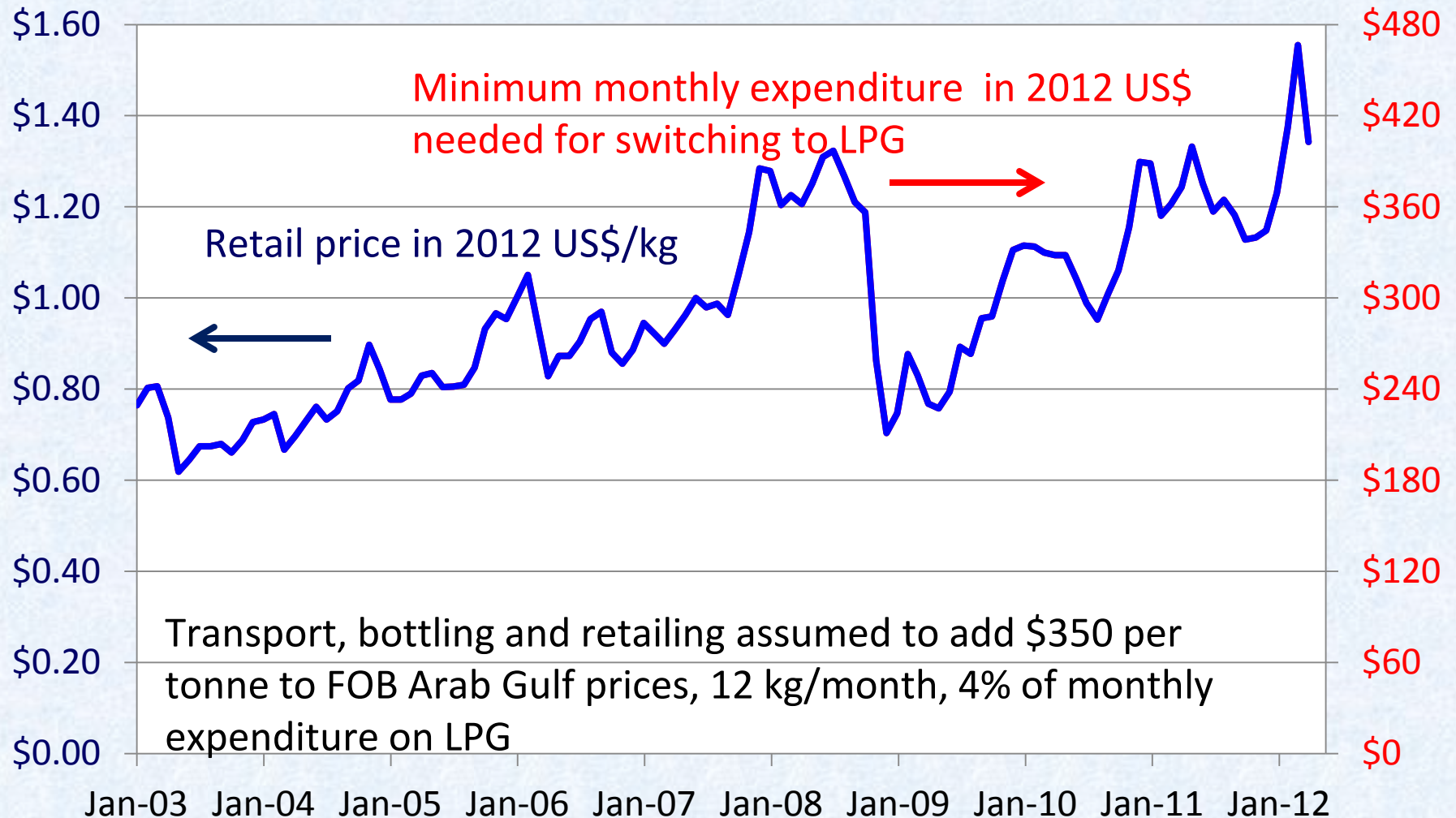
Retail prices of residential LPG in Jan 2012



