Promoting Global Agricultural Growth and Poverty Reduction 2010—2050

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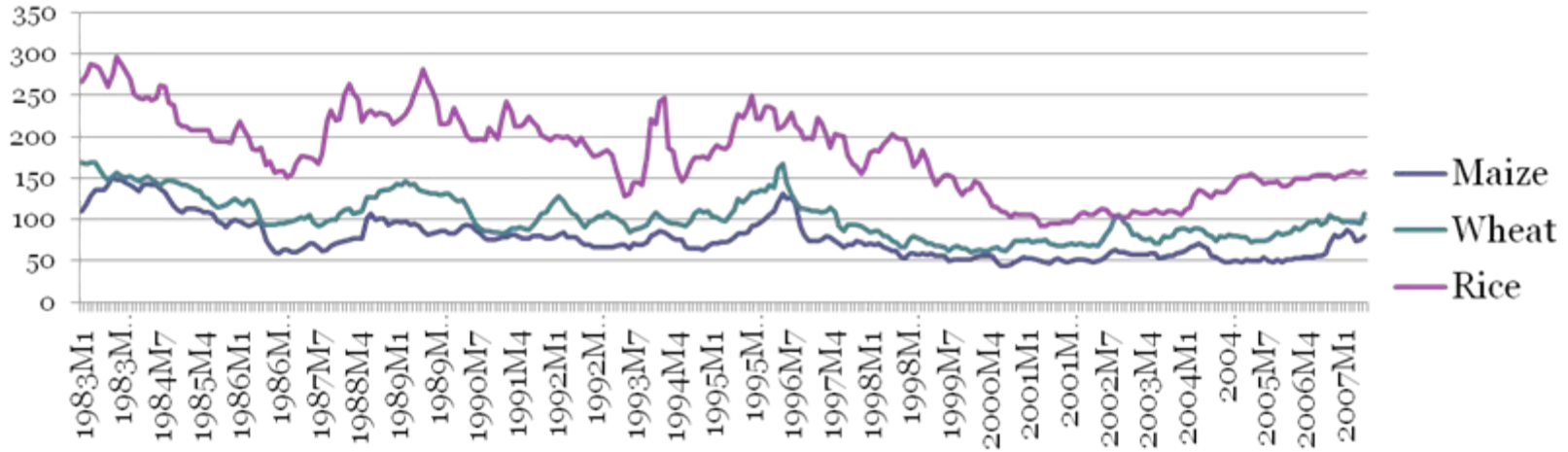
Motivation



- Food prices are on a rise again and may continue rising
  - Various reasons: climate change, biofuels, rising population etc.
- Is it a problem?
  - Higher food prices may increase poverty
- What should we do about it?
  - Improve agricultural productivity
  - Protect agriculture
  - Deliver technical change to small farmers

Global projections 2010–2050

- Global population is projected to rise by 34 percent with regional variation
  - Sub-Saharan Africa rise of 120 percent
  - Very low population growth in East Asia: 10%
  - Moderate growth in Latin America: 33%
  - Decline in Europe and Central Asia of 4 percent
- Developing country growth also projected strong
  - Capital stock in East Asia to grow by 800 percent
  - Very high factor productivity growth in East and South Asia

How global growth affects food prices

- Growth in population raises demand for food and food prices in two ways
  - Population growth increases food demand directly
    - More mouths to feed with the same amount of land
  - Income growth increases demand
    - Income elasticity of food is high for low-income countries
    - Especially East & South Asia can afford more food as their per capita incomes grow significantly

How global growth affects food prices

- Growth can affect supply of food too
  - Growth of capital stock "pulls" resources out of agriculture in developing countries
    - Rybczynski effect
  - Improvements in agricultural productivity raise output
    - The same amount of land can produce more food
    - Higher effective prices attract additional resources

How global growth affects poverty

- Rising food demand and food prices
  - Harm consumers who have to pay more for food
  - Help net-selling farm households whose incomes rise
- Higher productivity and larger endowments
  - Raise real incomes and lower poverty
  - Higher agricultural productivity
    - Raises agricultural output and effective producer prices
    - Higher supply lowers actual prices
- Technology adoption rate
  - A high rate of adoption of higher agricultural productivity by smallholder farmers may help the poor who are often smallholders as well

What analytical framework?

