

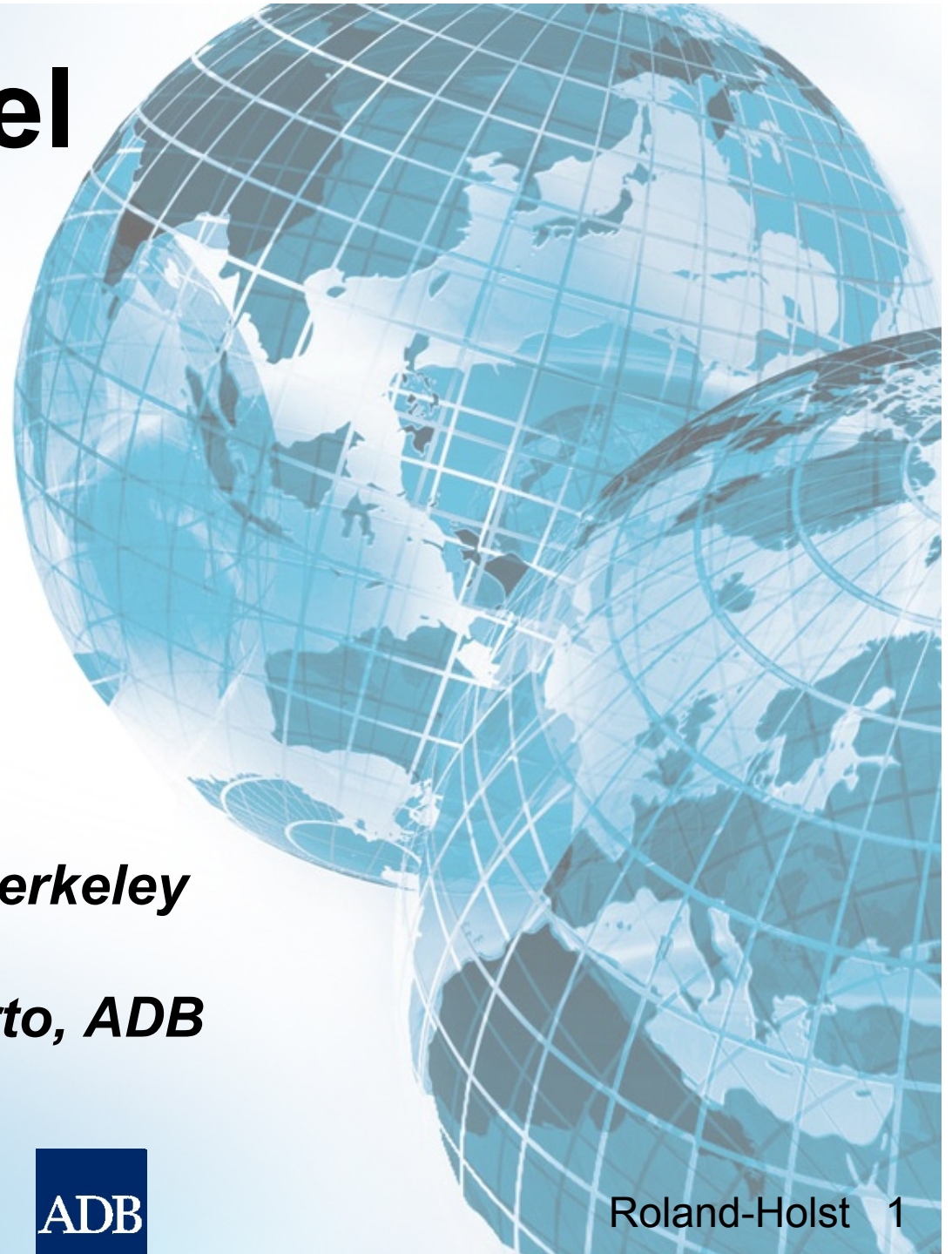
India's Biofuel Strategy: Global Dimensions

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27 September 2010

ADB

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Outline

1. Competing Narratives on Fuel and Food
2. Energy Trends
3. Food Trends
4. Scenarios for India

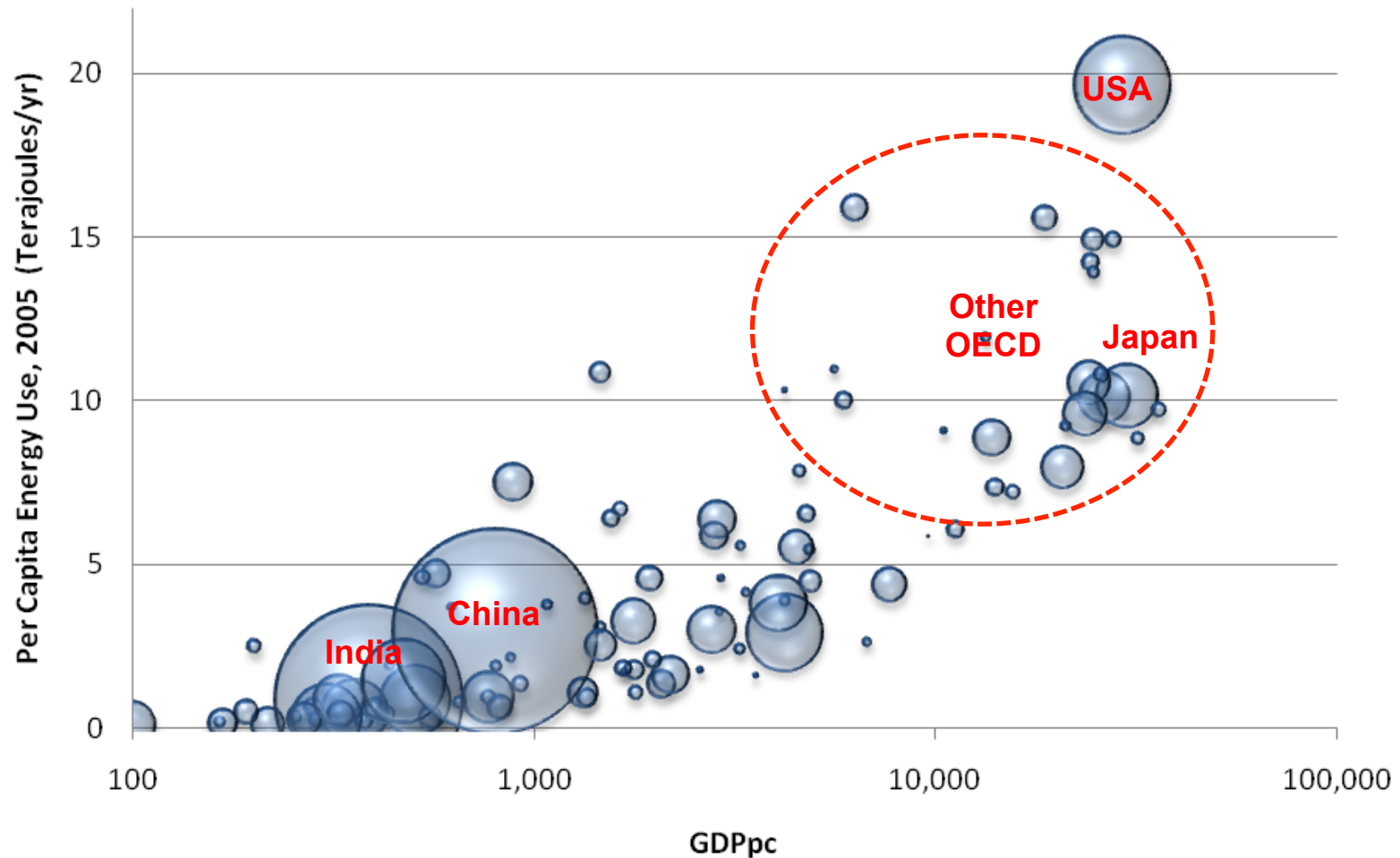
Competing Narratives

Energy and food are both essential commodities, but they are subject to different policy narratives:

- Global energy demand trends are seen as and unsustainable byproduct of affluence
- Food demand is seen primarily in terms of security for the poor
- Biofuel presents the two as competitors for agricultural resources, particularly from a North-South perspective
- Our research, however, suggests that emerging markets will be the catalyst accelerating both demand trends over the next generation
- Moreover, it will be neither the rich nor poor who drive this process, but a global middle class