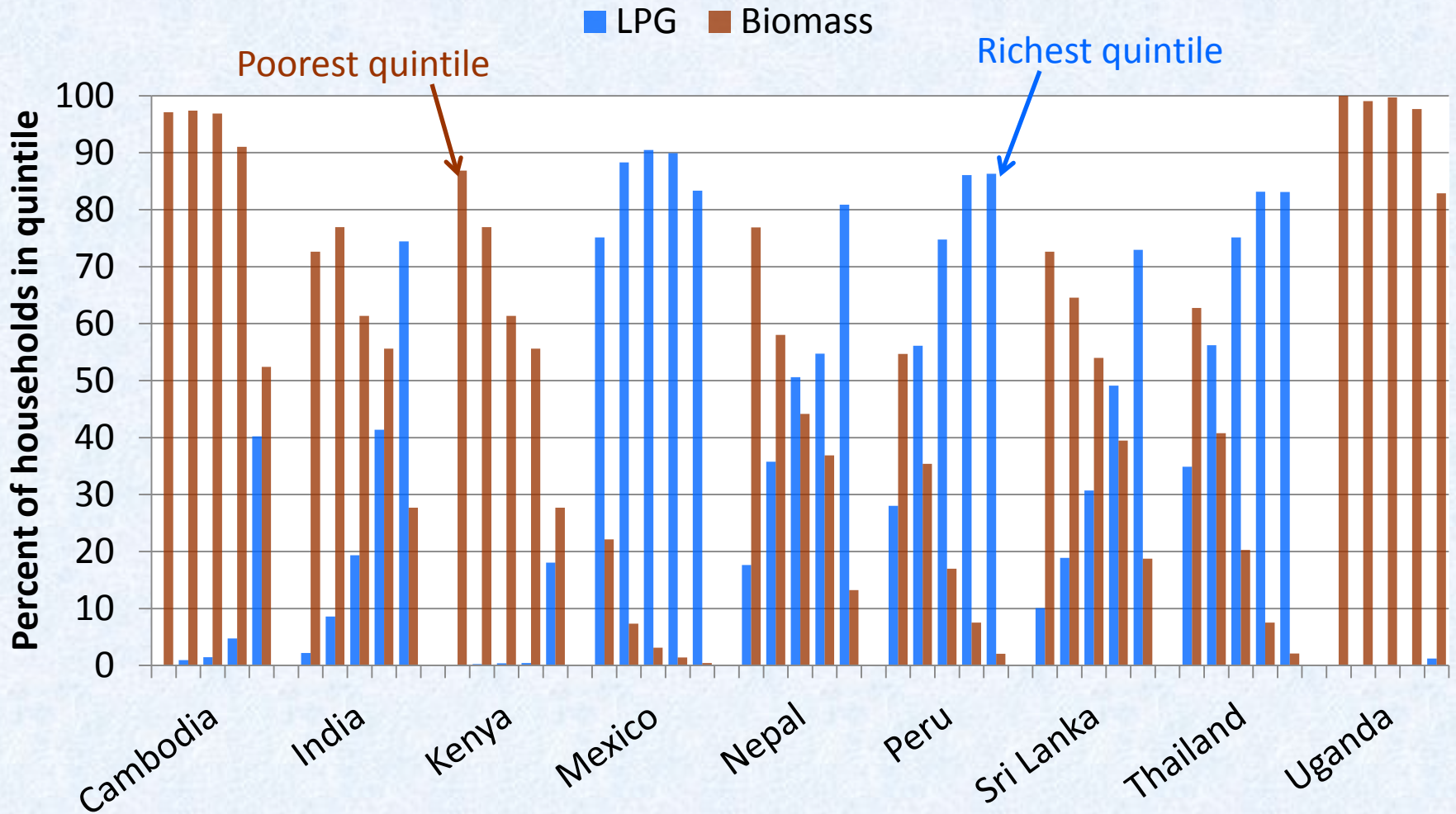
Affordability of LPG, willingness to pay

- Total additional costs above FOB prices vary by an order of magnitude across markets, with SSA markets showing some of the highest costs
- Even in an exceptionally efficient, low-tax market, monthly expenditure of \$15–25 would have been necessary to use LPG as primary cooking fuel in Jan-Apr 2012.
- Data from household surveys and cash transfer programs suggest high willingness to pay for electricity, much less for clean cooking and heating fuels except natural gas
- Willingness to pay for LPG rises with rising education, especially of women, after accounting for income, household size, and other factors → awareness raising
- Not all users of biomass are income-poor
 - Large scope for cost reduction, importance of consumer education, and increasing household fuel switching from solid fuels to LPG in urban areas in developing countries

Retail prices and minimum monthly income needed in an efficient, low-tax market



Primary cooking fuel in urban areas



Small cylinders?

- Lower payments but higher unit costs for fuel and cylinder
- Cylinder regulators:
 - Safety concerns
 - Easier to decant illegally → short-selling
- Small cylinders dominate only in a handful of markets: 2.7 and 6 kg in Senegal, 3 kg in Morocco, 3 kg in Indonesia
- All markets have small cylinders for camping, but, absent large subsidies, all have settled on 10–15 kg as dominant size, e.g., Turkey experimented with 2, 3, 5, 6 and 12 kg before selecting to retain only 2 and 12 kg

Subsidizing upfront cost?

- Will benefit a small segment of middle-class families
- Fundamental difference with power connection:
 - Power connection cost can be two orders of magnitude higher than monthly expenditure \leftrightarrow LPG connection cost today is only 2–5 times monthly expenditure for complete fuel switching
 - lessons from Deepam Scheme in Andhra Pradesh
 - Virtually all households spend cash on lighting, which can be redirected to electricity payment \leftrightarrow many households spend no cash on cooking and heating fuel, no cash to redirect to LPG purchase

Options for lowering end-use prices

Exploit economies of scale

Hospitality arrangements, third-party access, large refineries, large import parcels

Minimize demurrage charges

Rapid customs clearance, round-the-clock staffing by port authorities, adequate receiving facility

Minimize short-selling

Clear marking of tare weight, enforcement of scale calibration, industry association's seal of quality certification, publication of names of companies caught short-selling

Decrease barrier to entry and increase price competition

Hospitality arrangements, third-party access, competition policy, publication of prices by firm, location

Improve auxiliary infrastructure

Road conditions, port infrastructure

Concluding remarks

- For the poor, particularly in rural areas, the first step toward universal access will be advanced-combustion stoves for solid fuels.
- Regulatory framework for LPG is incomplete or deficient in many countries. Much work is also needed on monitoring and enforcement.
- LPG promotion schemes are likely to be more effective if focused on where costs of biomass cooking are high and infrastructure for reliable LPG delivery exists.
- Educating the public, especially women, about costs and benefits of fuel choice could promote household use of LPG.