- Use a global CGE model to examine the impact of projections on agricultural outcomes
  - Exogenous variables: population growth, factor accumulation, productivity changes
  - Outputs: price changes
- To examine the impact of price changes on poverty we use a detailed household model
  - Exogenous variables: price changes & productivity gains
  - Outputs: individual households' changes in welfare and poverty

Global general equilibrium model

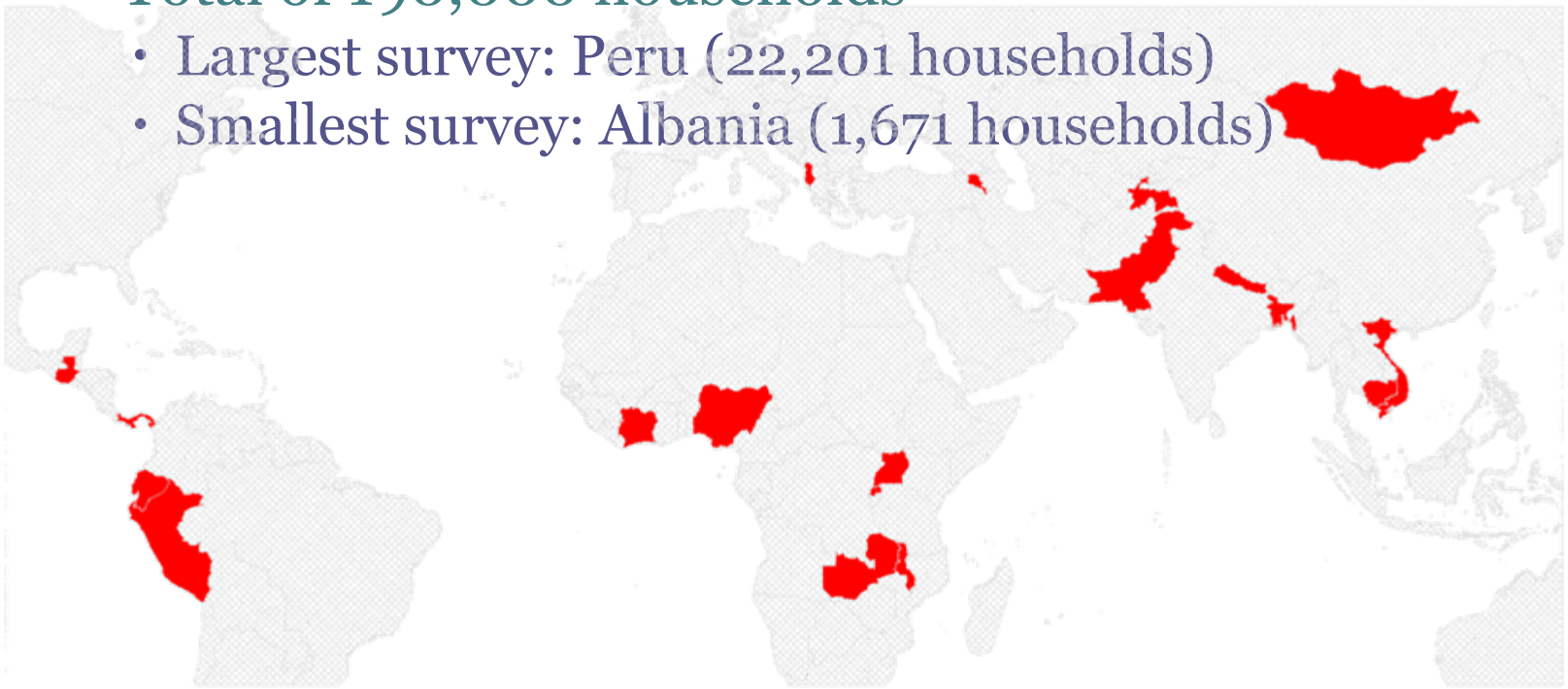
- Standard GTAP model
  - Six World Bank defined regions
- Latest GTAP database
  - Expanded agricultural commodity detail (FAO data)
    - 22 original agricultural and food commodities split in 38
      - E.g. split Soybeans and Groundnuts from “Oil seeds”
      - Focus on “orphan” crops such as sorghum, cassava etc.
- Parameter values
  - Doubled the trade elasticities for long run analysis
  - Raised value-added substitution in “Forestry” and “Fishing” to allow for growth in these industries

