

The Role of Agriculture Looking Forward

Channing Arndt

World Institute for Development Economics Research

United Nations University

(UNU-WIDER)

Structure of Presentation

I. Traditional considerations

II. Two long run concerns

A. Natural resource revenues and Dutch disease

B. Climate change

III. Mozambique in a world that mitigates

IV. Conclusions

Traditional Considerations for Agriculture

- A. Production potential and technology (supply)
- B. Population and income (demand)
- C. International/regional trade (prices)
- D. Employment and welfare (social)

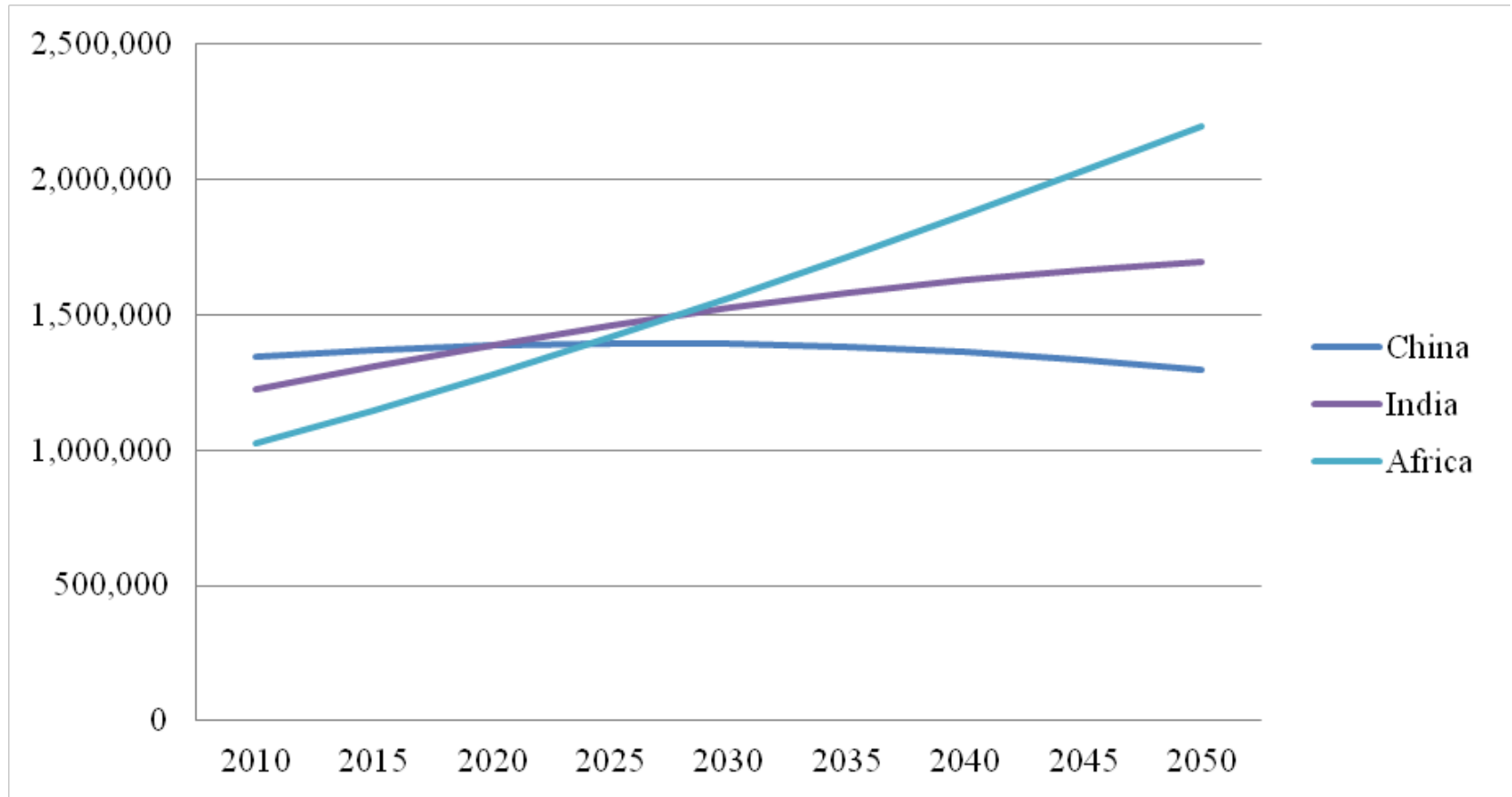
Mozambique – Supply Side

- **High potential**
 - Quantity of arable land
 - Rainfall
 - Irrigation potential
 - Reasonable soils
- **But, low productivity**
 - Essentially all figures point this direction
 - Little productivity improvement, at least until recently
- **Not that many other places in the world with this level of unrealized potential.**

Traditional Considerations for Agriculture

- A. Production potential and technology (supply)
- B. Population and income (demand)**
- C. International/regional trade (prices)
- D. Employment and welfare (social)

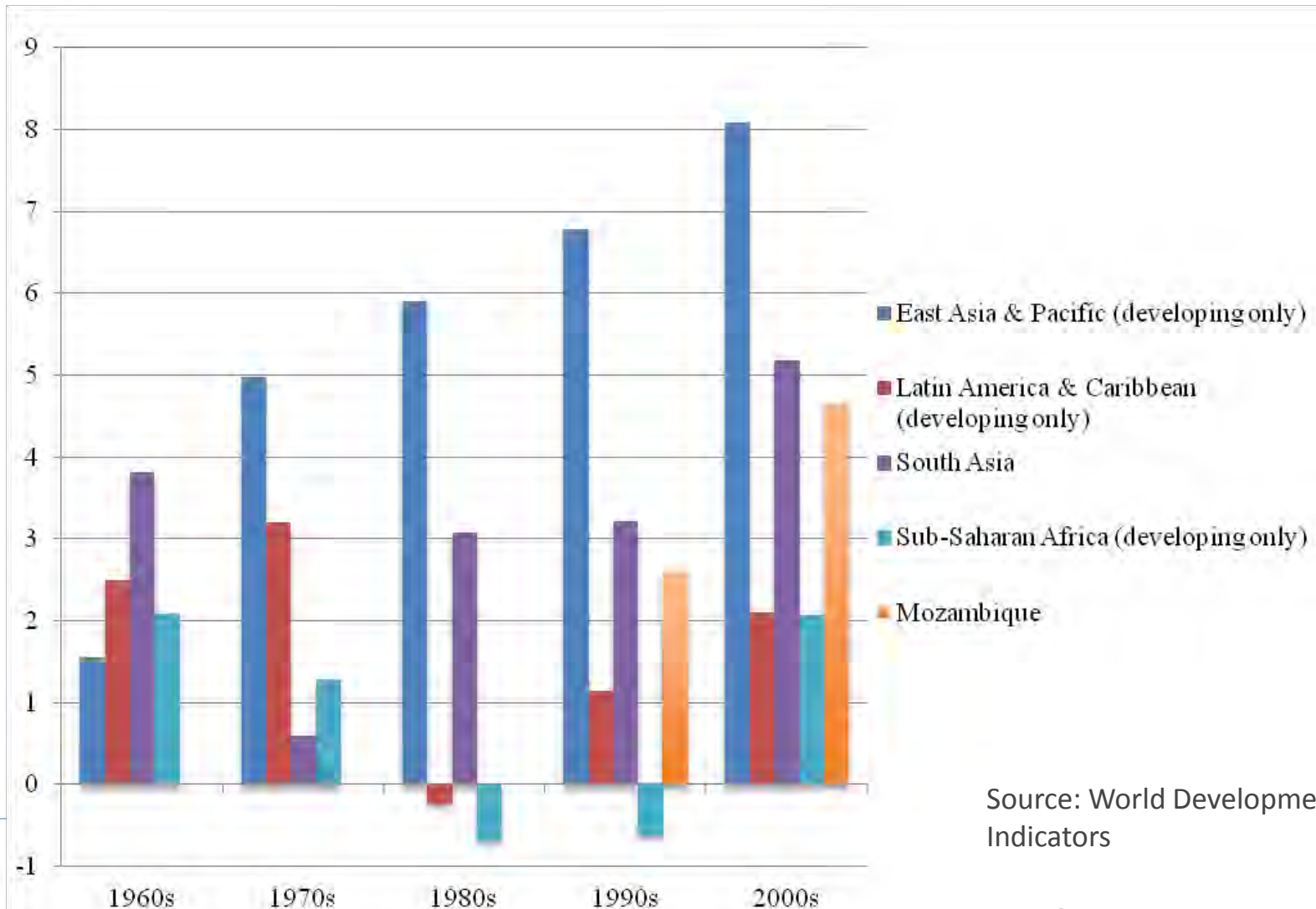
Population Projections (UN Medium Variant)



