

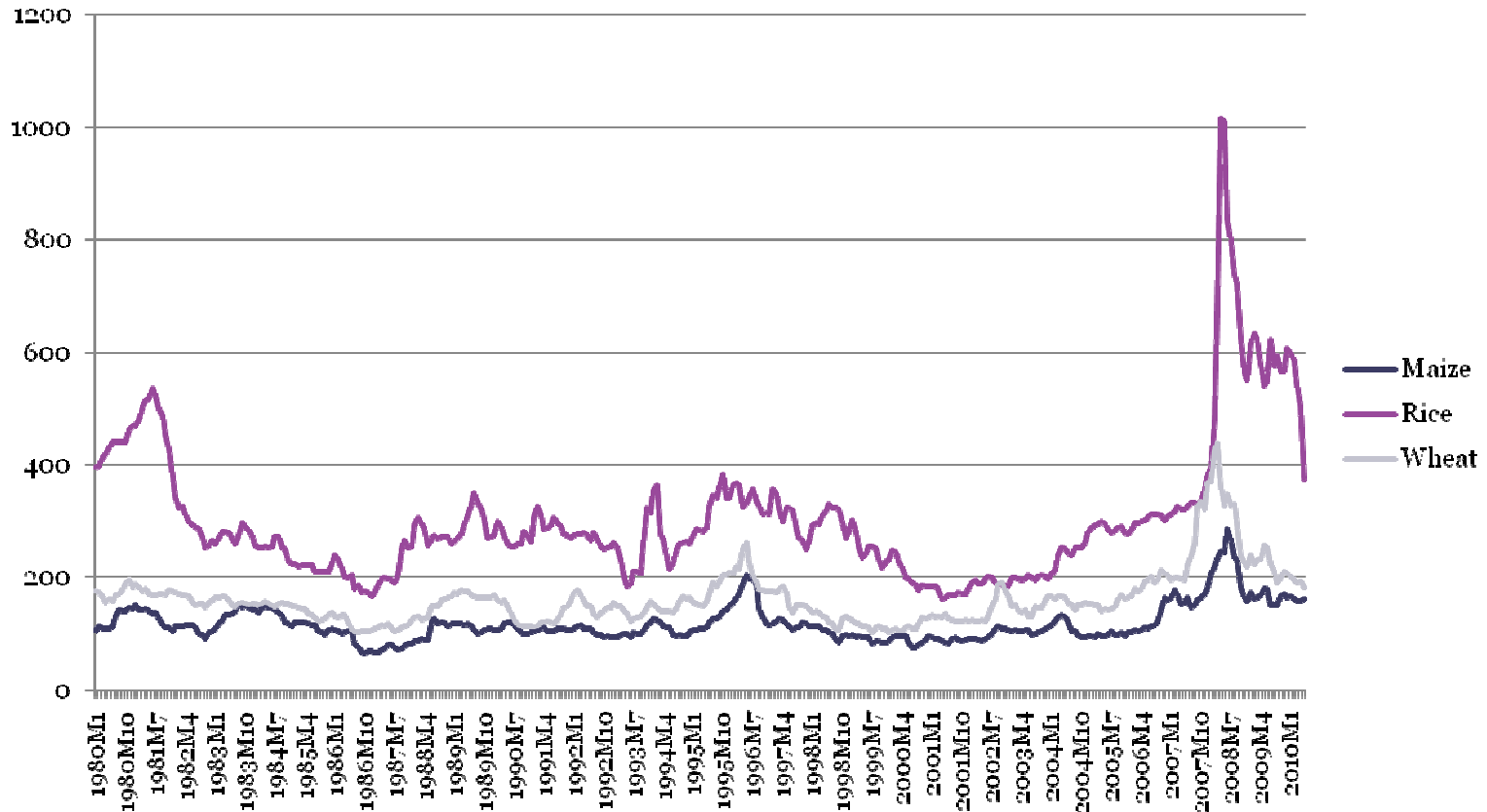
Promoting Global Agricultural Growth and Poverty Reduction 2010–2050

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Motivation



- Food prices remaining high
 - Various reasons: climate change, biofuels, rising population etc.