Energy and Affluence

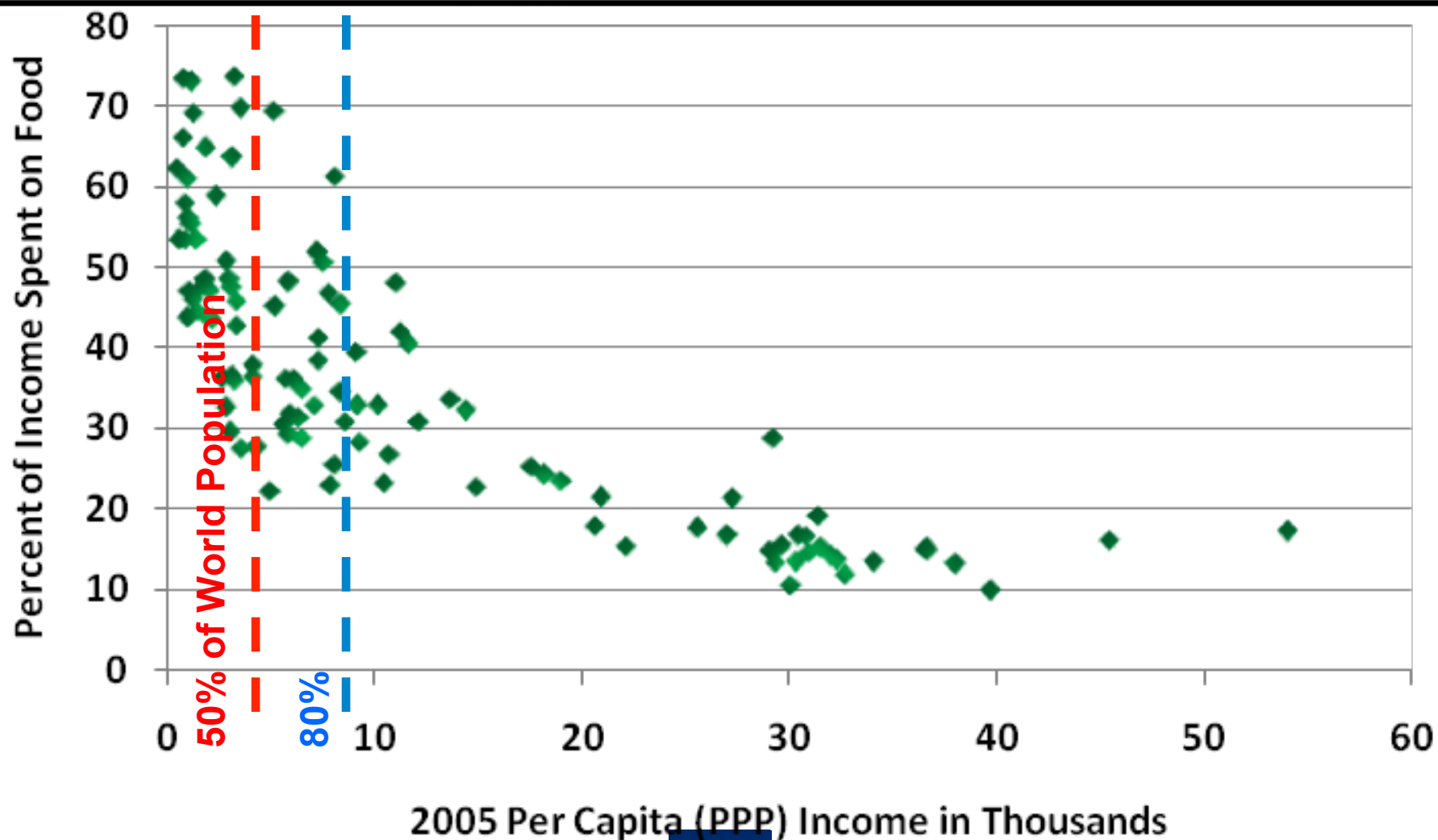
Per capita income and energy use for 118 countries.



Source: Authors' estimates from International Energy Agency and World Bank data. Bubble diameter is proportional to population

Food and Vulnerability

Food income shares for 118 countries.



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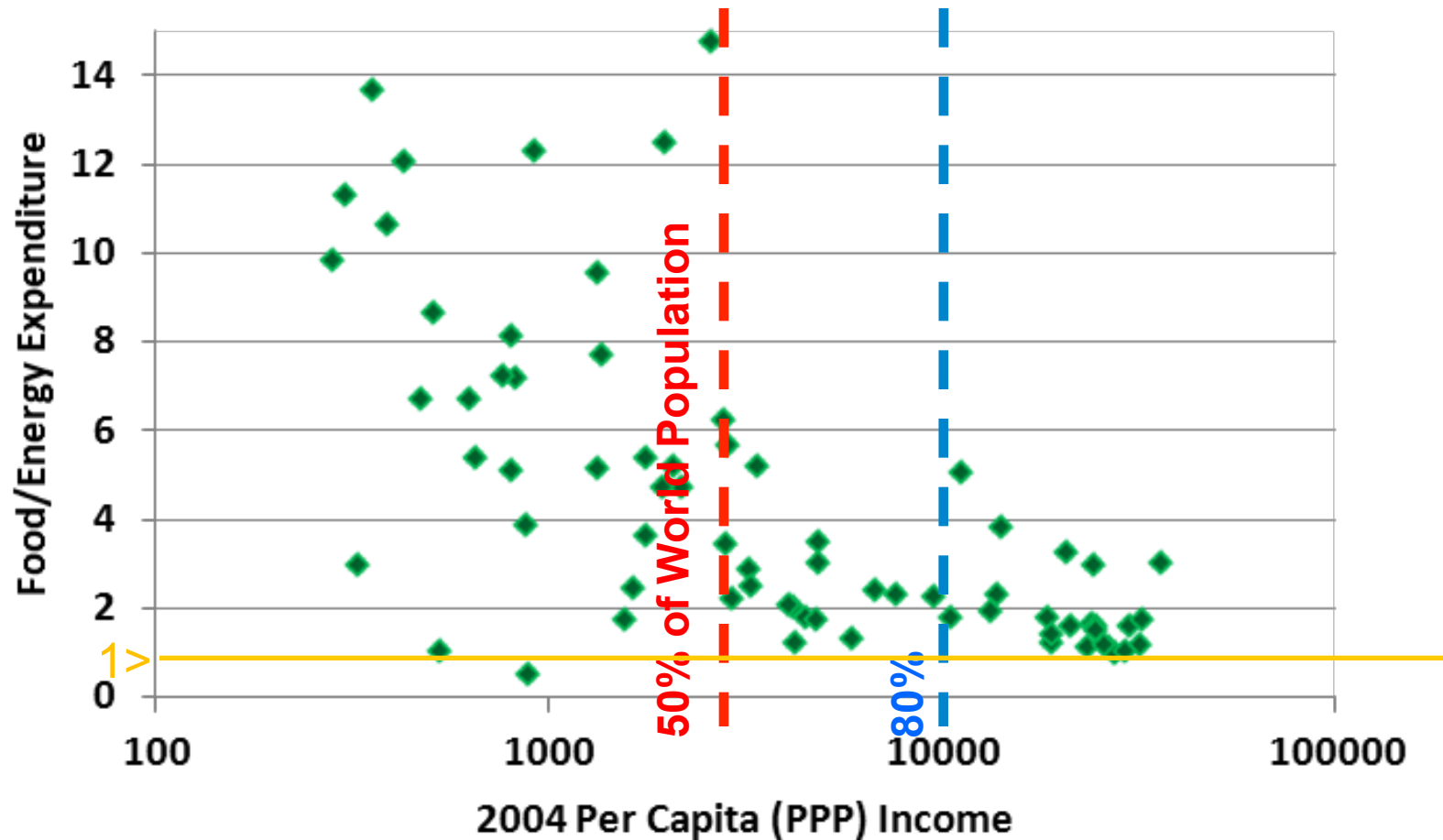


Source: Authors' estimates, from national data sources.

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Food Vulnerability is Greater than Energy Vulnerability

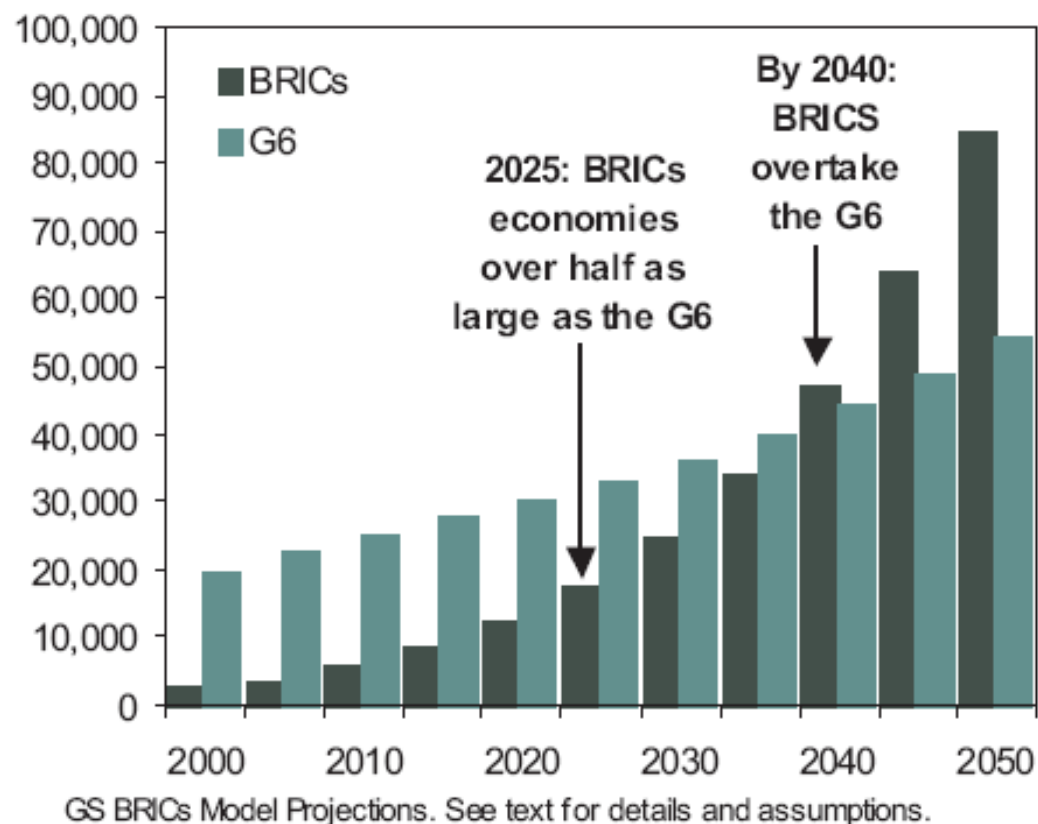
Food/Energy Expenditure Ratios for 77 countries.