Observations - Population

- **Nearly half of global population growth to 2050 will occur in Africa.**
- **Sub-Saharan Africa will account for more than 20% of global population by 2050.**
- **Africa is not “small” in population terms and is set to become much more important.**
- **Mozambican population is projected to grow more rapidly than the rest of Africa (going from 25 million today to 60 million in 2050).**

Per Capita GDP Growth by Decade



Source: World Development Indicators

Mozambique - Food Shares

Quintile	Foods	Non Food
1	64.4%	36.4%
2	67.8%	32.5%
3	67.5%	32.7%
4	64.6%	35.7%
5	47.2%	52.8%

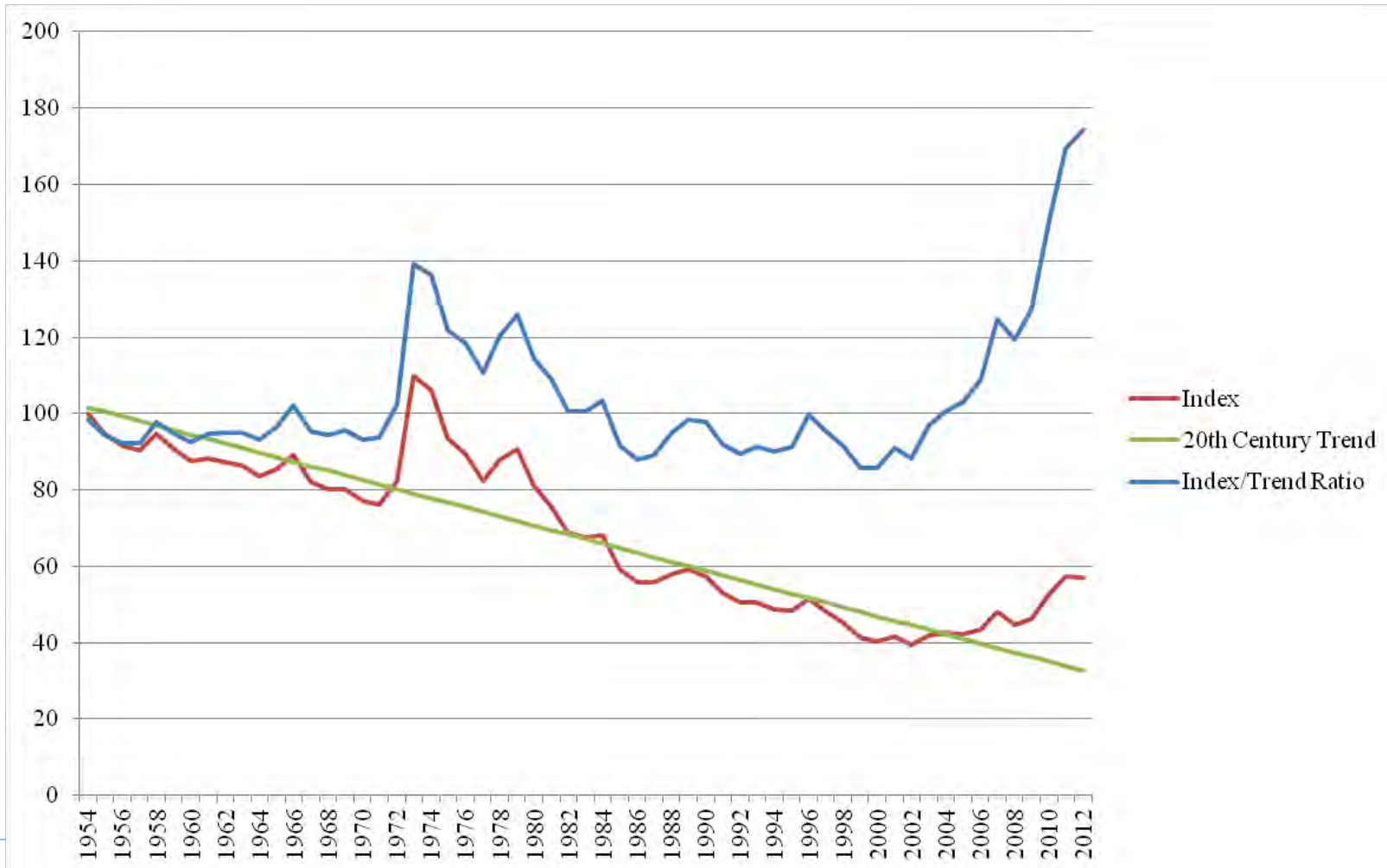
Source: IOF 2008-09.

Traditional Considerations for Agriculture

- A. Production potential and technology (supply)
- B. Population and income (demand)
- C. International/regional trade (prices)**
- D. Employment and welfare (social)

