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Poverty Reduction Impacts of Agricultural Productivity Growth and Trade Policy Reform

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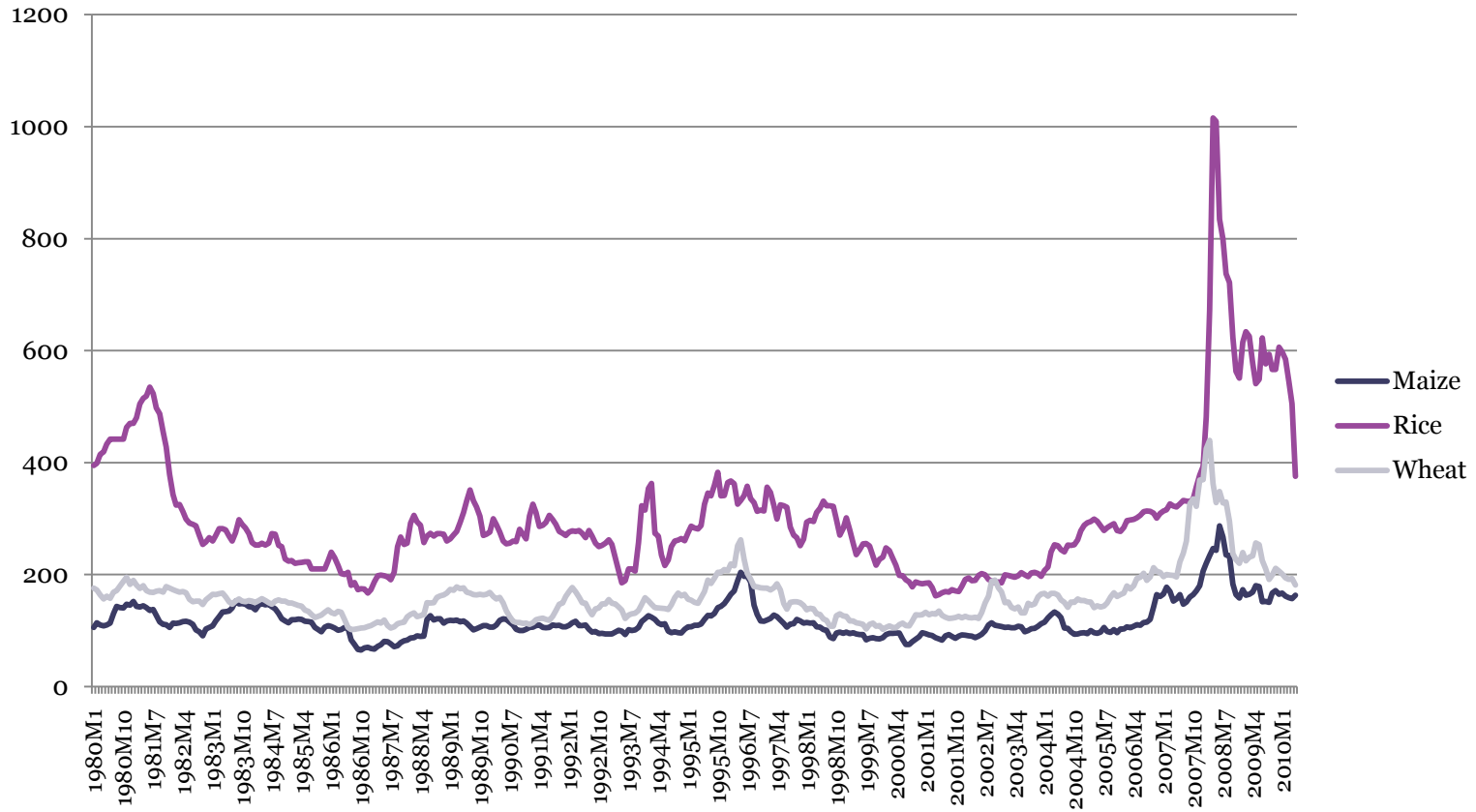
Food prices may stay higher than in the past



- Reasons include: climate change, biofuels, rising population etc.