Household model

- Calculate welfare changes for each household
  - Change in the cost of living
  - Change in business income
  - Change in wage income
- Take into account the second-order impacts
  - Households adjust their consumption and production with respect to changing prices
    - Demand (CDE)
    - Supply (CRETH)
    - Supply and demand parameters consistent with CGE model

Household model coverage

- A set of household income and expenditure surveys
  - Recent surveys conducted in 2000-2007
  - 21 developing countries
  - Spread across regions
  - Total of 190,000 households
    - Largest survey: Peru (22,201 households)
    - Smallest survey: Albania (1,671 households)



Scenarios

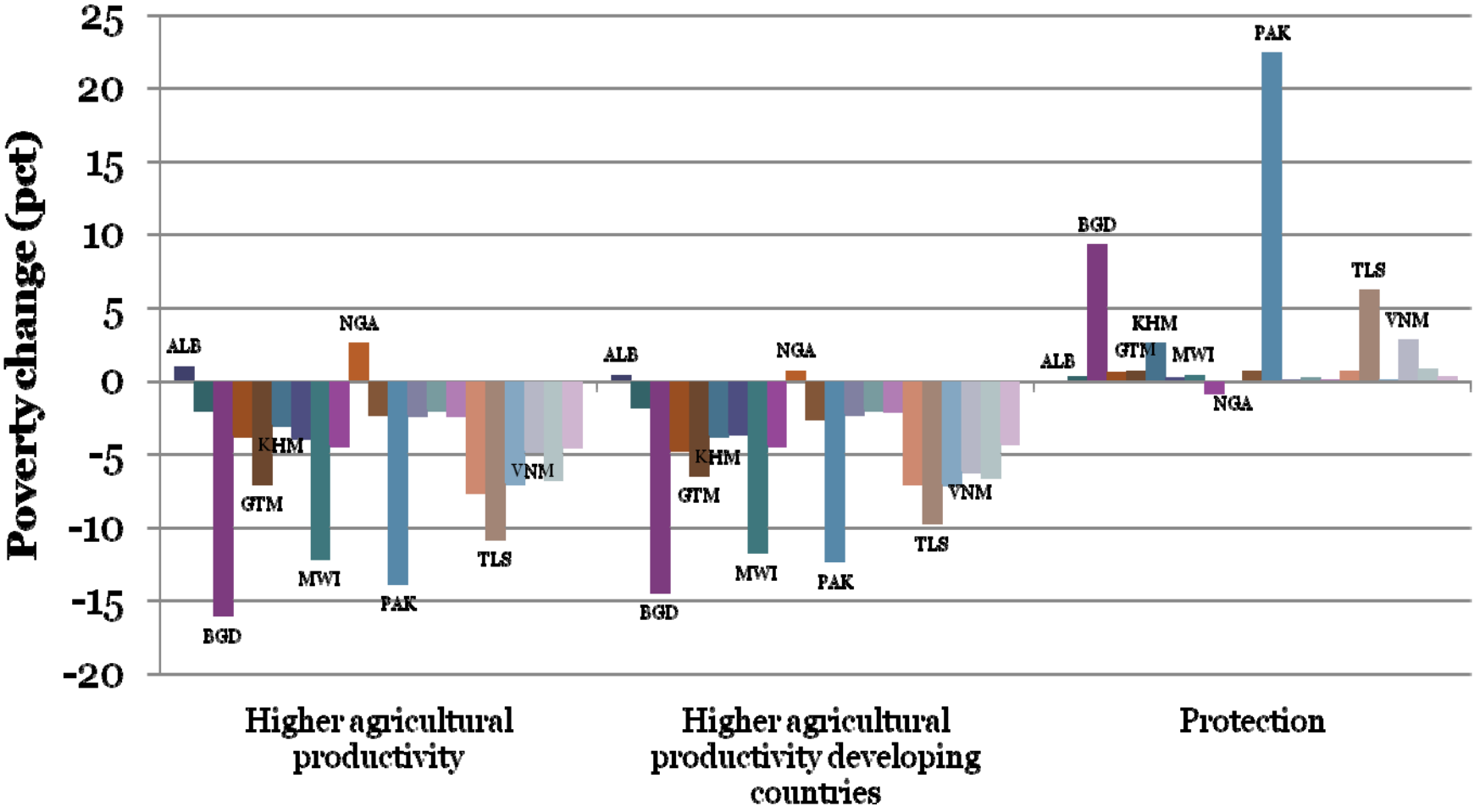
- Four broad scenarios
  - Baseline (projected growth)
  - Higher agricultural TFP worldwide (additional 1pct p.a.)
  - Higher agricultural TFP in developing countries (additional 1pct p.a.)
  - Protection of primary agriculture in developing countries
    - Raise self-sufficiency—halve import shares in 2050
- Additional analyses
  - Higher productivity in individual crops
  - Type of technical change
    - **Factor** productivity or **total** productivity
  - Assessing the importance of the adoption rate