World Markets

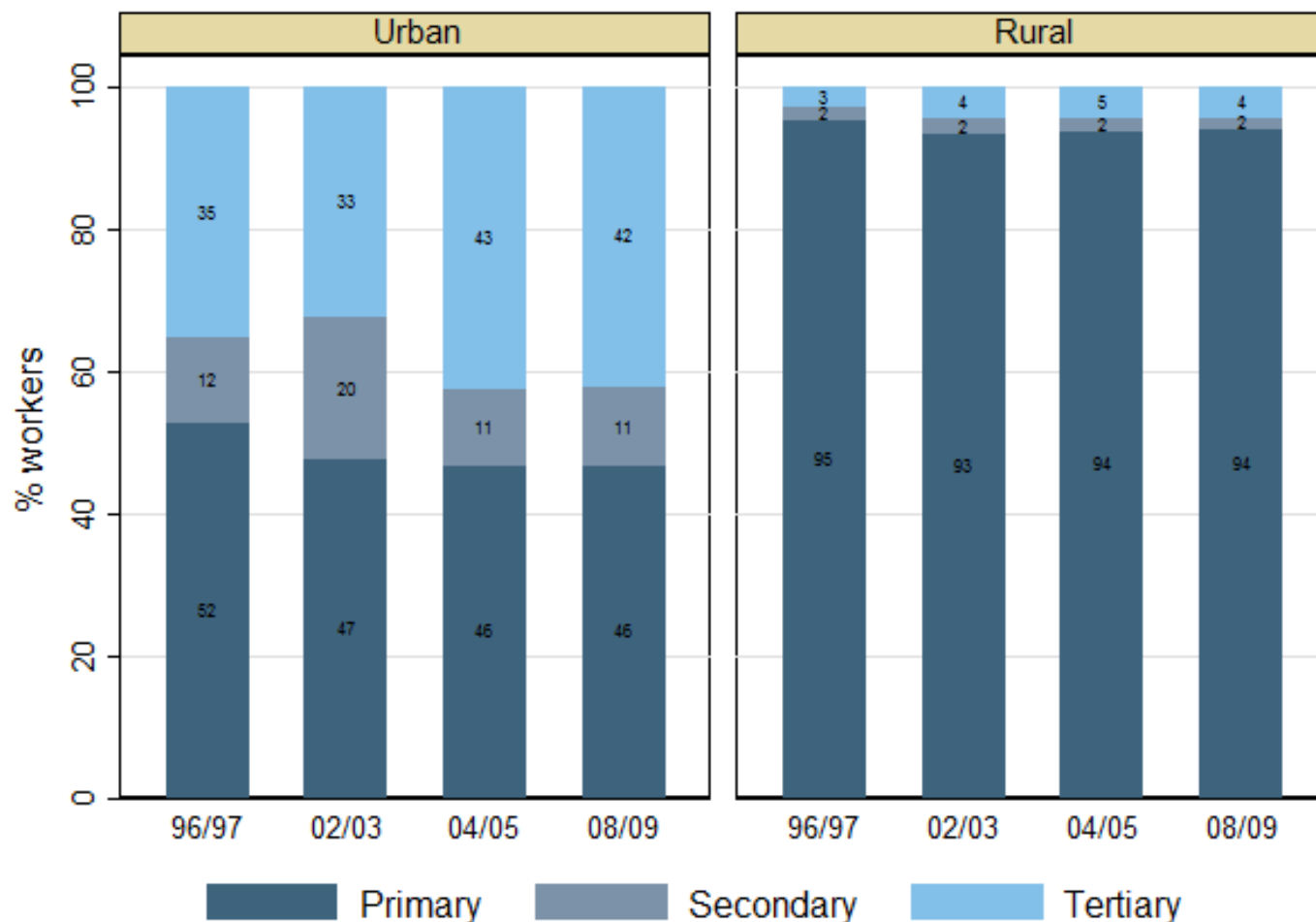
Producer Prices for Agriculture



Traditional Considerations for Agriculture

- A. Production potential and technology (supply)
- B. Population and income (demand)
- C. International/regional trade (prices)
- D. Employment and welfare (social)**

Social – Principal Occupation by Sector



Summary – Mozambican Agriculture

- Strong supply potential (largely unrealized)
- Rapid demand growth for food
- Generally favorable international price environment
- Potential for large social gains from agricultural growth

By traditional indicators, good reasons to push agricultural development looking forward.

Concern 1: Natural Resource Revenues

Natural Resources and Development

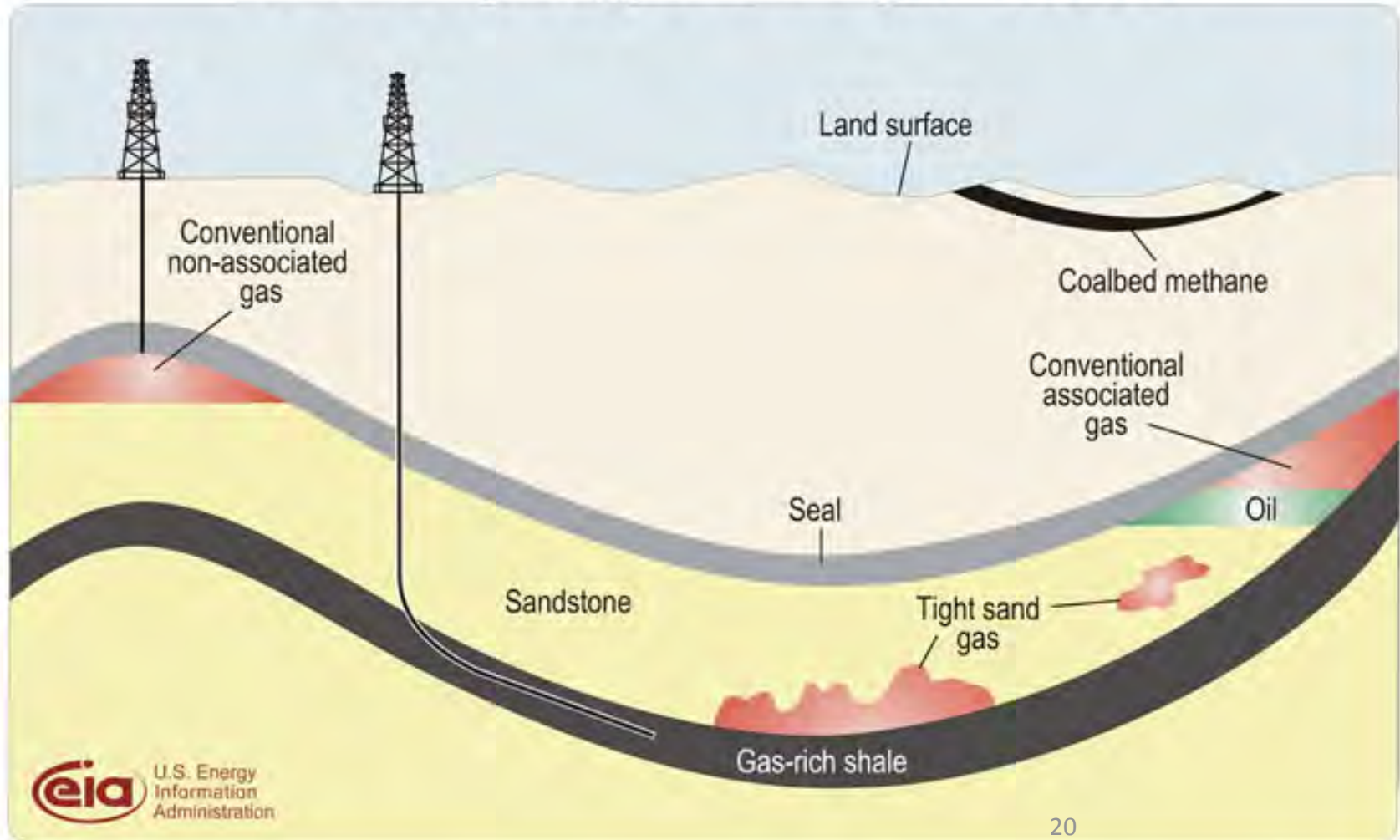
- **International experience is mixed**
- **Principal issues:**
 - Unequal distribution of benefits
 - Conflict
 - Loss of international competitiveness (Dutch disease)

Essential Challenge for Developing Countries with Resources

- **Convert natural capital below the ground,**
 - Gas
 - Coal
 - Etc.,
- **Into physical and human capital above the ground.**
 - Road
 - Rail
 - Ports
 - Schools
 - Water and sanitation infrastructure, etc.
- **Easy to say but hard to do!**