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 & effective producer prices
 - Actual prices fall– especially with global technical change
- Technology adoption rate
 - A high rate of adoption of new technology by smallholder farmers may help poor smallholders

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 vbles: 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”
 - Include 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

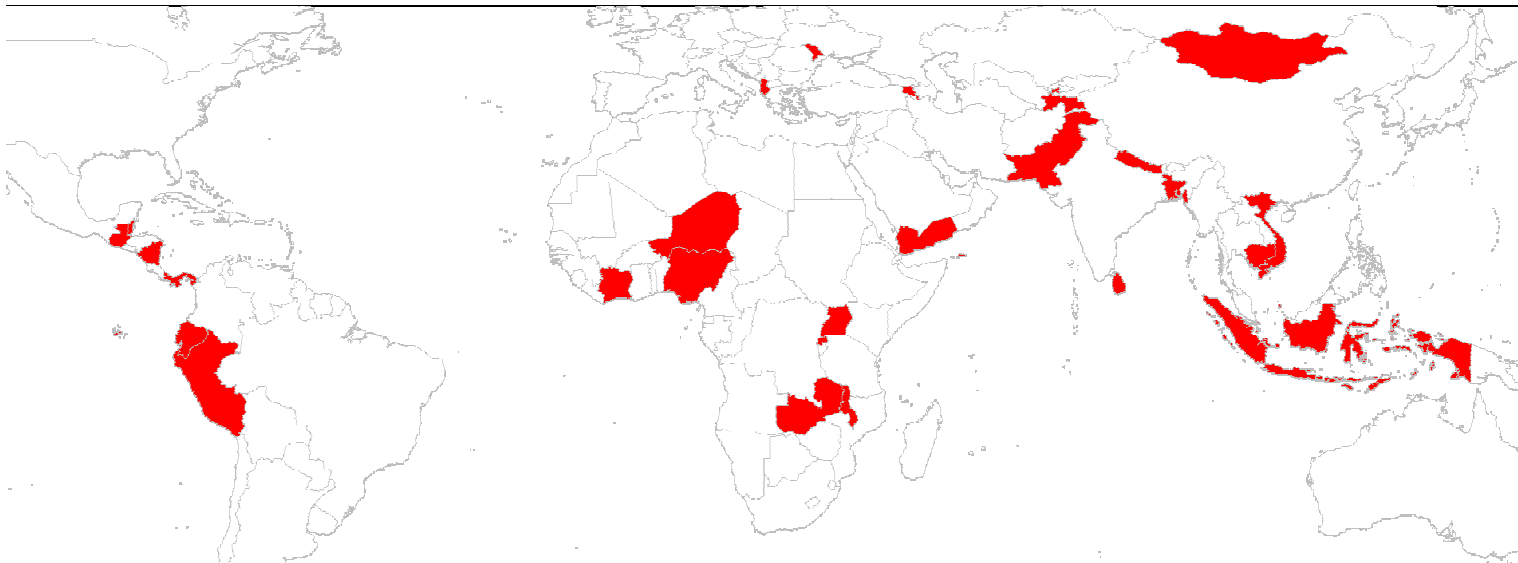


Household model

- 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 & demand parameters consistent with CGE

Household model coverage

- A set of household income and expenditure surveys
 - Recent surveys conducted in 2000-2007
 - 27 developing countries
 - Spread across regions
 - Total of 234,000 households
 - Largest survey: Peru (22,201 households)
 - Smallest survey: Moldova (1,546 households)