Global aggregate changes

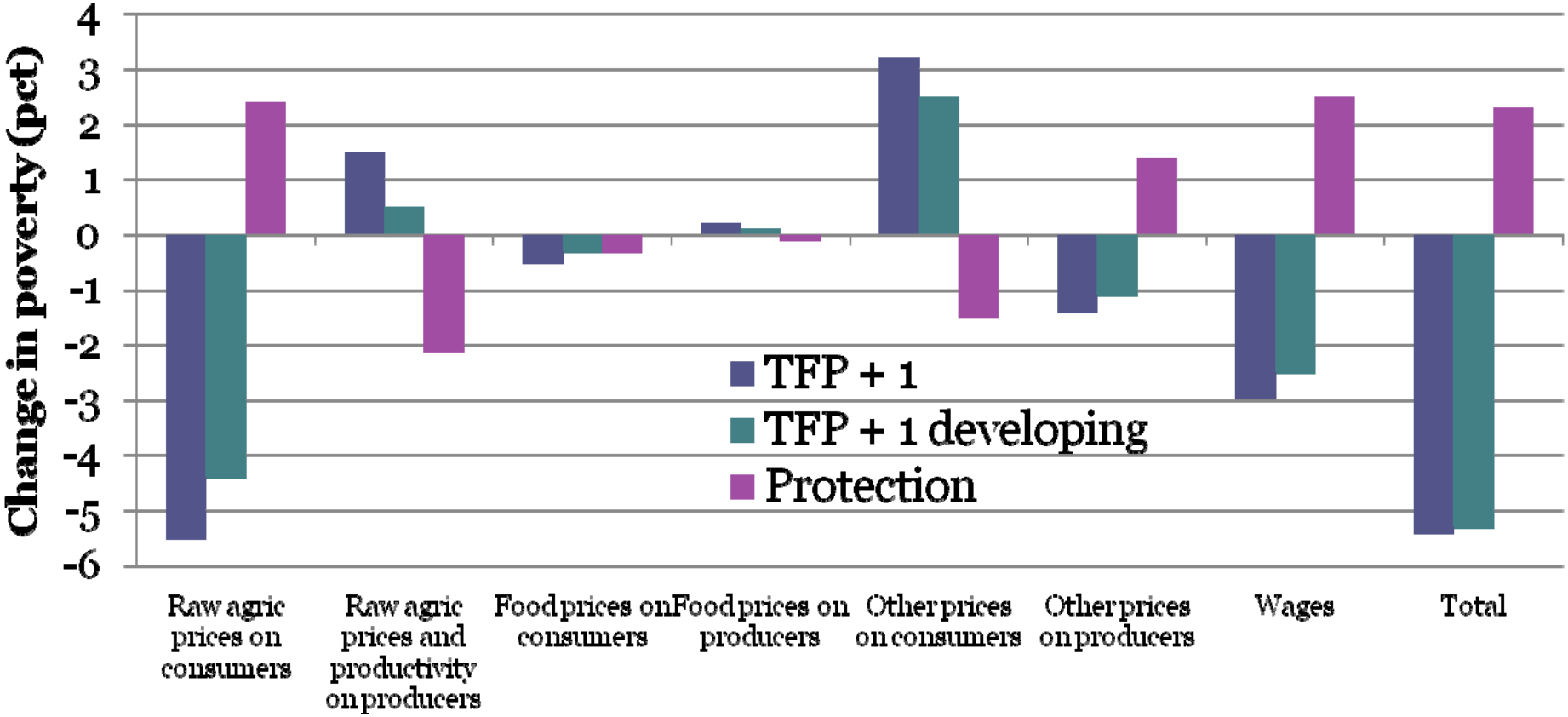
Commodity	Baseline		Ag TFP+1	
	Output	Price (CPI)	Output	Price (CPI)
Primary agriculture	126.9	115.6	179.1	4.8
Processed food	124.6	14.0	154.6	-1.8
All food	126.0	48.3	164.7	1.4
Energy	206.7	-6.0	212.4	0.8
Nondurables	204.7	-4.7	209.7	-0.6
Durables	203.5	-6.4	205.5	-0.2
Services	177.1	-5.9	179.6	-0.4