Convert Natural Resource Capital

Schematic geology of natural gas resources



Into Physical Capital



And Human Capital



But consumption is tempting

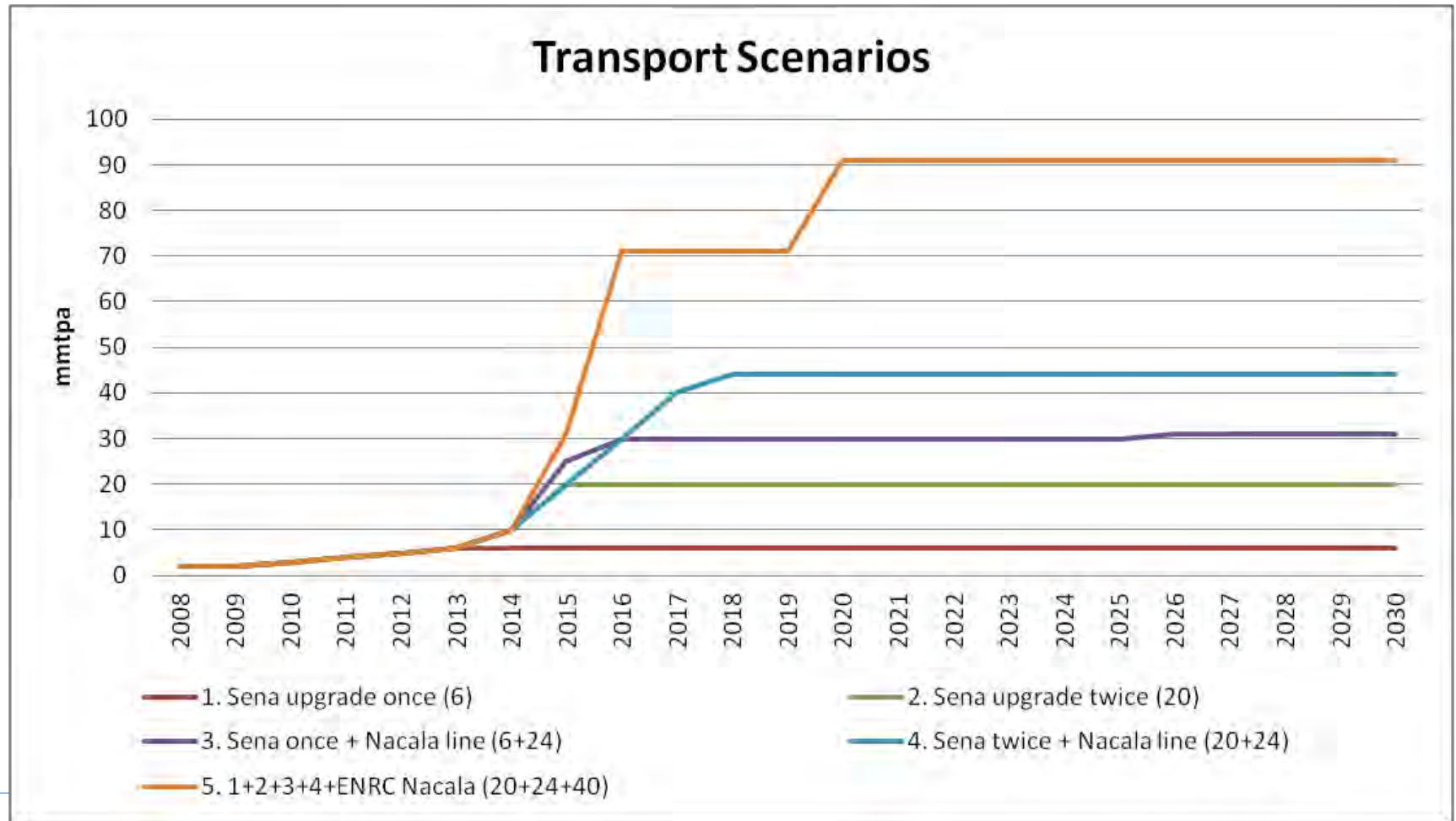


Natural Resource Revenues

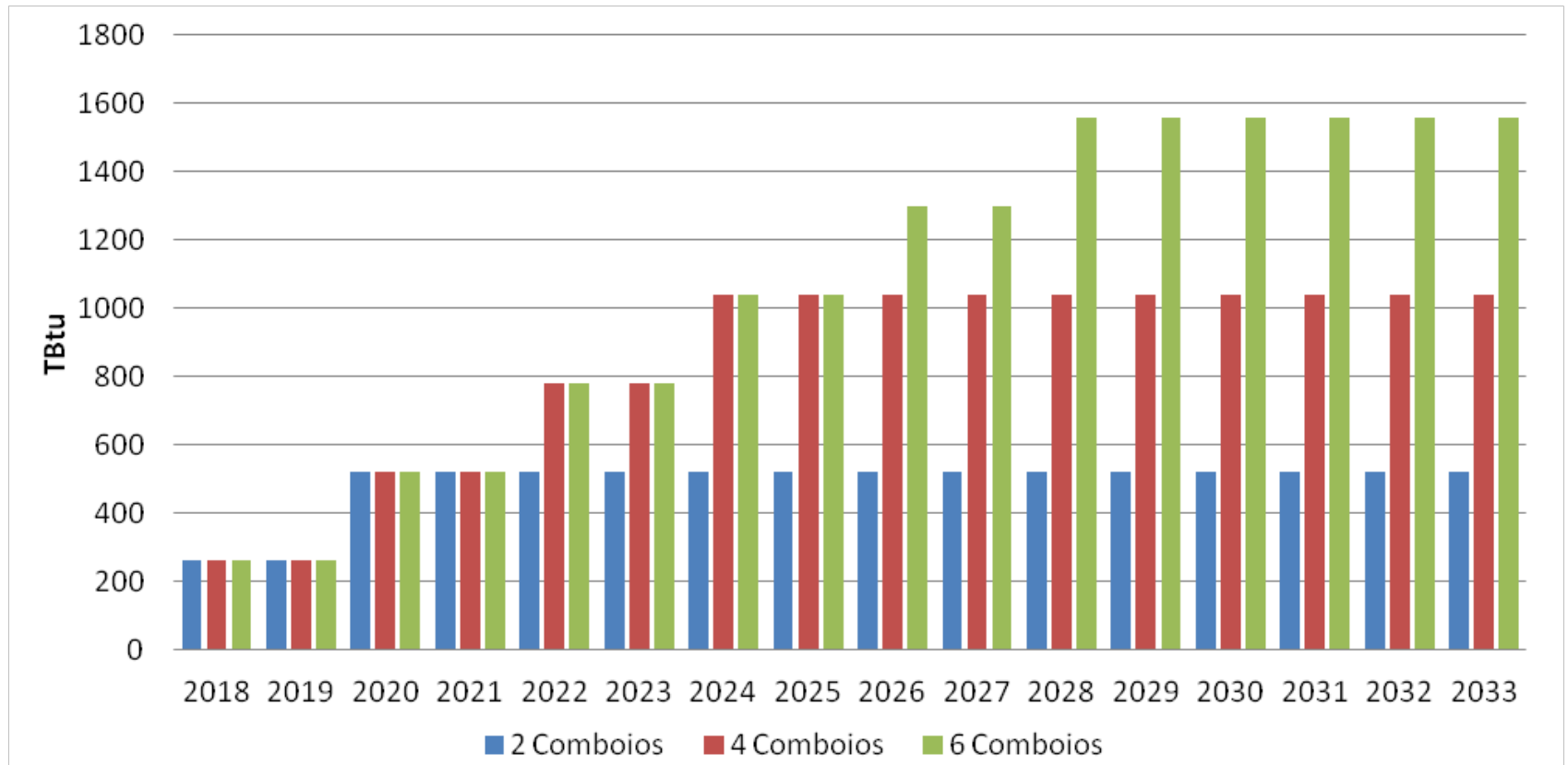
Resources require major investments in order to realize value.