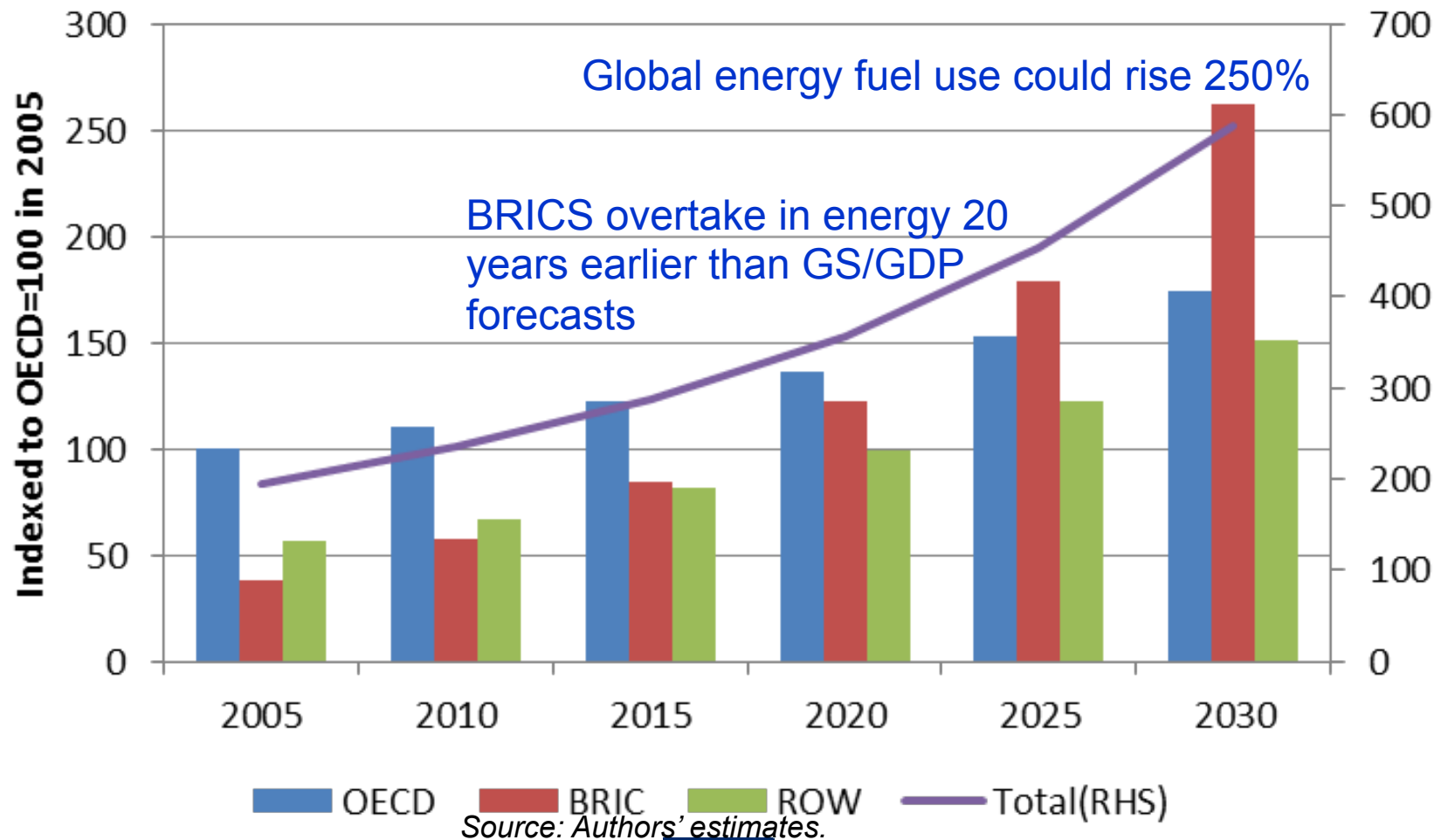
Source: Authors' estimates, from national data sources.

Energy Trends: Emerging Markets

- The BRICS story from an energy perspective
- The Goldman projections show aggregate growth
- With GSP-overtaking by 2040