Key policy issues

- Renewed emphasis on raising agricultural productivity
  - Partly because of higher profitability
  - Partly because of concerns about self-sufficiency

- Also pressures for agricultural protection
  - Clearly, this can raise food self-sufficiency
  - But what impacts on households' access to food
    - Typically a much more important question than self-sufficiency

Analyzing impacts on poverty

- Agric productivity has strong impacts on poverty
  - Directly through effects on the incomes of farmers
  - Indirectly thru impacts on food prices & factor returns
  - Appears to have high rates of return -- $20/$1 invested

- Price policies for food can also have strong impacts
  - By raising returns to poor producers
  - By raising the cost of food to the poor
  - Key question– which effect dominates?

Poverty impacts of productivity

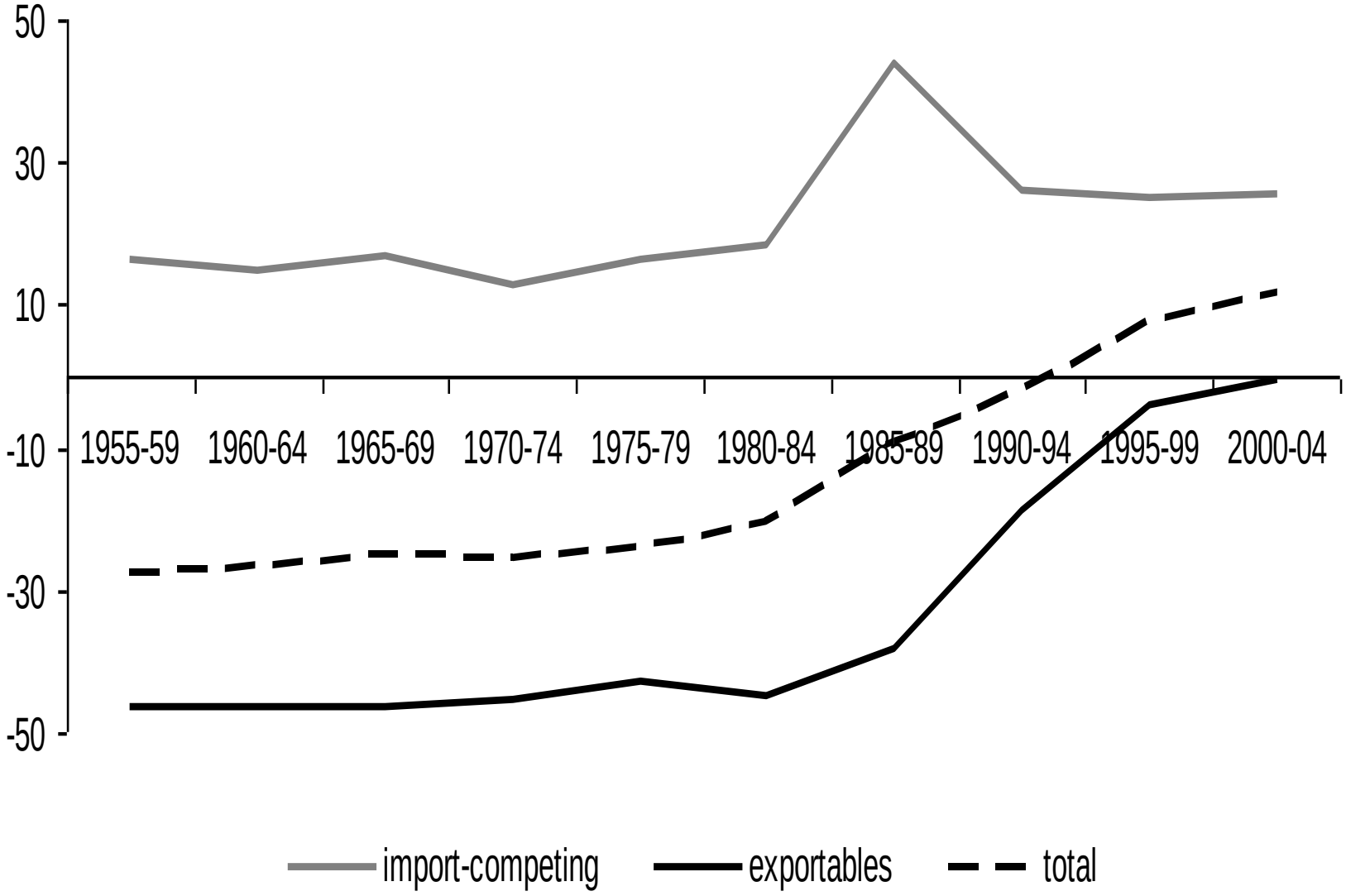
- Depend upon the type of productivity growth
  - Is technical change factor-saving?
  - Or does it save on all inputs?
  - Or does it save on some inputs, but increase requirements for others?
- And on who has access to the new technology
  - Which crops benefit?
  - Which regions benefit?
  - Which producers benefit?