- Coal Rail transport
- Natural gas LNG trains
- Hydropower Dams and transmission

Coal: Exports Constrained by Transport Capacity



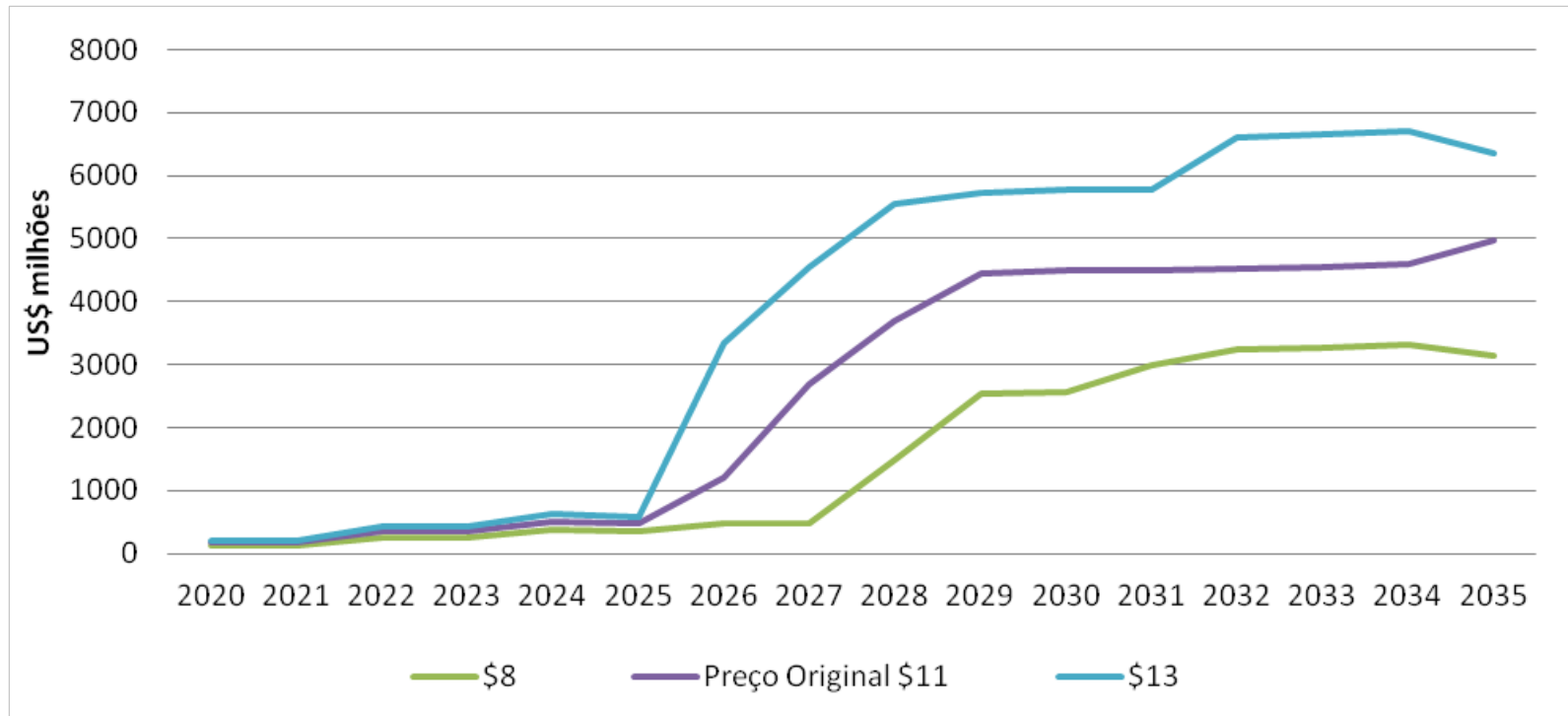
Natural Gas: Investment in LNG Trains



Government Revenue

- **Enormous uncertainties:**
 - Quantity of reserves, particularly for gas
 - Costs of extraction
 - Pace of investment
 - Prices received
- **Regular government revenues from resources:**
 - Unlikely to be very substantial before about 2025
 - Ramp up quickly
 - Potentially large, 5-6 billion USD/year before 2030 is possible

Example: Gas Price Uncertainty and Government Revenue from Gas



NOT a forecast. Numbers are meant to illustrate the implications of gas price uncertainty. Many other factors can also substantially alter likely revenue trajectories.

Summary – Natural Resources

- **Despite the uncertainties, significant and regular natural resource revenues can be expected in about 10 years.**
- **Assume:**
 - GDP growth of 7% over the next 10 years
 - Government spending at 33% of GDP in about 2025
 - Natural resource government revenues of 5 billion USD in about 2025
- **Then, natural resource revenues would be about 40% of government spending in 2025**

Implications for Agriculture

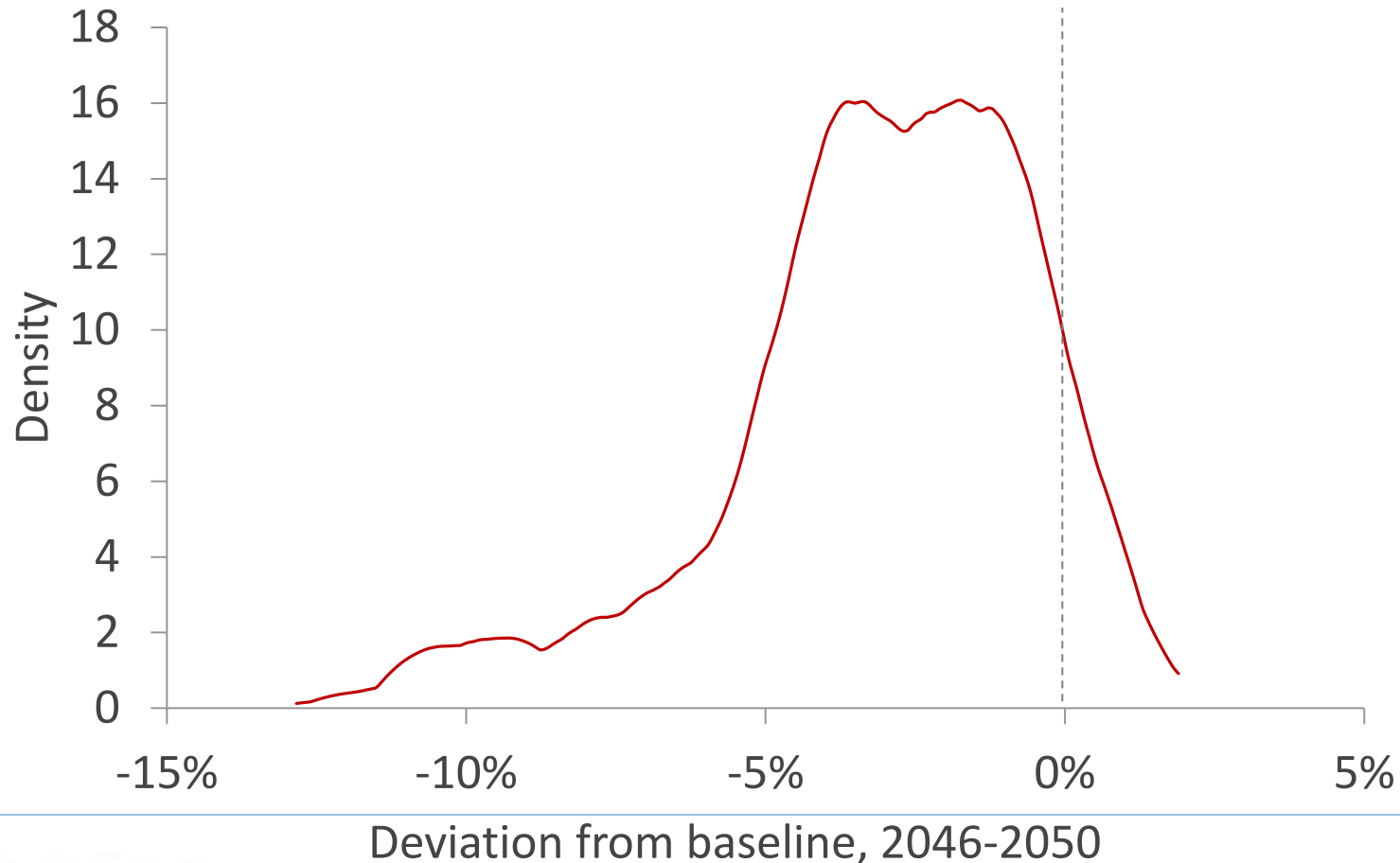
- **The resource boom does not undermine and likely supports the case for investment in agriculture:**
 - Large investment needs
 - Distributed benefits
 - Strong potential for productivity gains to maintain competitiveness