Scenarios

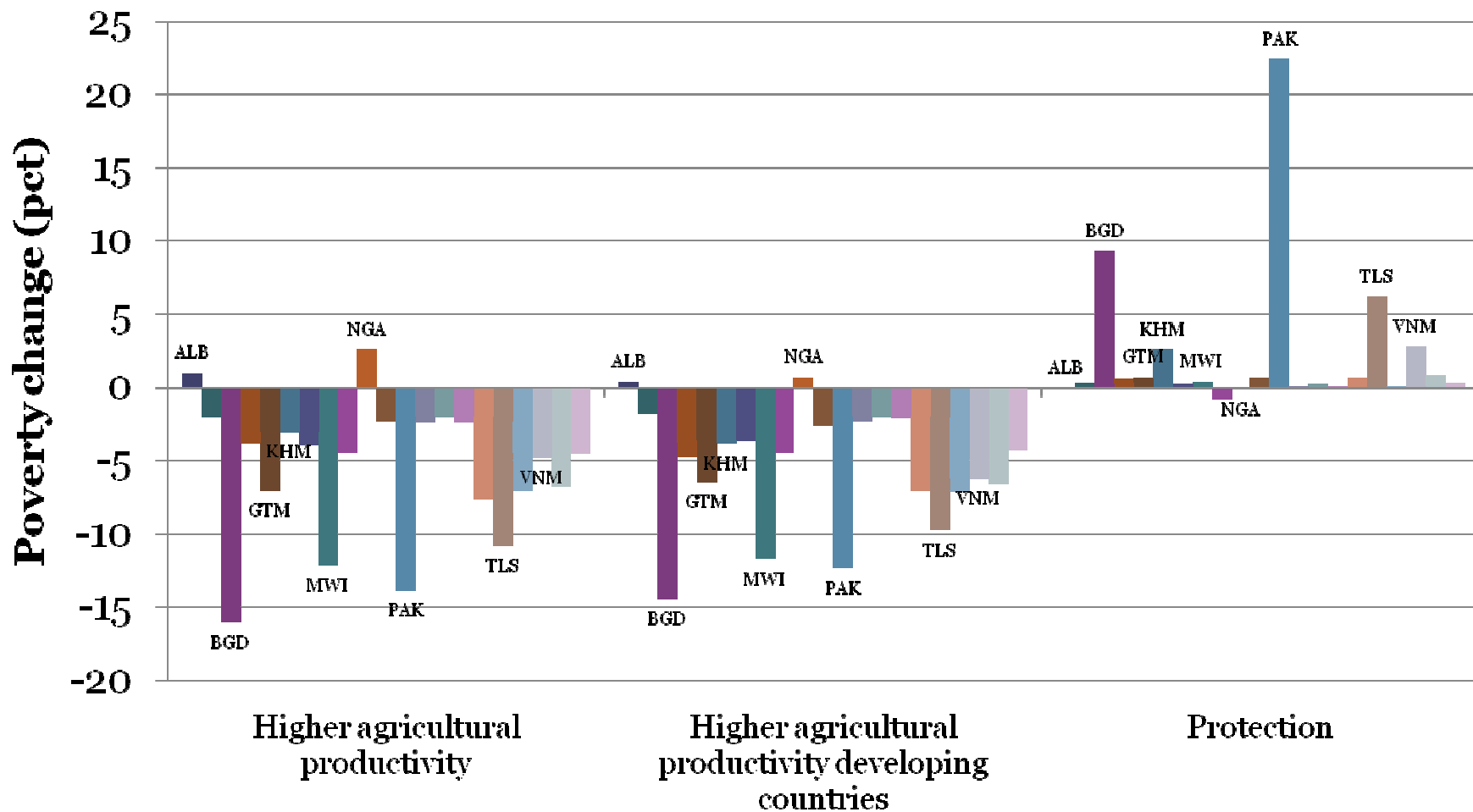
- Four broad scenarios
 - Baseline (projected growth)
 - Higher agricultural TFP worldwide (additional 1pct p.a.)
 - Higher agricultural TFP in developing countries (additional 1pct p.a.) and regions
 - Protection of primary agriculture in developing countries
 - Raise self-sufficiency—halve import shares 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