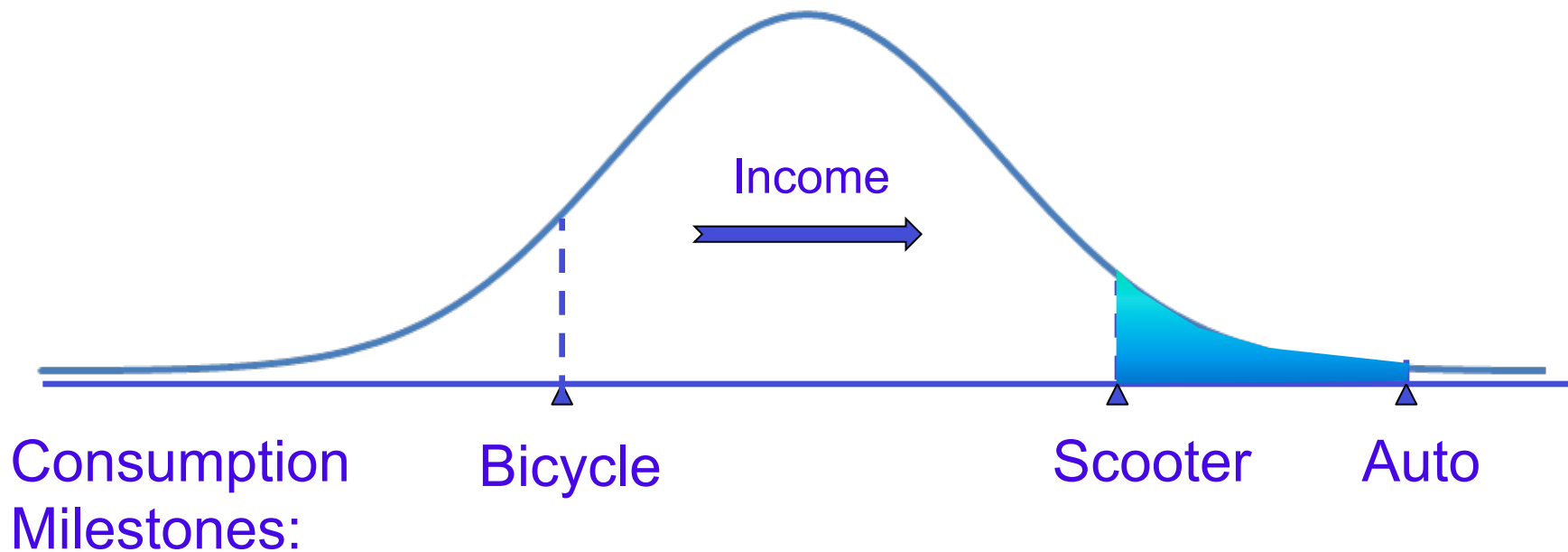


Global Energy Fuel Demand Business as Usual



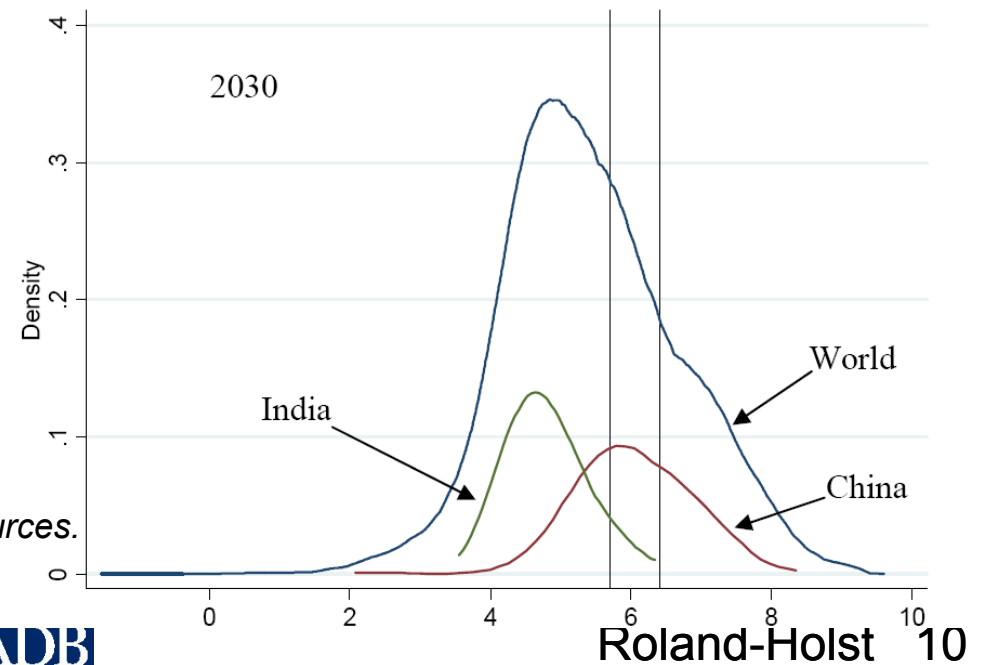
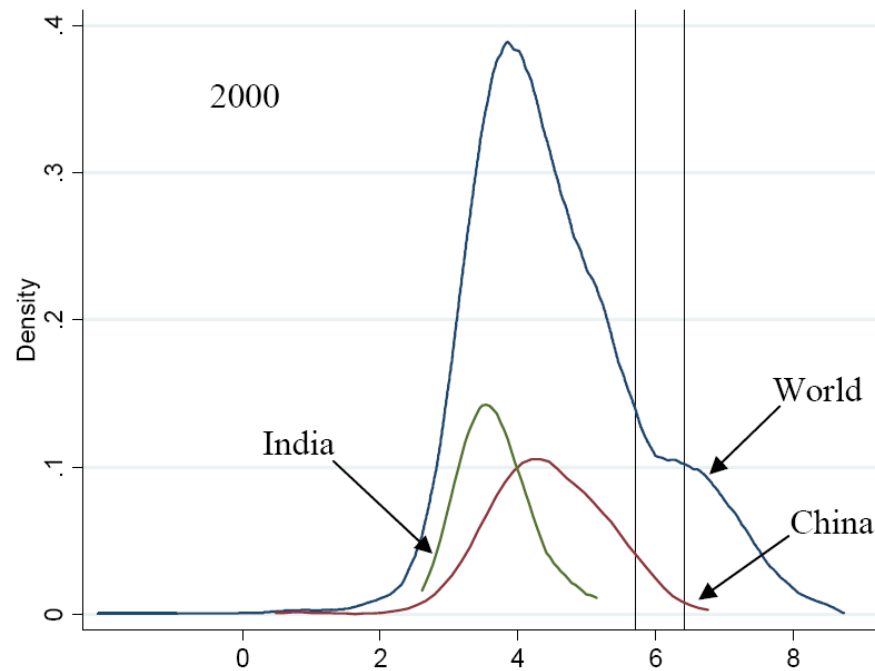
Demand emergence...

Sentinel Durable Goods: Linear Growth of Average Income Induces Exponential Growth of New Demand



China and India in a Global Context

(monthly household income per capita, 1993PPP\$)

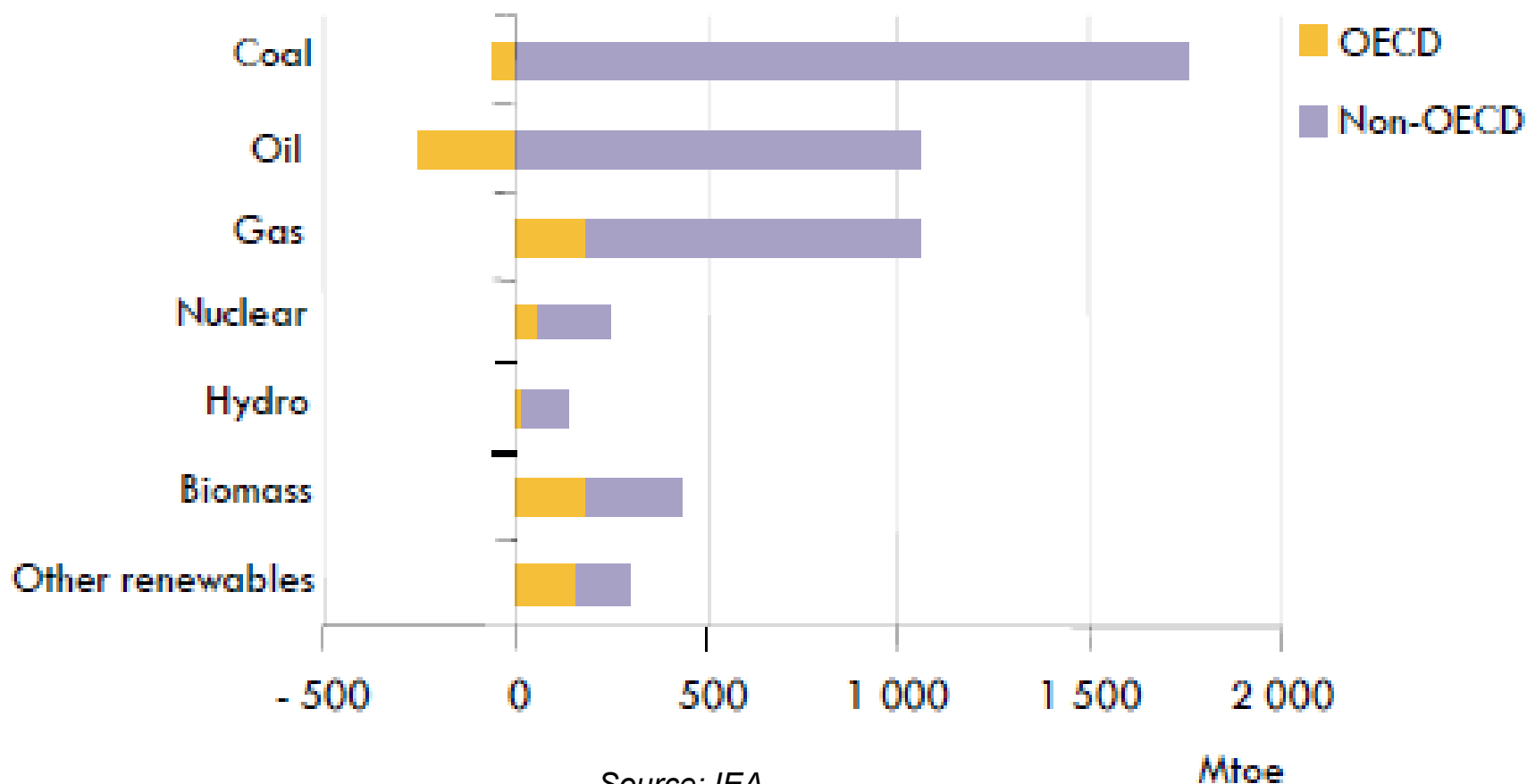


Source: Authors' estimates for ADB, from national data sources.

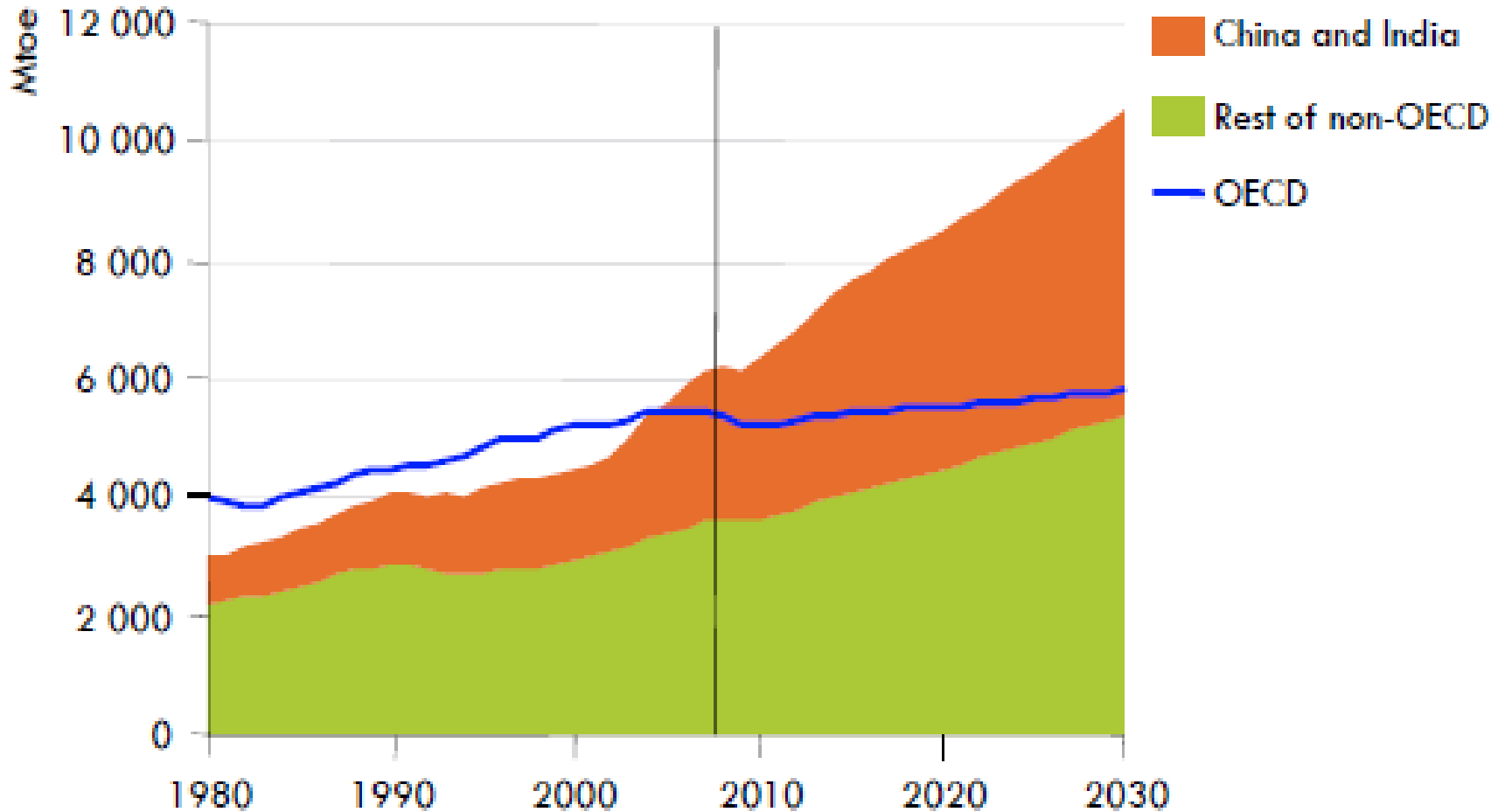
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Whither Energy Prices?