Concern 2: Climate Change

**Draws from recently published work
with James Thurlow and others.**

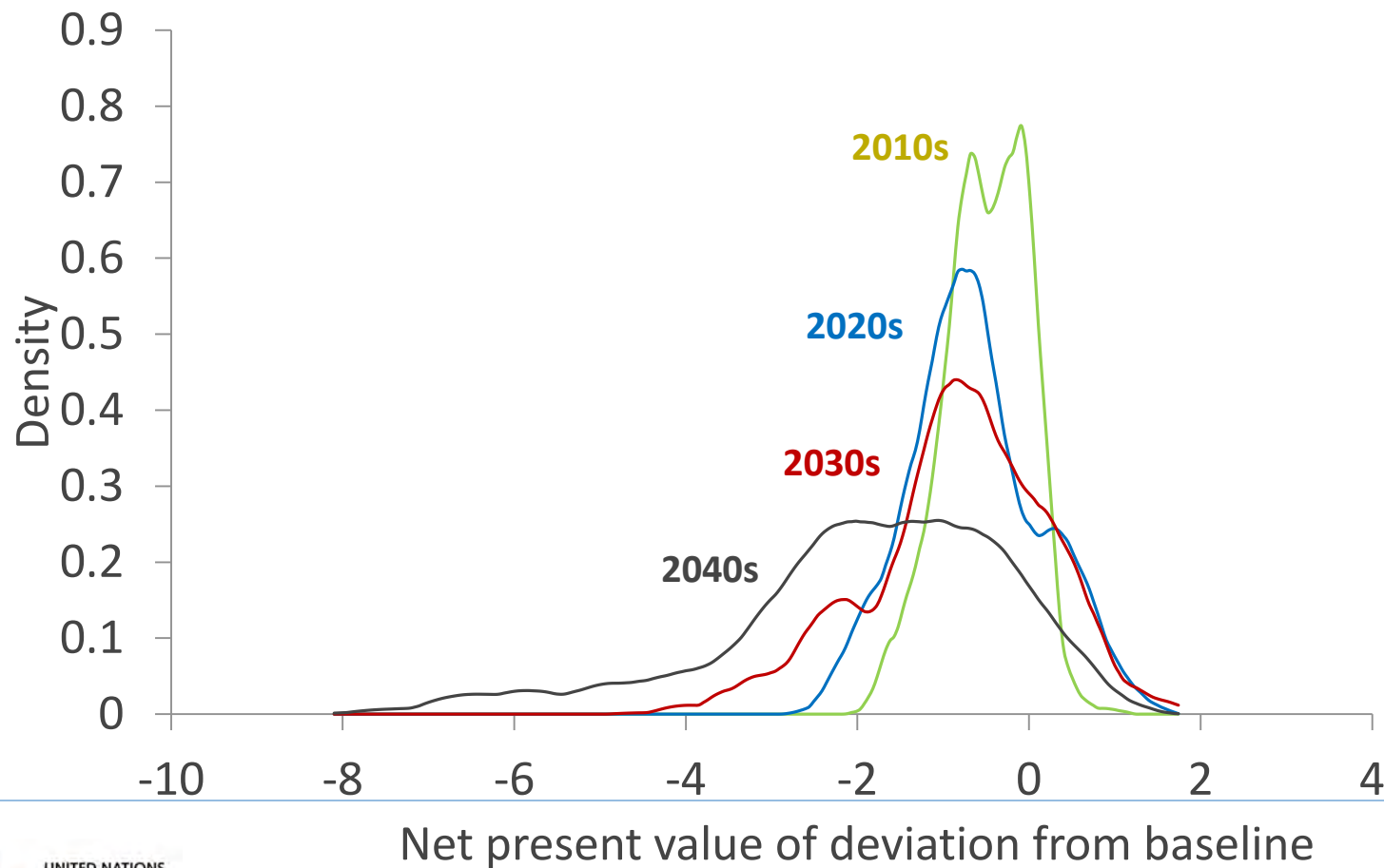
Mozambique- Changes in GDP with globally unconstrained emissions

Change in total value-added (2046-2050)



Net Present Value of GDP Losses

Cumulative change in total value-added
(5% discount rate applied, units in billions of 2007 USD)



Implications

- **Under unconstrained emissions:**
 - Climate change shocks are negative for the large majority of **future possible climates**.
 - Climate change shocks become progressively more negative with time.
 - Large impacts are associated with big increases in the frequency and severity of flooding events.
 - But, the growth effects in agriculture and elsewhere are small on a per year basis, particularly in the next two decades.
- **Solid reasons for investing into agriculture. Research into heat resistant varieties is particularly important.**

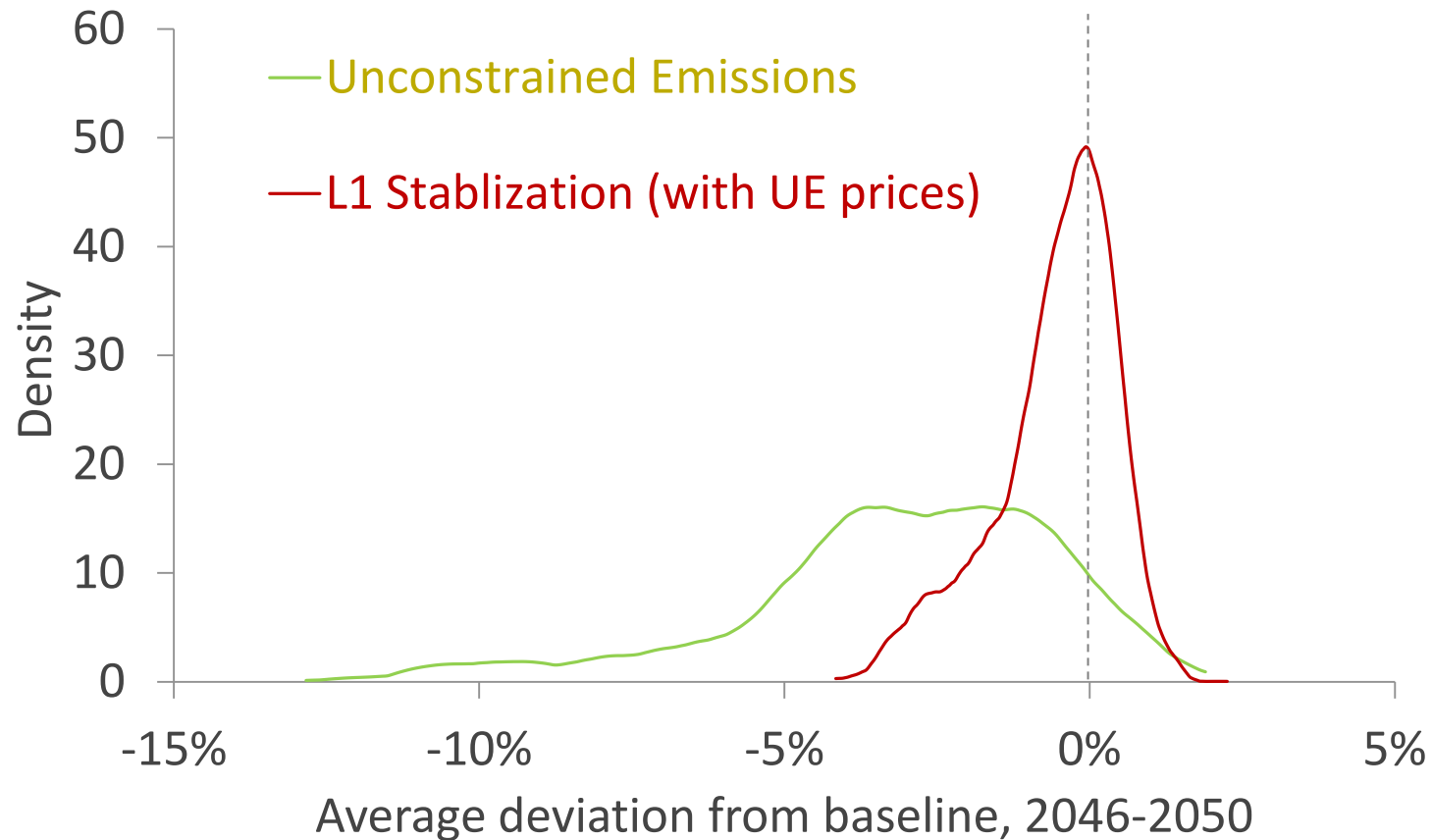
What about global mitigation?