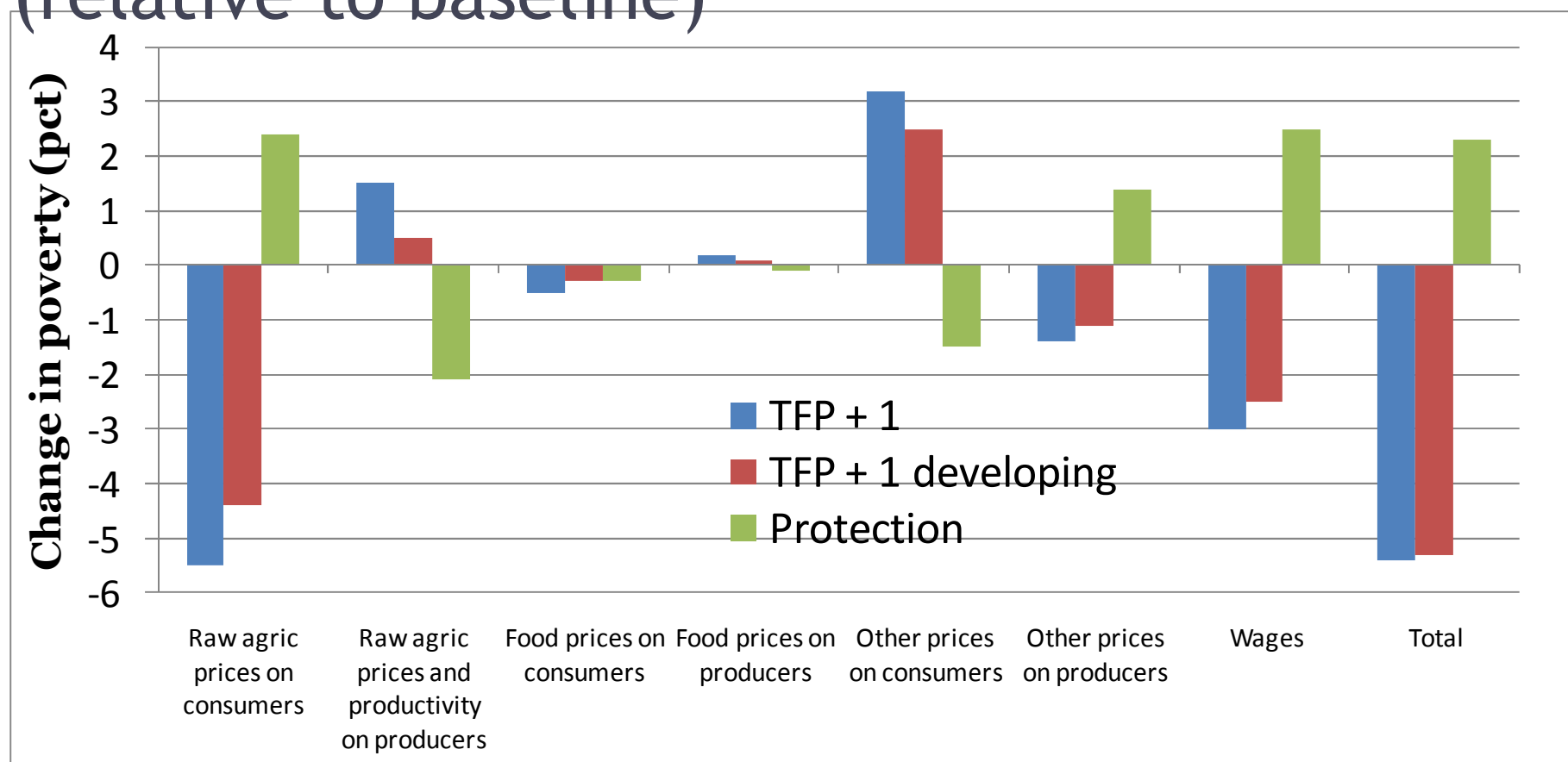
Commodity	Baseline		Ag TFP+1	
	Output	Price (CPI)	Output	Price (CPI)
Primary agriculture	126.9	115.6	179.1	4.8
Processed food	124.6	14.0	154.6	-1.8
All food	126.0	48.3	164.7	1.4
Energy	206.7	-6.0	212.4	0.8
Nondurables	204.7	-4.7	209.7	-0.6
Durables	203.5	-6.4	205.5	-0.2
Services	177.1	-5.9	179.6	-0.4