Fuel Composition of New Energy Demand



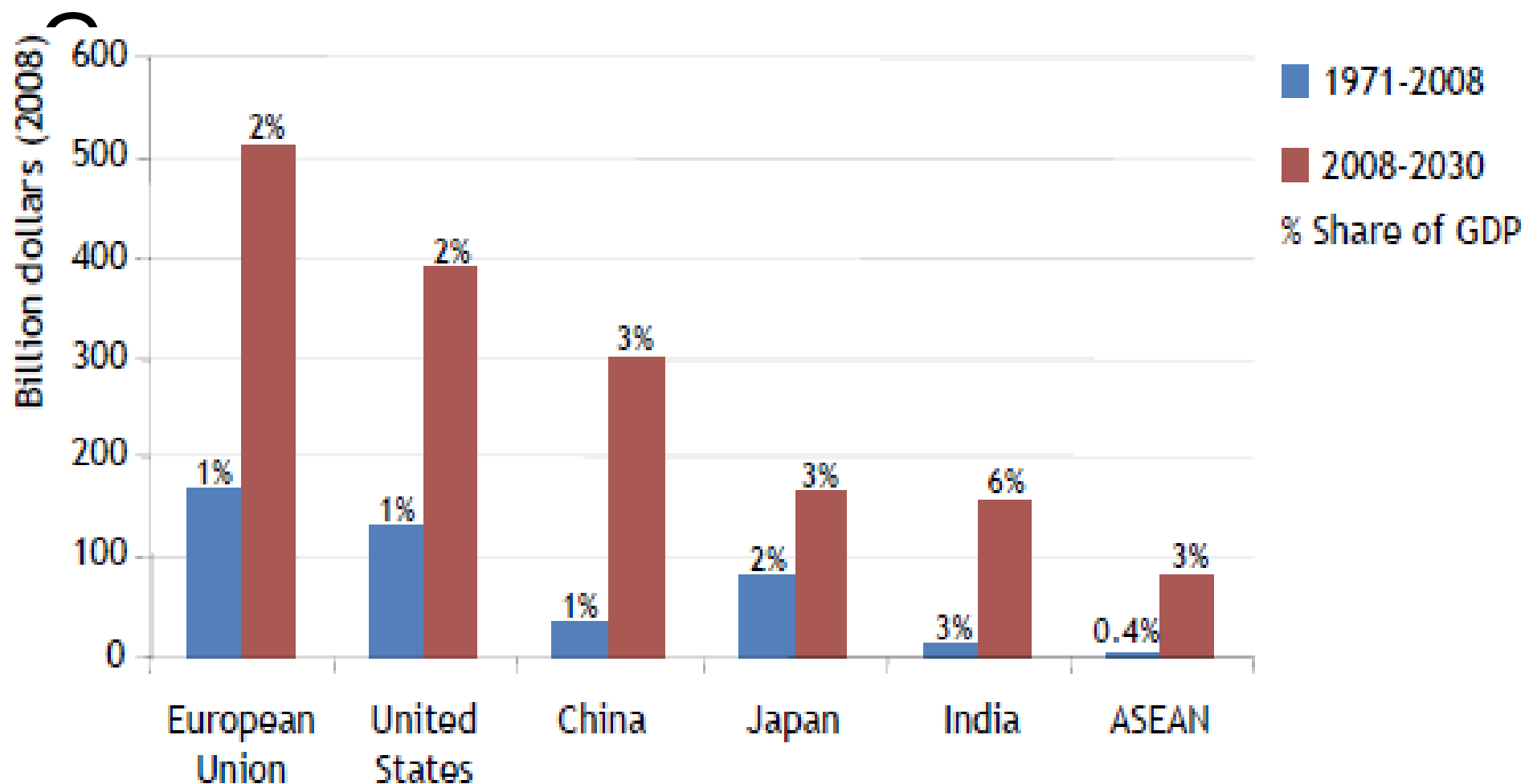
Global Primary Energy Demand



Source: IEA

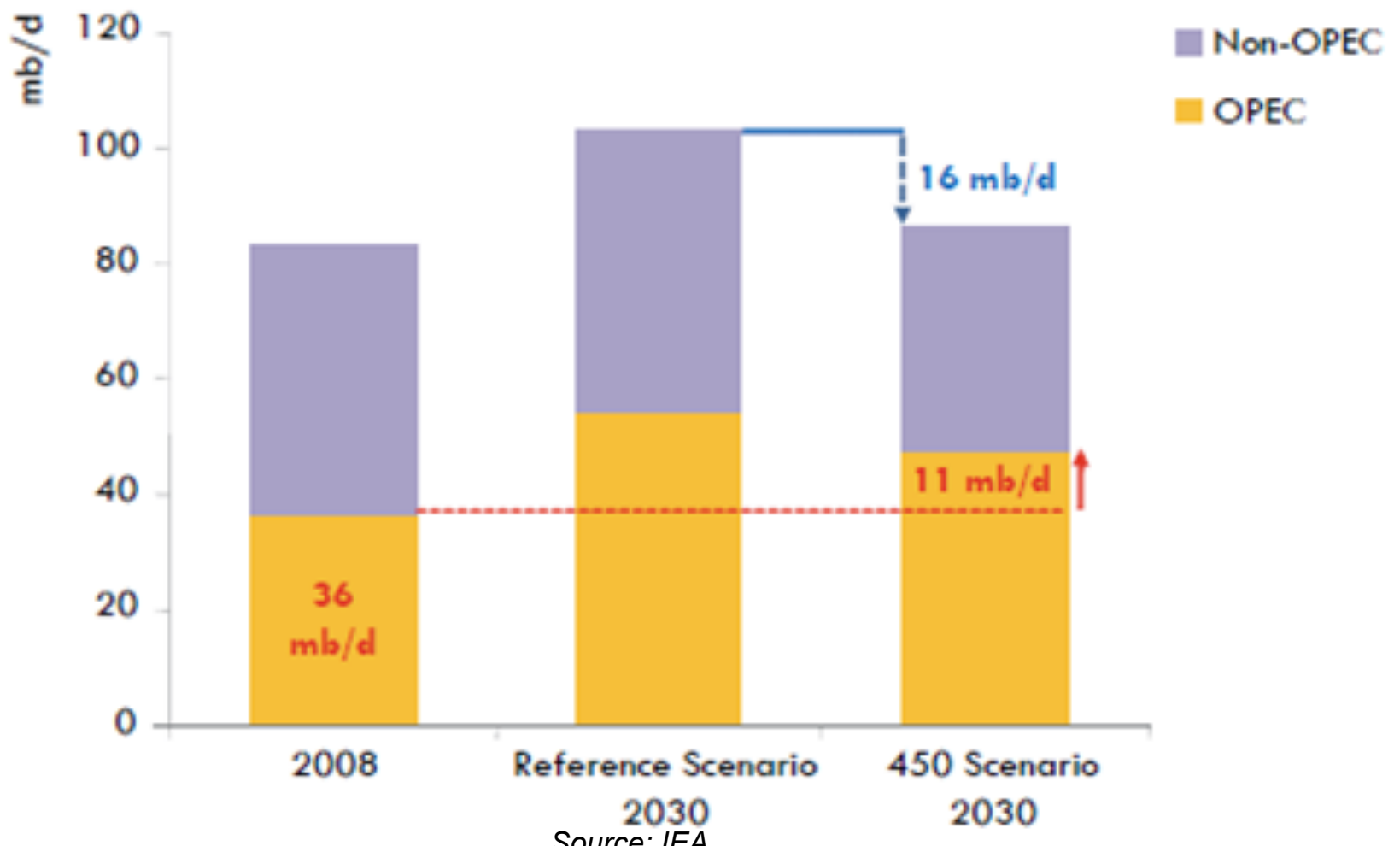
Rising Import Dependence

Average Annual Net Imports, Oil and



Source: IEA

Increasing Monopoly Power Oil Production by Source