Agricultural trade policies have been changing rapidly

- Traditional pattern was for developing countries to tax agriculture heavily
  - Partly for tax revenue reasons
  - Partly for political economy reasons
    - Cheap food for urban consumers
  - A striking contrast with agricultural protection policies in rich countries
- But a major recent study has found a sea change
  - Increases in protection in developing countries
  - Stabilization and even decline in the industrial ctries

Evolution of agricultural price distortions: NRA agric for HICs and DCs, 1955-2004

In DCs, ag export taxation almost gone, but NRA ag import-competing is positive & growing



Analytical framework used

- 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
- Examine the impact of price changes on poverty with detailed household models
  - Exogenous variables: price changes & productivity gains
  - Outputs: individual households' changes in welfare and poverty

Global general equilibrium model

- Standard GTAP model
  - Six World Bank 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

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

Household model coverage

- Use household income and expenditure surveys
  - Recent surveys
    - conducted 2000-07
  - 26 developing countries
  - Spread across regions
  - Total of 190,000 households
    - Largest survey: Peru (22,201 households)
    - Smallest survey: Albania (1,671 households)
- Use data on sources of income and patterns of expenditure
  - Price impacts based on net trade patterns

Scenarios

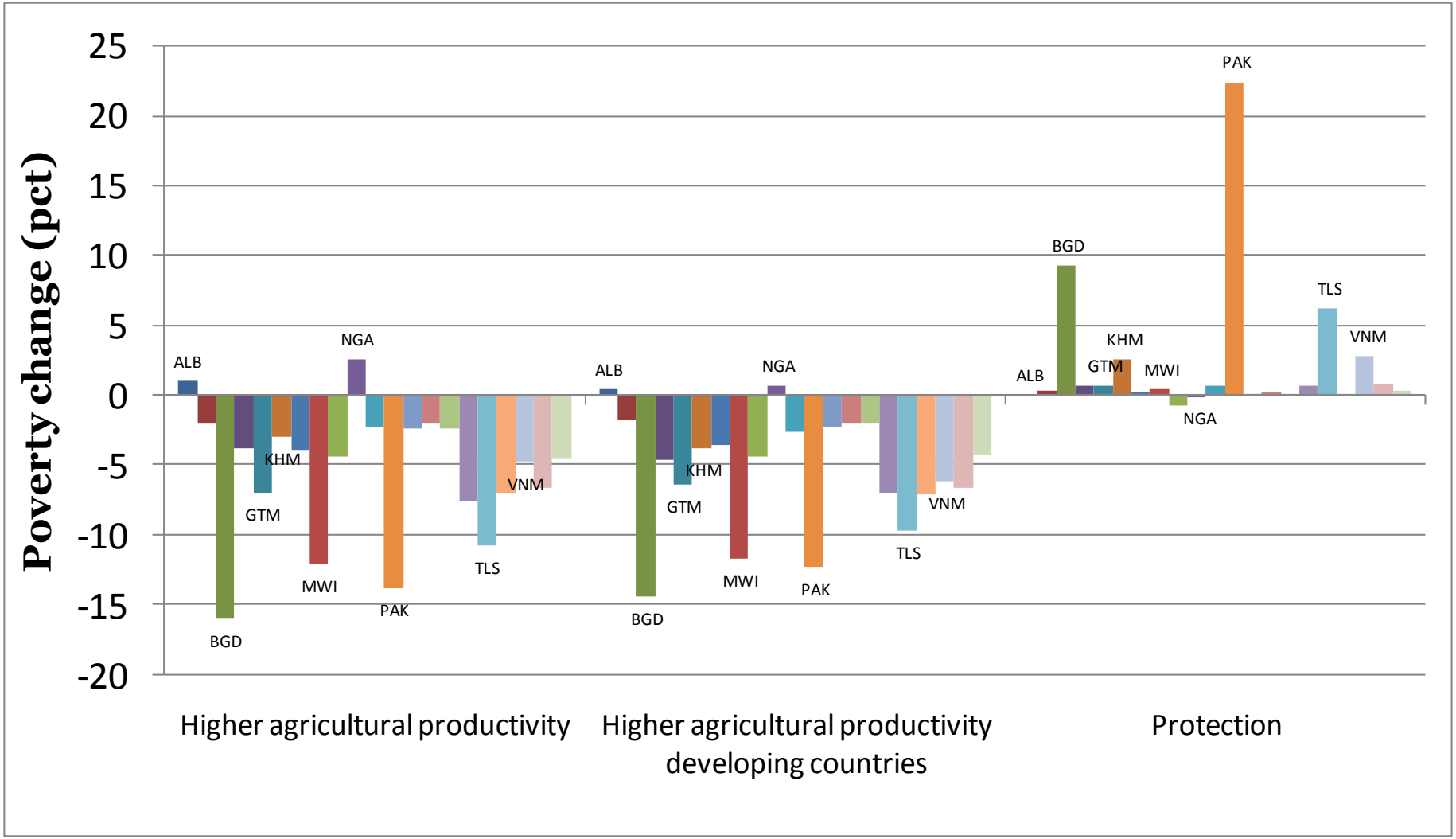
- Four broad scenarios
  - Higher agricultural TFP worldwide (additional 1pct p.a. over 40 years)
  - Higher agricultural TFP in developing countries (additional 1pct p.a.) and regions
  - Protection of primary agriculture in developing countries
    - Raise self-sufficiency—halve import shares in 2050
- Additional analyses
  - Higher productivity in individual crops
  - Type of technical change
    - **Factor** productivity or **total** productivity
    - Could look at biases or higher input requirementsf
  - Assess the importance of the adoption rate