- Food prices are significantly lowered by higher agricultural TFP

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

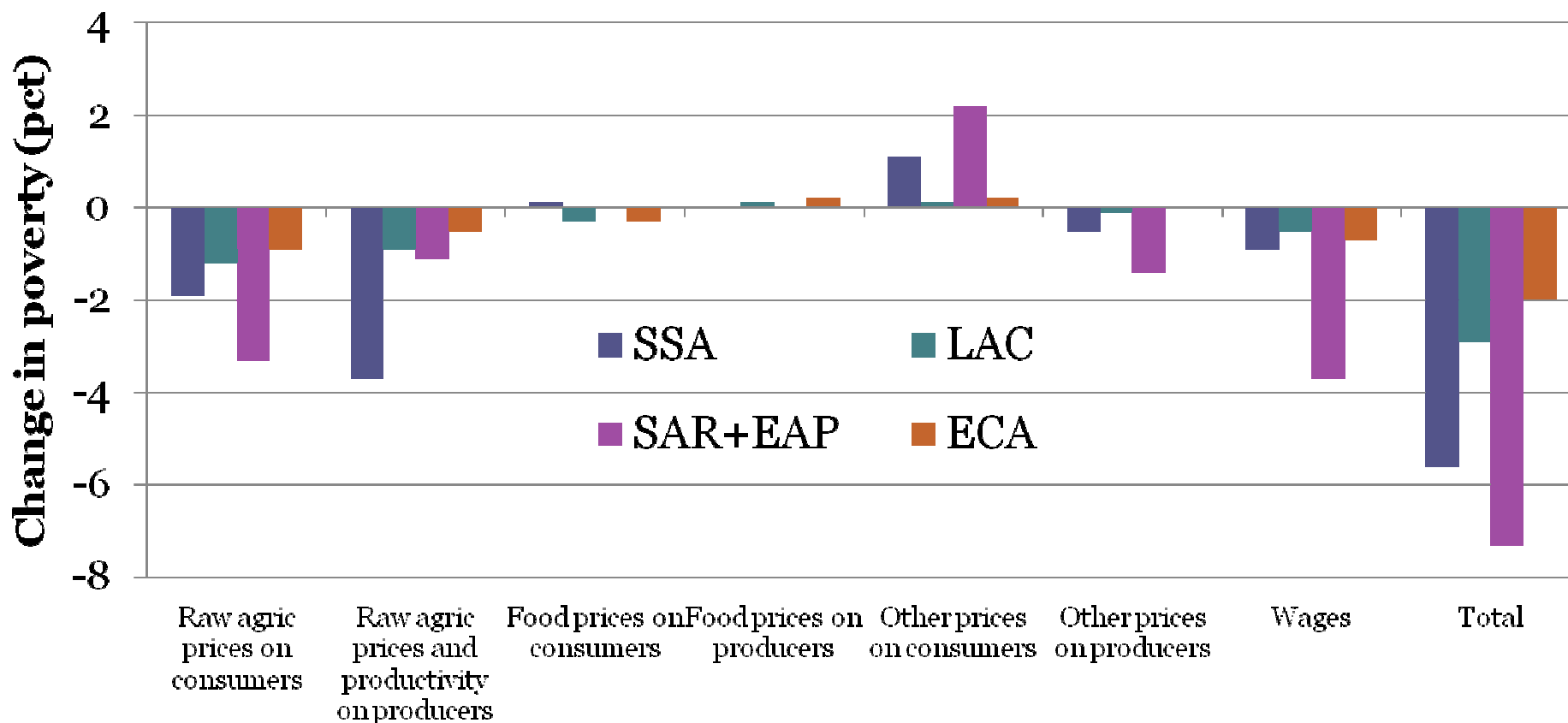


Decomposition of global poverty impacts (relative to baseline)