- Food prices are significantly lowered by higher agricultural TFP

Poverty impacts by country of higher agricultural TFP & protection (relative to baseline)

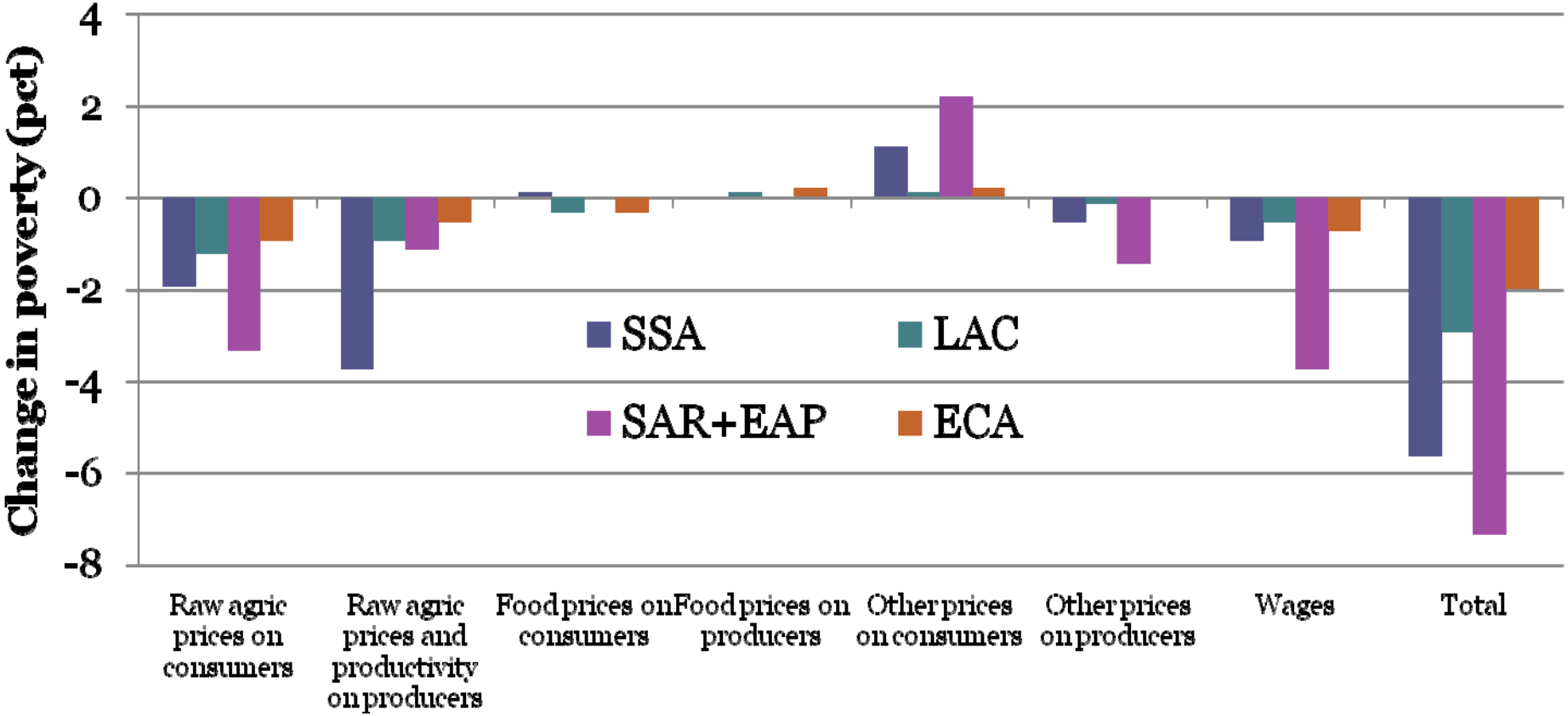


Decomposition of global poverty impacts (relative to baseline)