Food Demand: Differing Perspectives on Asia

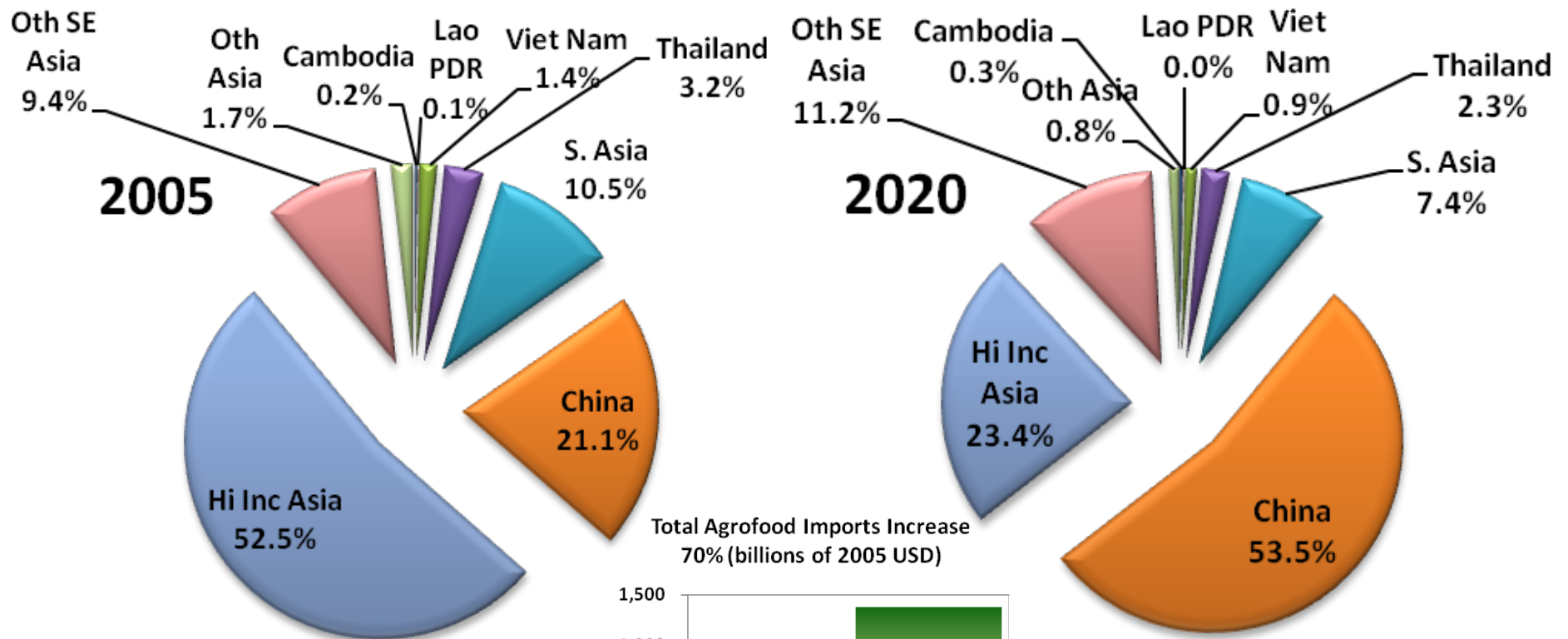


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Asian Regional AgroFood Imports



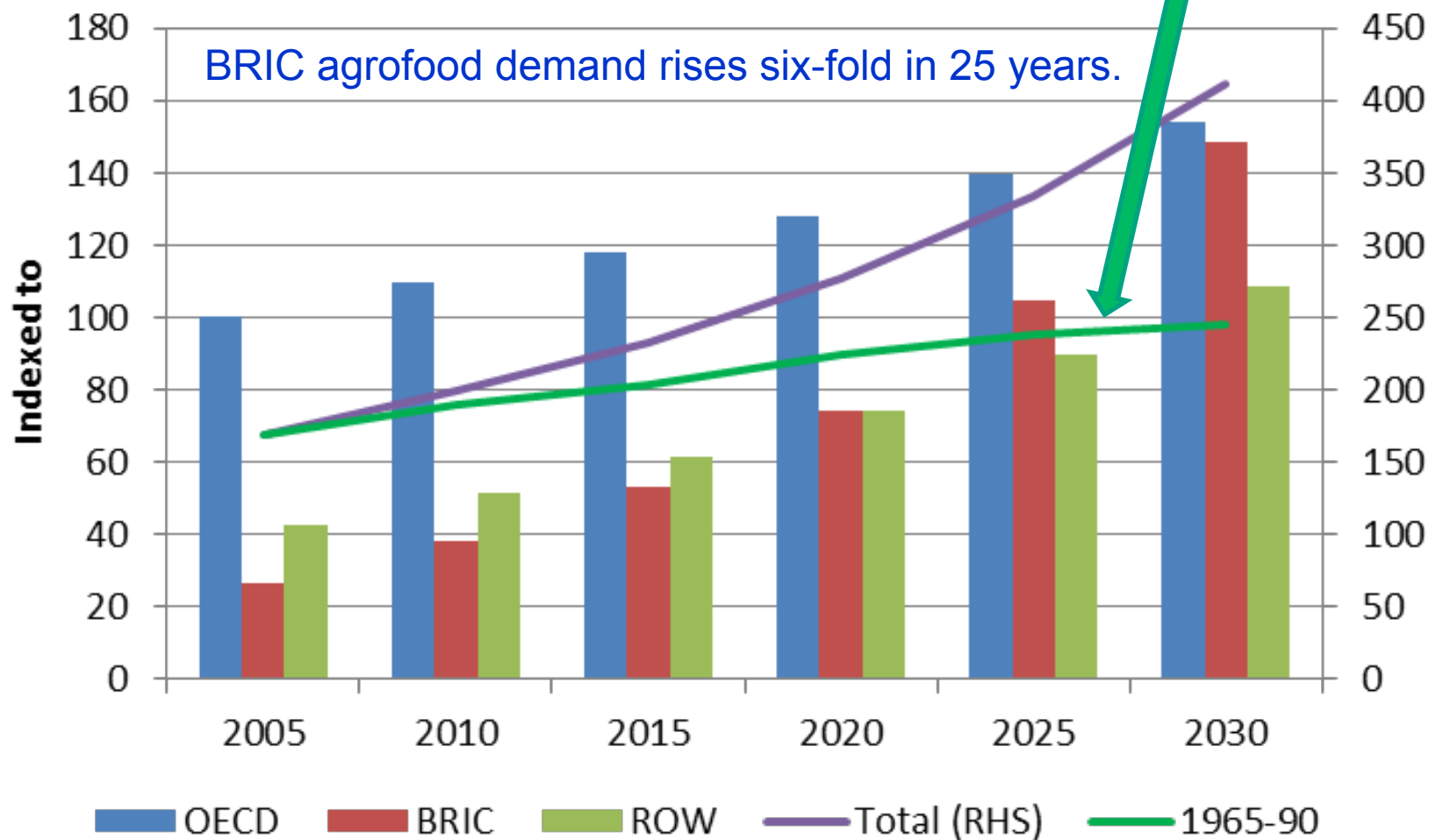
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Global Agrofood Demand

Green revolution productivity trend.