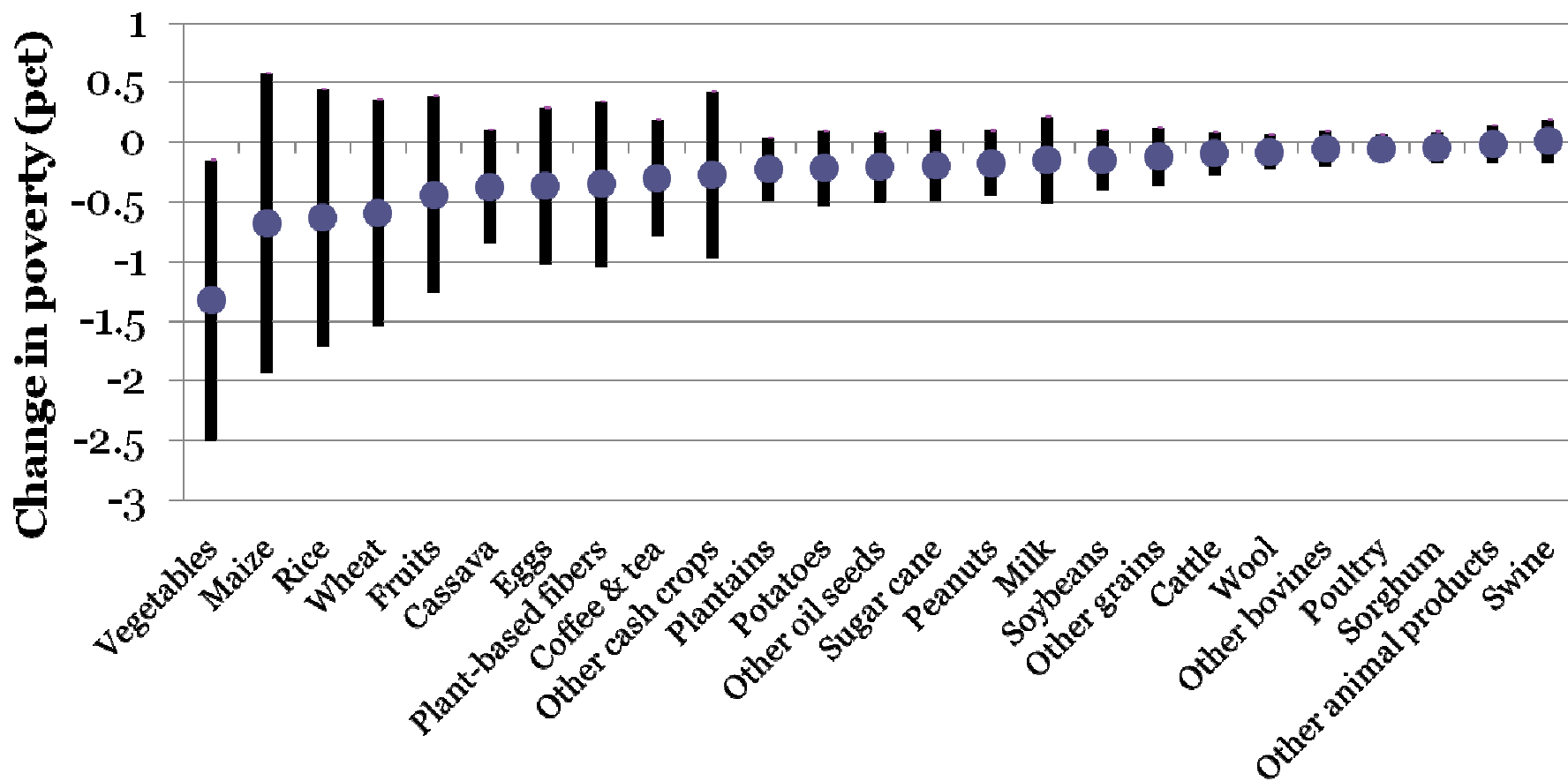
- Higher agricultural productivity lowers poverty mainly through favorable agricultural price and wage impacts
- Protection works in opposite direction, mainly hurting poor through lower wages