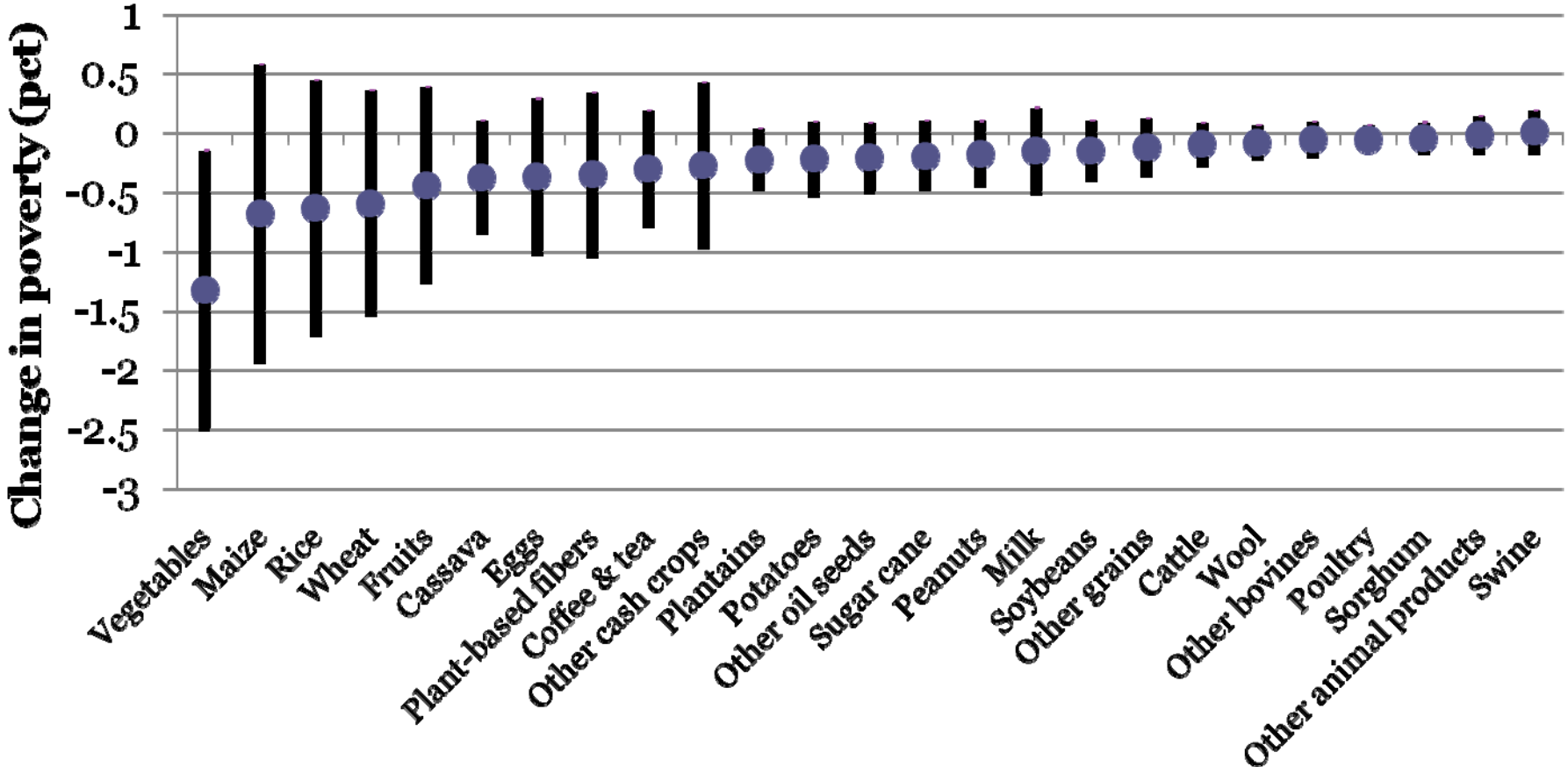
- Higher agricultural productivity lowers poverty mainly through favorable agricultural price and wage impacts
- Protection works in opposite direction, mainly hurting poor through lower wages