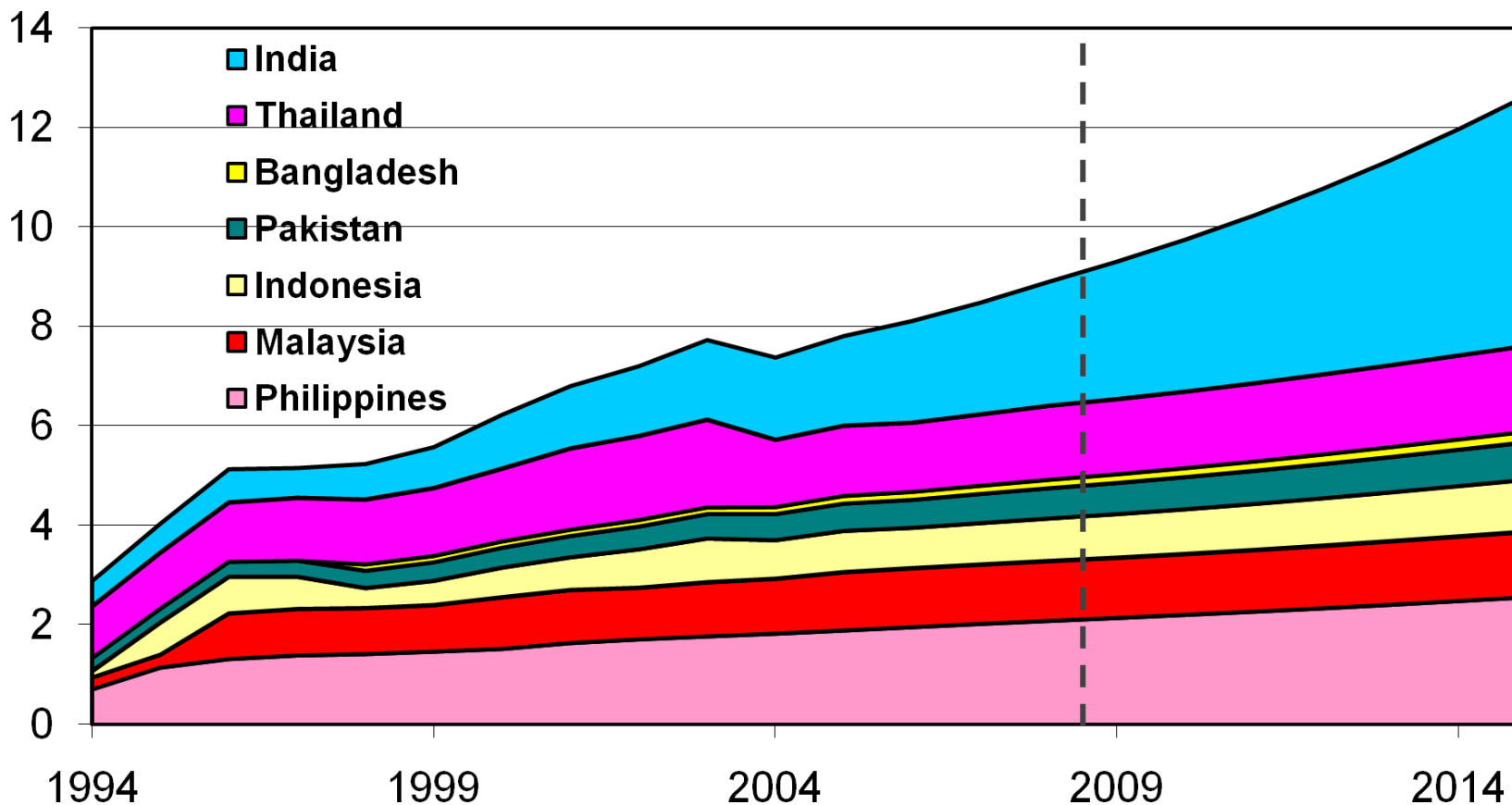


Source: Authors' estimates.

Meat: Another sentinel product

Pork and Poultry

Million metric tons

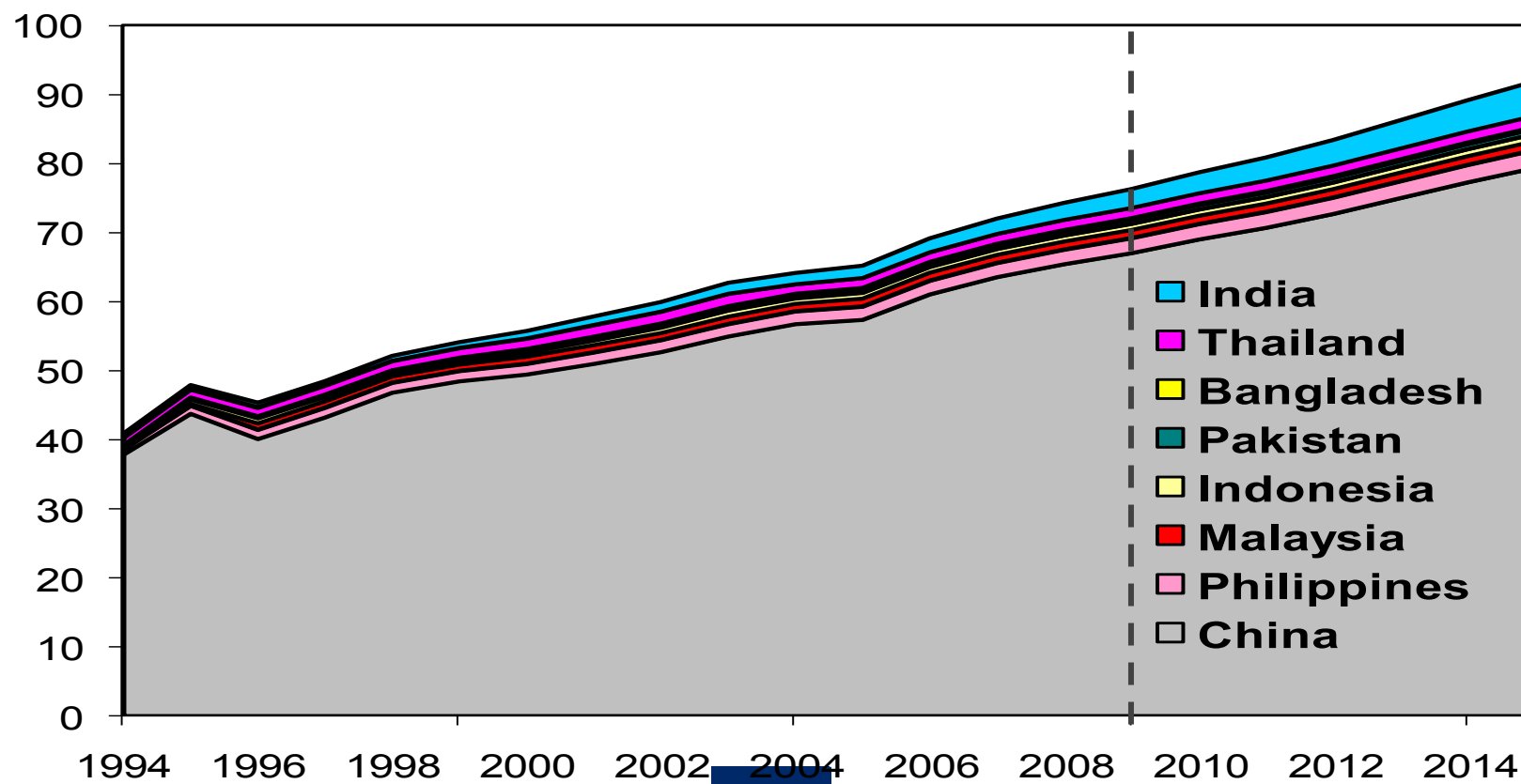


Source: USDA.

All Asia Pork and Poultry

Clearly, the impact of any imbalance in China's meat economy will fall primarily on the price system.