Comparison of regional poverty impacts

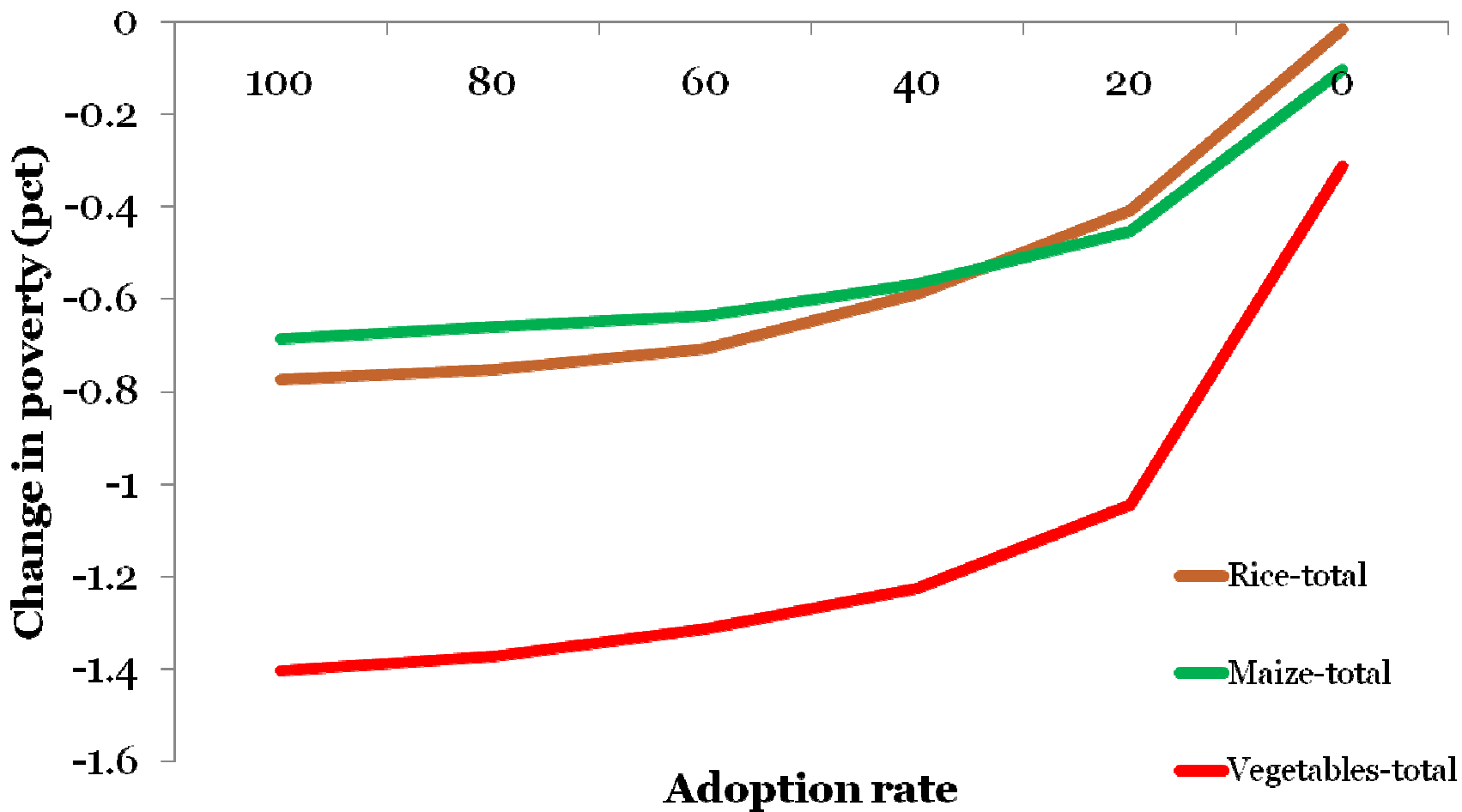


- Simulation: 1 pct additional agric growth by region
- Significant regional differences appear:
 - Africa benefits mainly from direct impacts on the price of agriculture
 - Asia benefits mainly from wages
 - Latin America and Eastern Europe benefit more equally