Global aggregate changes to 2050

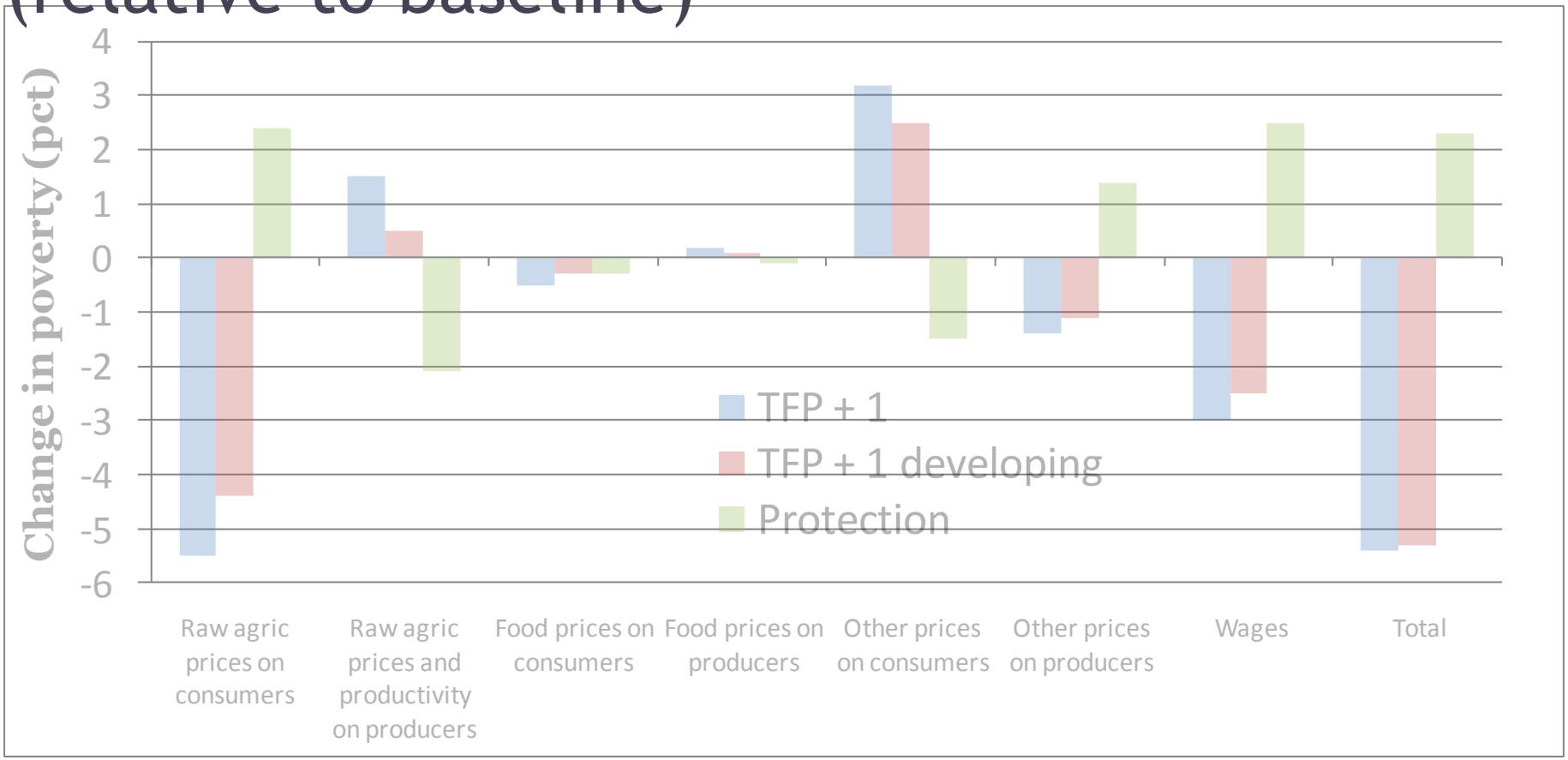
Commodity	Baseline		Ag TFP+1	
	Output	Price (CPI)	Output	Price (CPI)
Primary agriculture	126.9	115.6	179.1	4.8
Processed food	124.6	14.0	154.6	-1.8
All food	126.0	48.3	164.7	1.4
Energy	206.7	-6.0	212.4	0.8
Nondurables	204.7	-4.7	209.7	-0.6
Durables	203.5	-6.4	205.5	-0.2
Services	177.1	-5.9	179.6	-0.4