Million metric tons

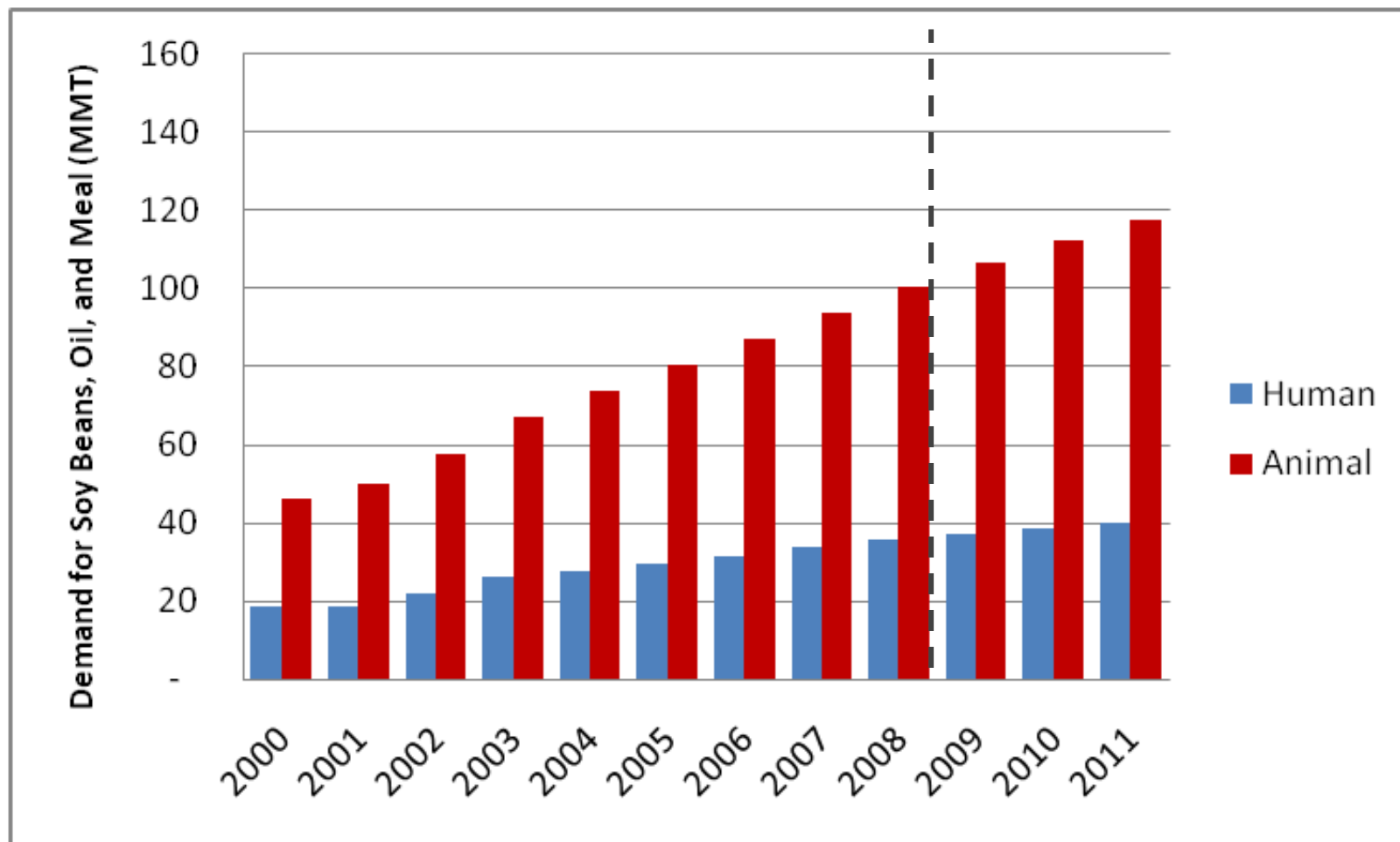


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Source:  USDA

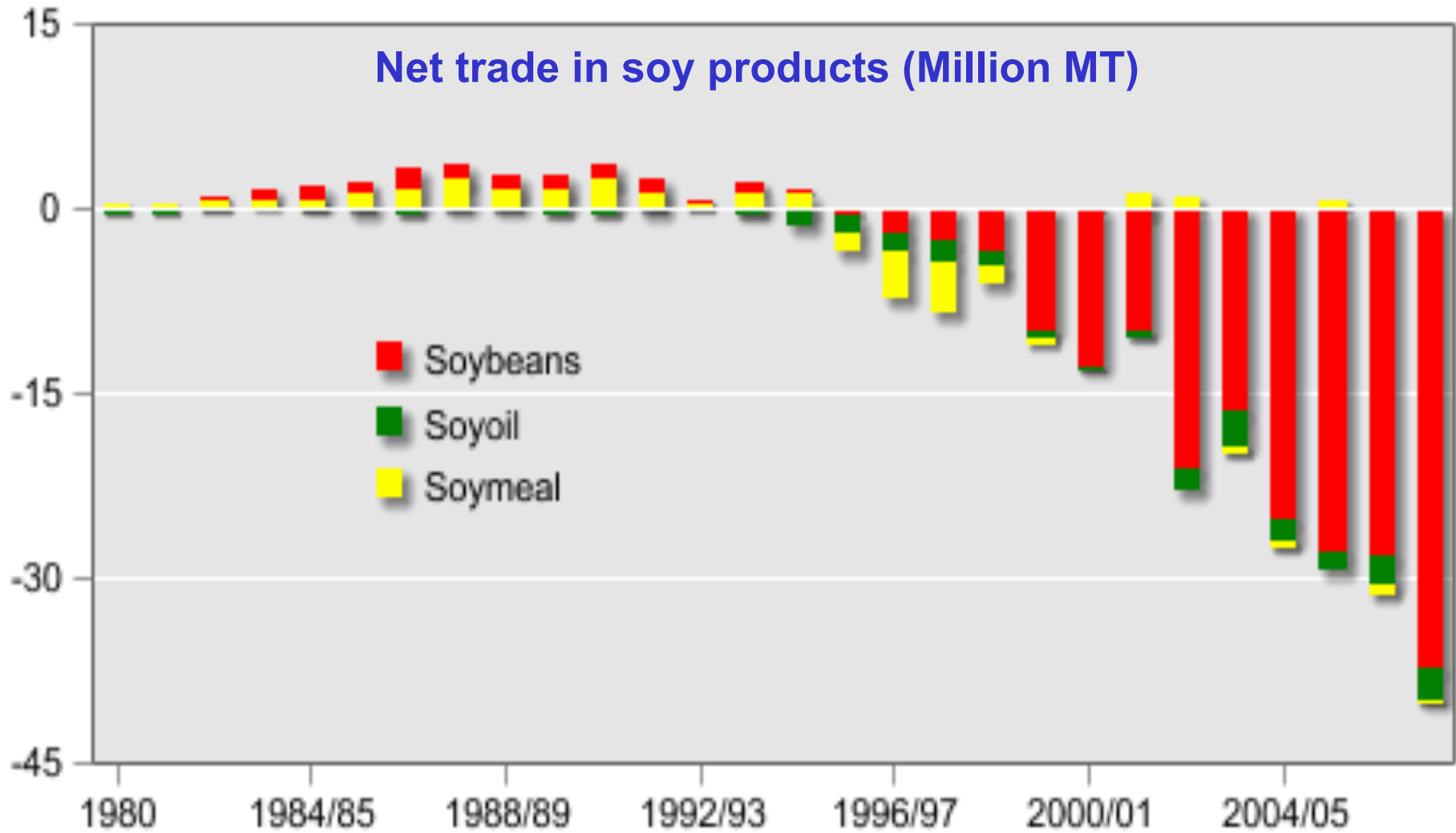
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China's Soy Demand



Source: *USDA*.

Trade: China's Soy Tsunami



Source: USDA/ERS.

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Scenarios for Energy and Food Security



Baseline: Reference case, global oil and gas prices constant.

S1: Global oil and gas prices rise 50% over the period 2010-2030.

S2: Scenario 1 with biodiesel and ethanol standards (USA, EUR, IND)

S3: Scenario 2 with 1 percent annual energy efficiency gains.

S4: Scenario 3 with 1 percent agrofood productivity growth.

Macroeconomic Results

	Oil Price	Biodiesel	Ethanol	EE	Ag Prod
	S1	S2	S3	S4	S5
Real GDP	-4.8%	1.1%	1.3%	0.9%	2.9%
Real Cons	-6.6%	2.1%	2.4%	3.4%	6.2%
Exports	-4.1%	-0.9%	-1.0%	2.4%	1.3%
Imports	-9.3%	0.0%	-0.1%	2.7%	3.2%
Agfood Imports	-8.3%	2.3%	3.0%	9.5%	-29.5%
Energy Imports	-27.6%	-10.6%	-12.5%	-19.0%	-13.0%
GDPPC_PPP	-4.1%	-0.9%	-0.9%	1.3%	5.1%
CPI	3.0%	0.7%	0.8%	4.6%	1.7%
Food CPI	-2.6%	0.4%	0.6%	1.9%	-11.9%
Energy CPI	48.6%	5.4%	5.8%	-9.0%	0.4%
Real HH Income	-4.7%	0.9%	1.1%	2.3%	4.2%
Real Wages	-5.9%	0.4%	0.7%	3.7%	7.9%
GHG Emissions	-13.2%	-6.7%	-7.5%	-18.1%	-15.6%

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% Change from 2030 Baseline
 % Change from S1

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Conclusions: Food or Energy Security?

- For countries like India, who have low income majorities and are price takers in global energy markets, food price risk is more important than energy price risk – two different policy approaches apply
 - Countries with significant domestic biofuel potential can consider supply side solutions to energy needs
 - Others should consider demand side solutions rather than diverting agrofood potential to energy production
- For the latter group, priority should be given to offsetting livelihood risk from food prices, promoting agrofood productivity to reduce food costs and, indirectly, any adverse real income effect from higher energy prices.



Thank you

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B-GTAP

A new global database including:

- GTAP-7 complete, 113 countries, 57 sectors
- Energy disaggregation – 13 sources
- Emissions data – 14 categories
- Income distribution – deciles
- Demographic data – population by age (young, working, retired)

Energy Disaggregation

1. **Coal**
2. **Oil**
3. **Gas**
4. **Biodiesel**
5. **Ethanol1 - Sugar based**
6. **Ethanol2 - Starch based**
7. **Nuclear**
8. **Hydro**
9. **Biomass and Waste**
10. **Wind**
11. **Geothermal**
12. **Solar**
13. **Tide and Wave**

Emission Categories

Air Pollutants

1.	Carbon Dioxide	CO ₂
2.	Suspended particulates	PART
3.	Sulfur dioxide	SO ₂
4.	Nitrogen dioxide	NO ₂
5.	Volatile organic compounds	VOC
6.	Carbon monoxide	CO
7.	Toxic air index	TOXAIR
8.	Biological air index	BIOAIR

Water Pollutants

9.	Biochemical oxygen demand	BOD
10.	Total suspended solids	TSS
11.	Toxic water index	TOXWAT
12.	Biological water index	BIOWAT

Land Pollutants

13.	Toxic land index	TOXSOL
14.	Biological land index	BIOSOL

Emission Paths for OECD and non-OECD