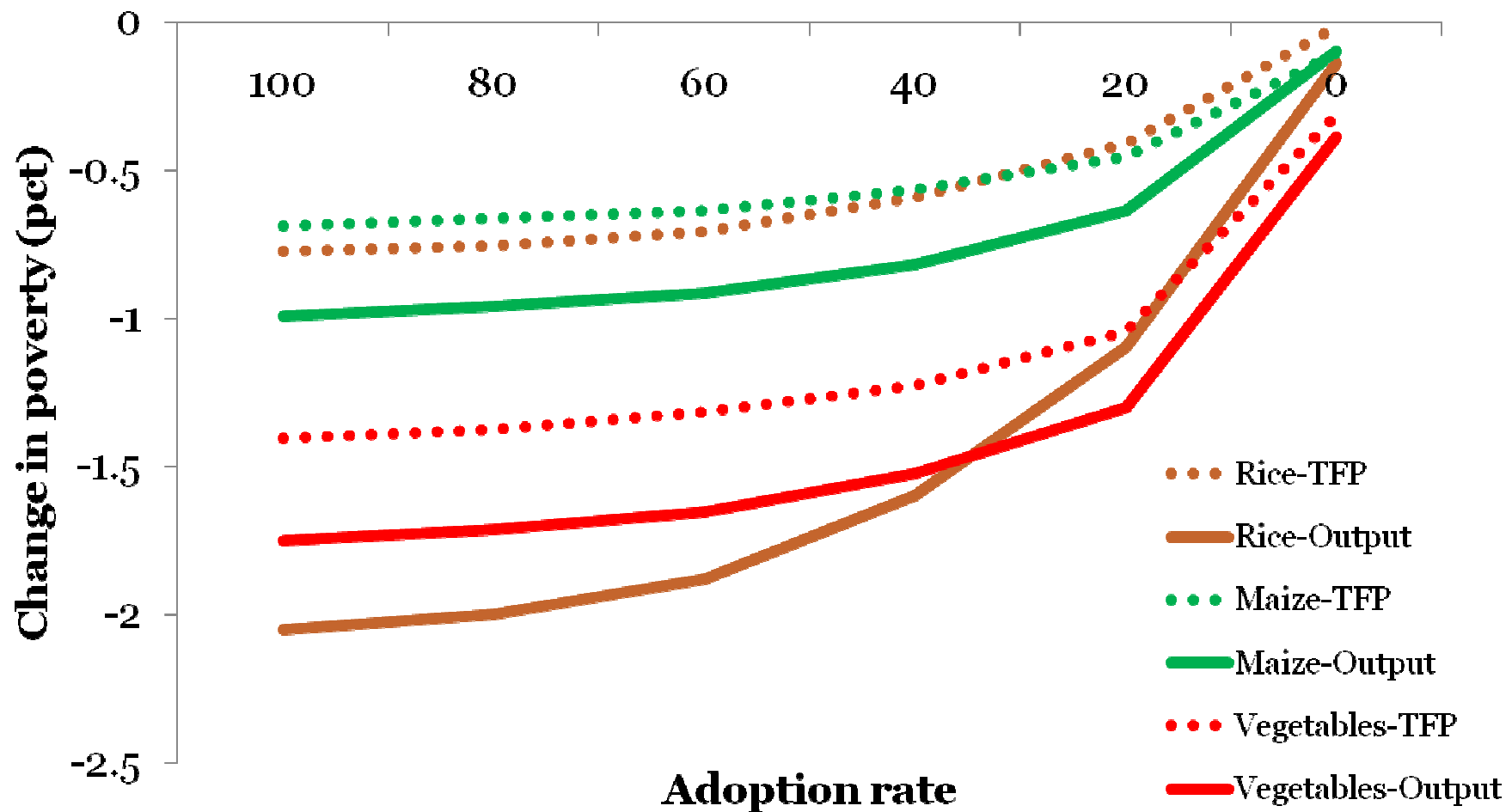
Impact of higher productivity on poverty by commodity (1pct TFP)



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