Comparison of regional poverty impacts

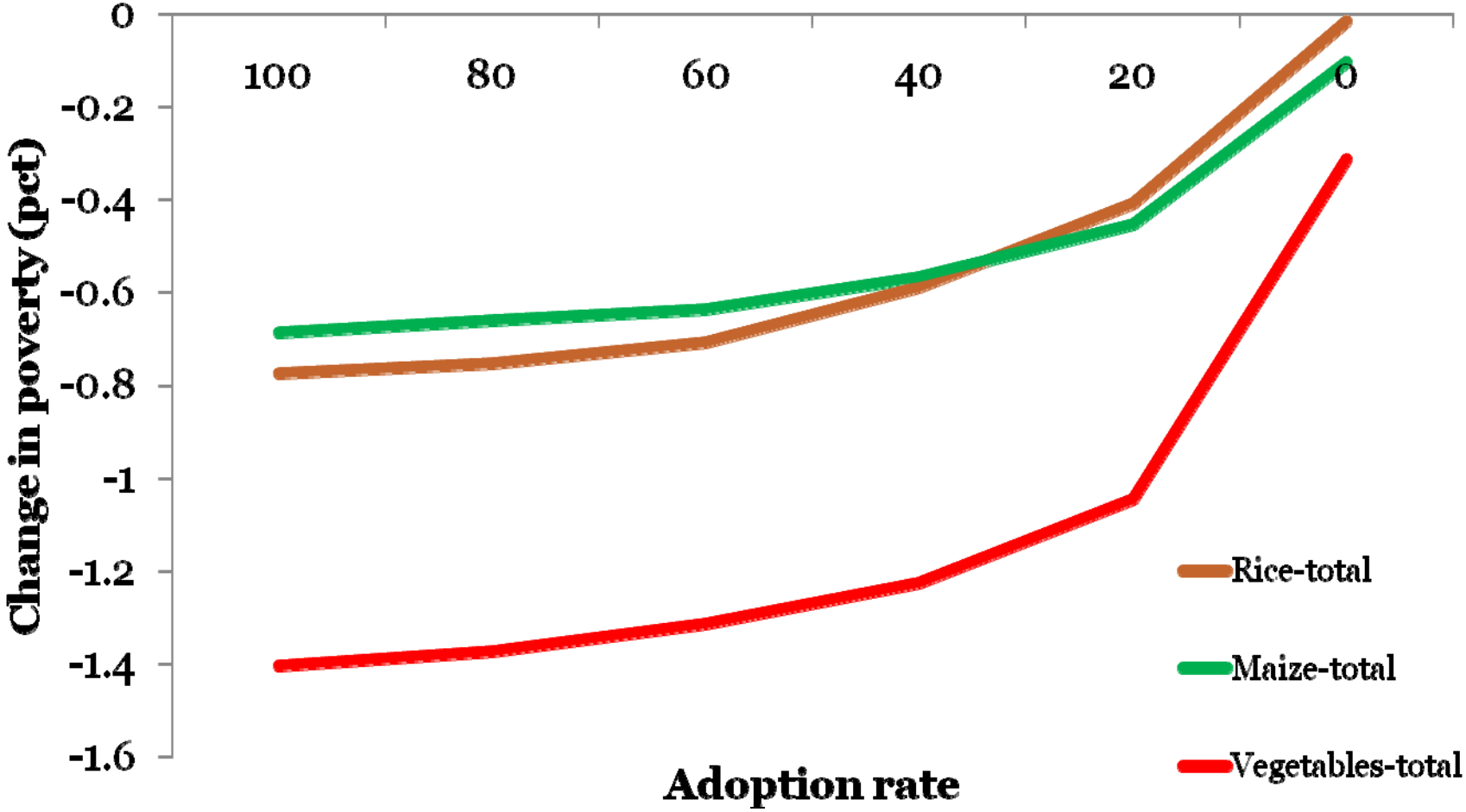


- Simulation: 1 pct additional agric growth by region
- Significant regional differences appear:
  - Africa benefits mainly from direct impacts on the price of agriculture
  - Asia benefits manly from wages
  - Latin America and Eastern Europe benefit more equally