- Food prices are significantly lowered by higher agricultural TFP

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

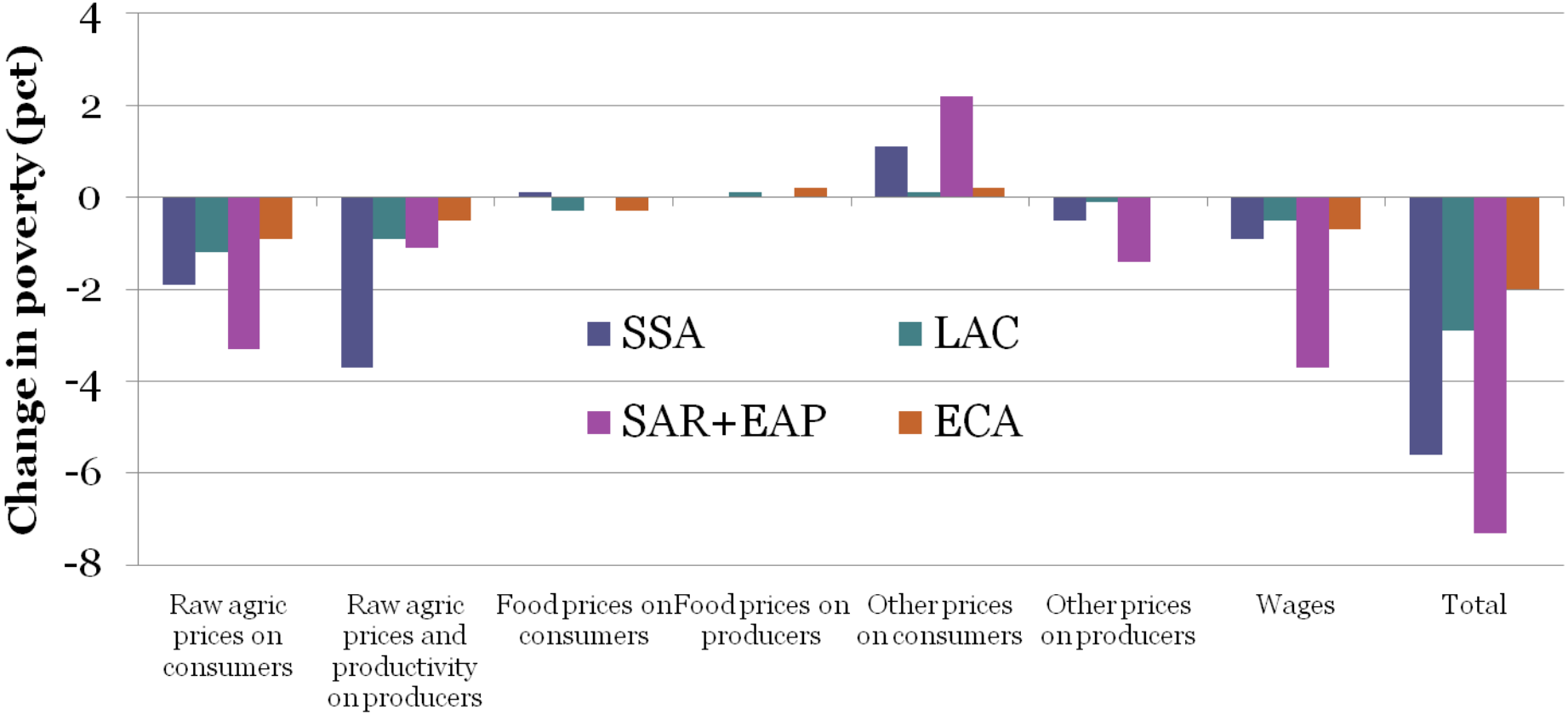


Decomposition of global poverty impacts (relative to baseline)