Recent events

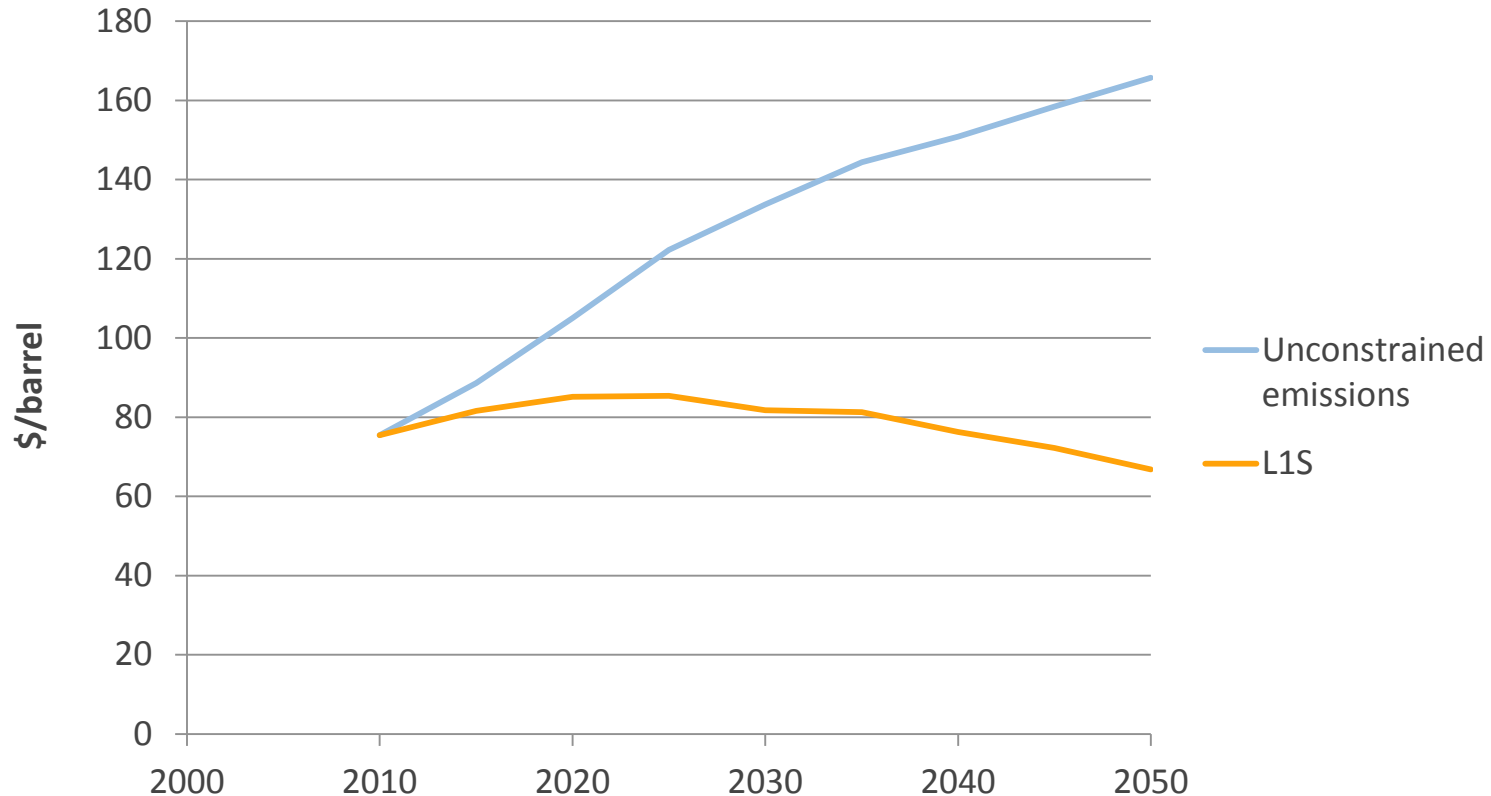
- **Agreement between the United States and China:**
 - USA to reduce greenhouse gas emissions to 26-28% below 2005 levels by 2025 (with steeper reductions thereafter).
 - China to halt emissions growth before 2030 (with absolute declines thereafter).
- **We will see. Nevertheless, prospects for real progress on global emissions are brighter, perhaps than ever before.**

Effects of Global Mitigation Policy: Mozambique

Change in total value-added (GDP)