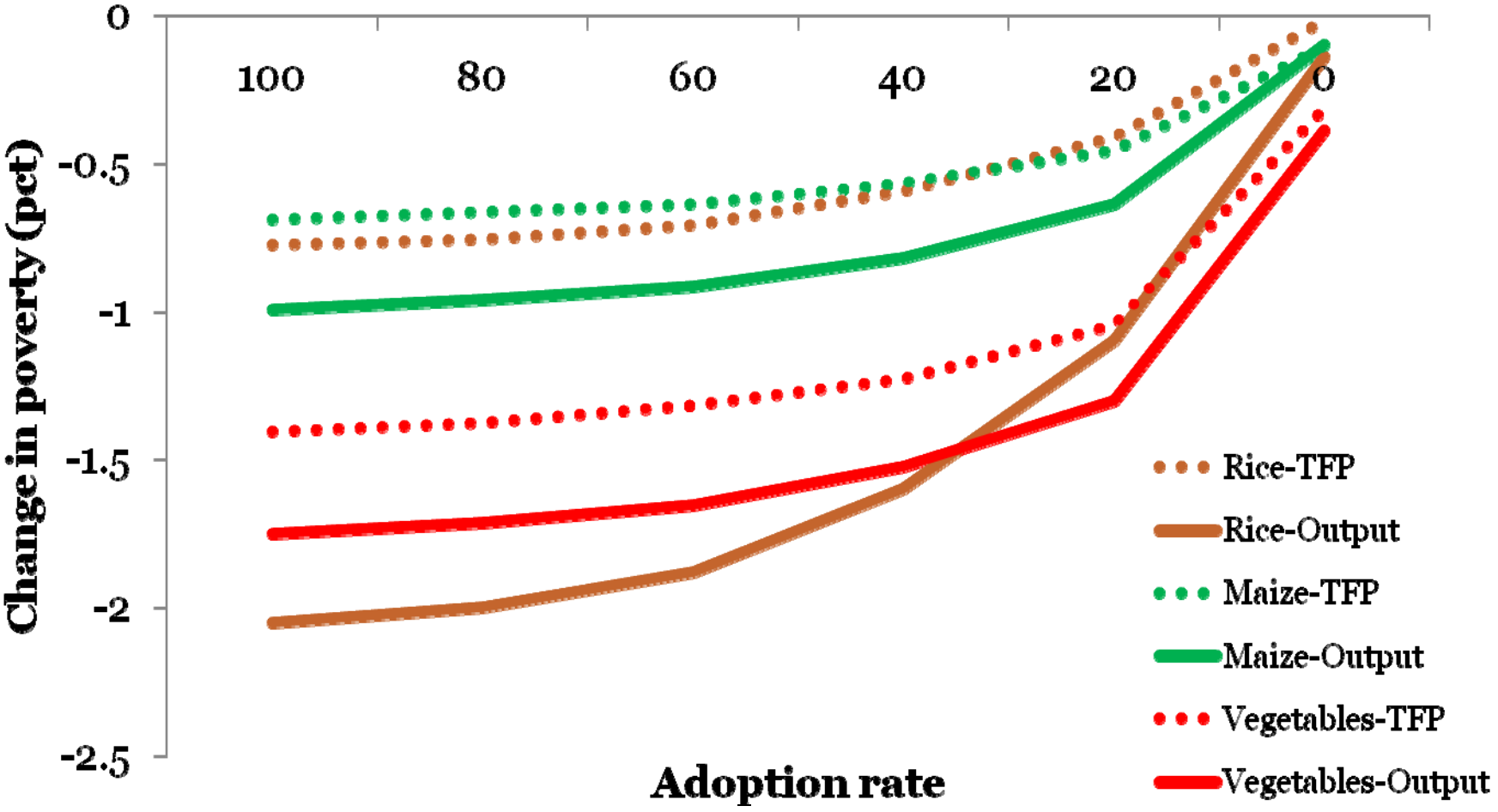
Impact of higher productivity on poverty by commodity (1pct TFP)



Adoption rates & poverty impacts of total **factor** productivity (1pct p.a.)



Adoption rates & total **output** productivity impacts on poverty (1pct p.a)



Conclusions

- Projected growth may result in higher global food prices with adverse impacts on poverty
- The adverse impact of higher food prices on poverty is best dealt with by raising productivity
  - Productivity benefits consumers in developing countries through lower food prices
  - Impacts on producers are less clear
    - Output productivity better than TFP productivity
- Agricultural protection generally raises poverty
  - Benefits to the farmers, but heavy costs to consumers

Conclusions (continued)

- Poverty reduction may be targeted by promoting certain commodities with largest poverty impact
  - Some commodities (rice, maize and vegetables) help more than others
- Who adopts the technology matters
  - It is often not critical to reach everyone
  - Most of benefits are often realized without reaching households with very small output