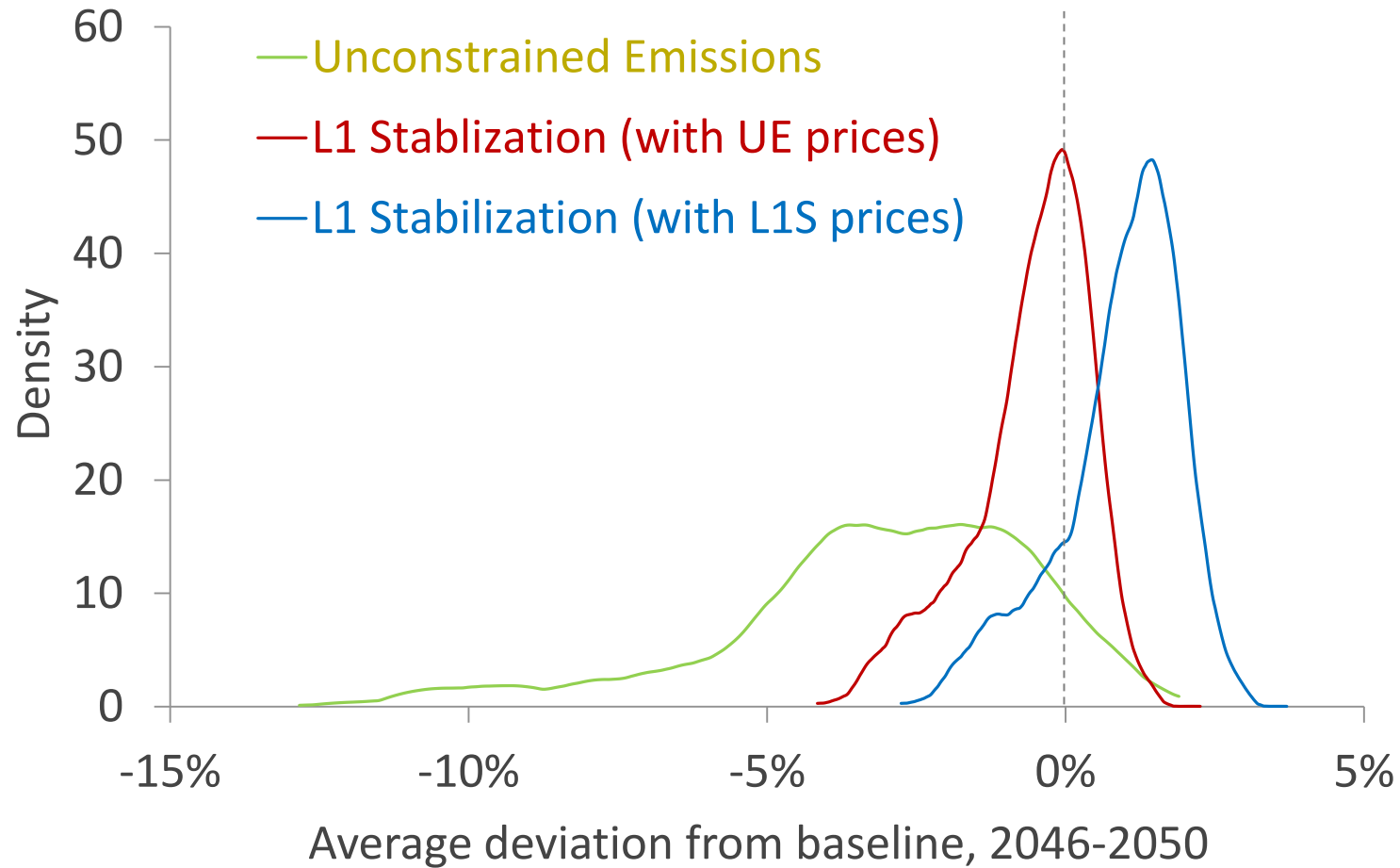


World Oil Producer Prices (Unconstrained emissions versus L1S)

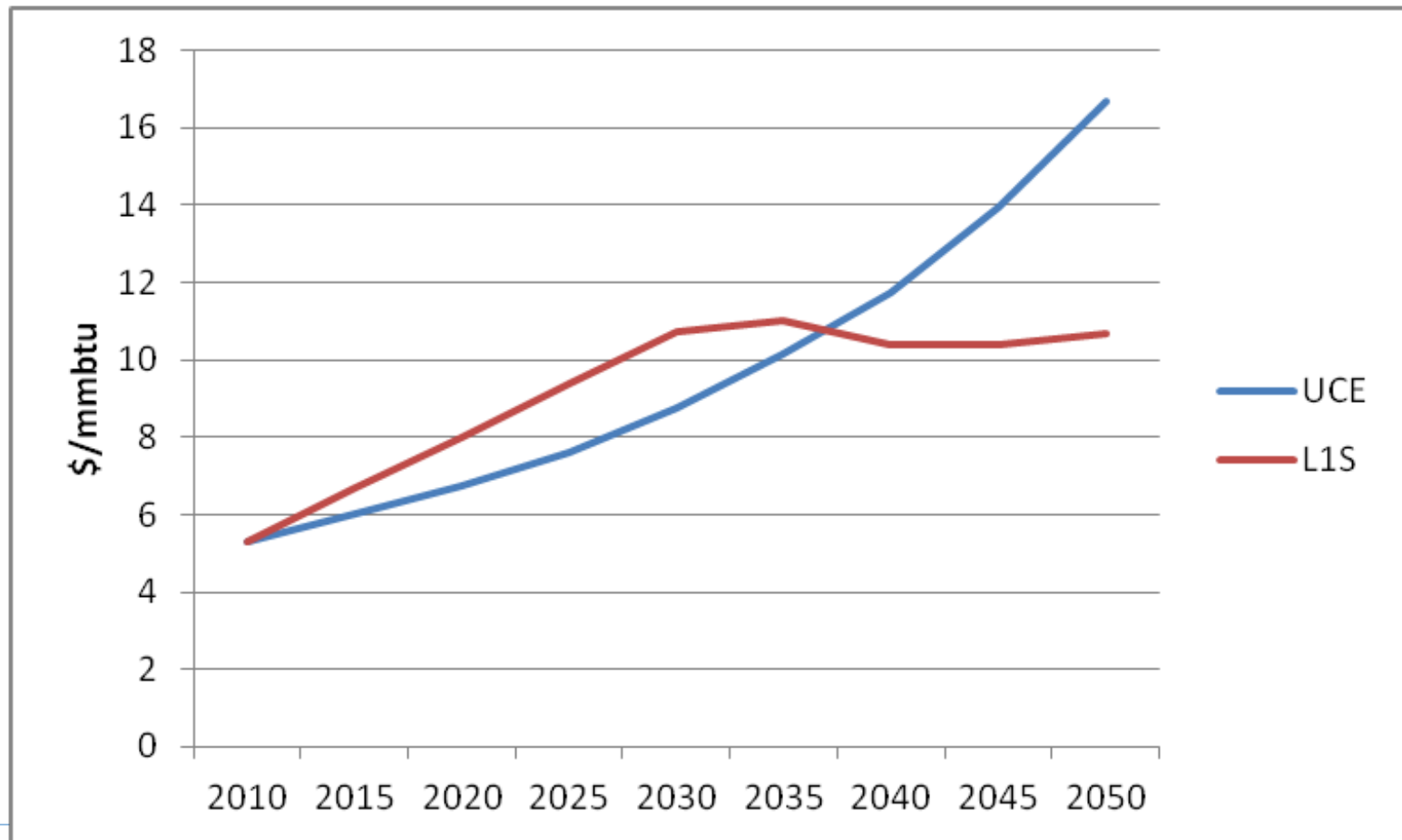


Effects of Global Mitigation Policy: Mozambique

Change in total value-added (GDP)



World Natural Gas Producer Prices (Unconstrained emissions versus L1S)



Principal Likely “World” Price Effects of Serious Global Mitigation Policy

Product	Effect	Implication for Mozambique
Oil	Reduce	Good
Coal	Reduce	Bad
Natural gas	Increase then reduce	Good then bad
Hydro electricity	Increase	Good
Agriculture	Increase	?

Conclusions 1

- **Solid reasons to invest in agriculture based on traditional considerations**
 - supply potential,
 - demand growth,
 - world prices, and
 - social objectives

Conclusions 2

- **Our two concerns,**
 - Natural resource boom and
 - Climate change,generally reinforce the desirability of a vibrant and productive agricultural sector.
- **Converting natural resource capital below the ground into agricultural investment above the ground makes a lot of sense.**

Future Research:

Some Thoughts on Mitigation

- **Whether Mozambique joins a global mitigation regime or not, the world price effects of global mitigation are likely to have substantial implications for Mozambique.**
- **Once Mozambique attains middle income status (perhaps in 10-15 years), pressure to join a global regime (if it exists) is likely to increase.**
- **Overall, global mitigation is likely to impose some costs but also offer a series of strategic opportunities, particularly in agriculture.**



UNITED NATIONS
UNIVERSITY
UNU-WIDER

www.wider.unu.edu

Helsinki, Finland