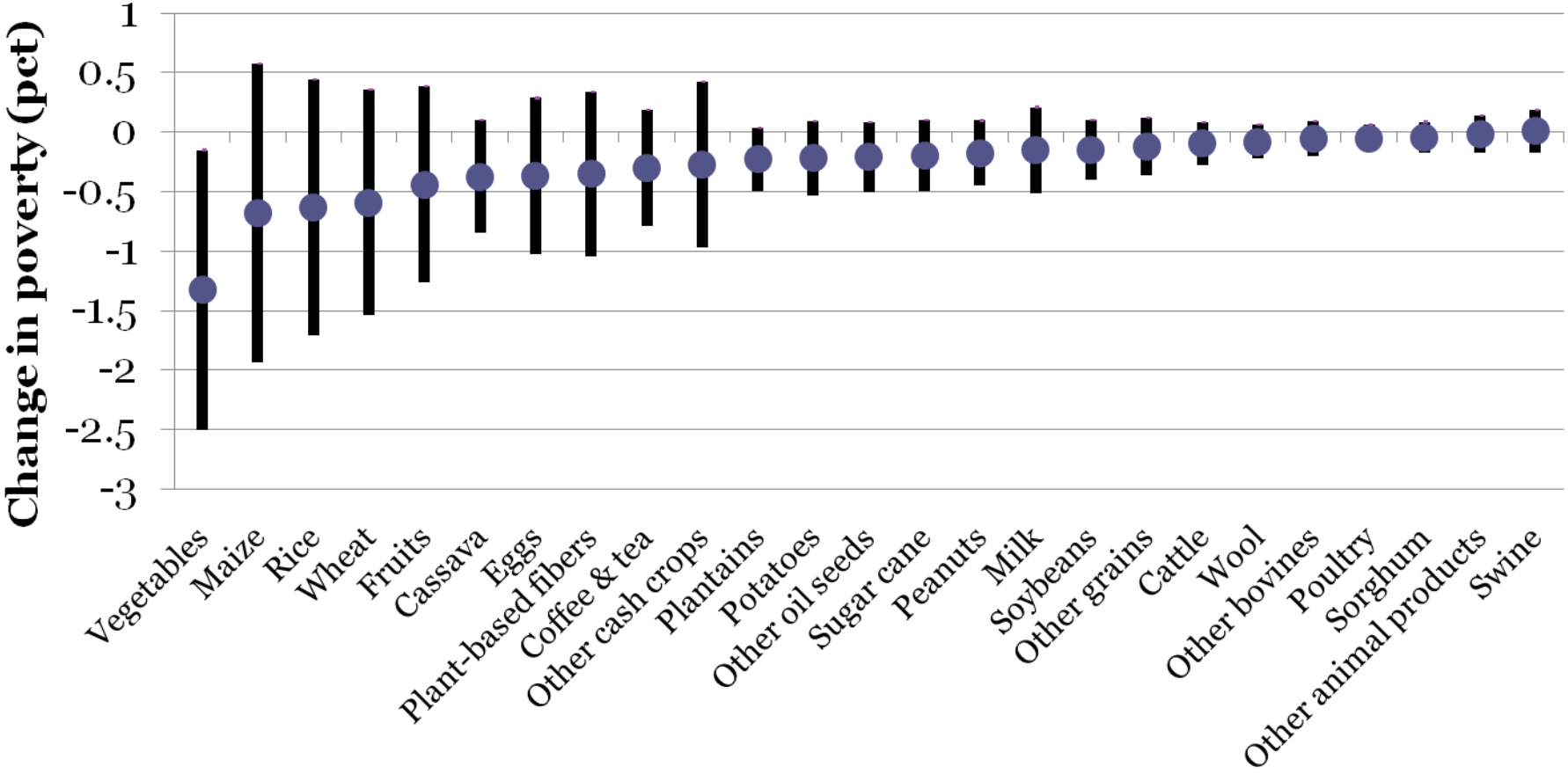
- Higher global agricultural productivity lowers poverty mainly through favorable agricultural price and wage impacts
- Protection works in opposite direction, mainly hurting poor through higher food costs and lower wages

Comparison of regional poverty impacts

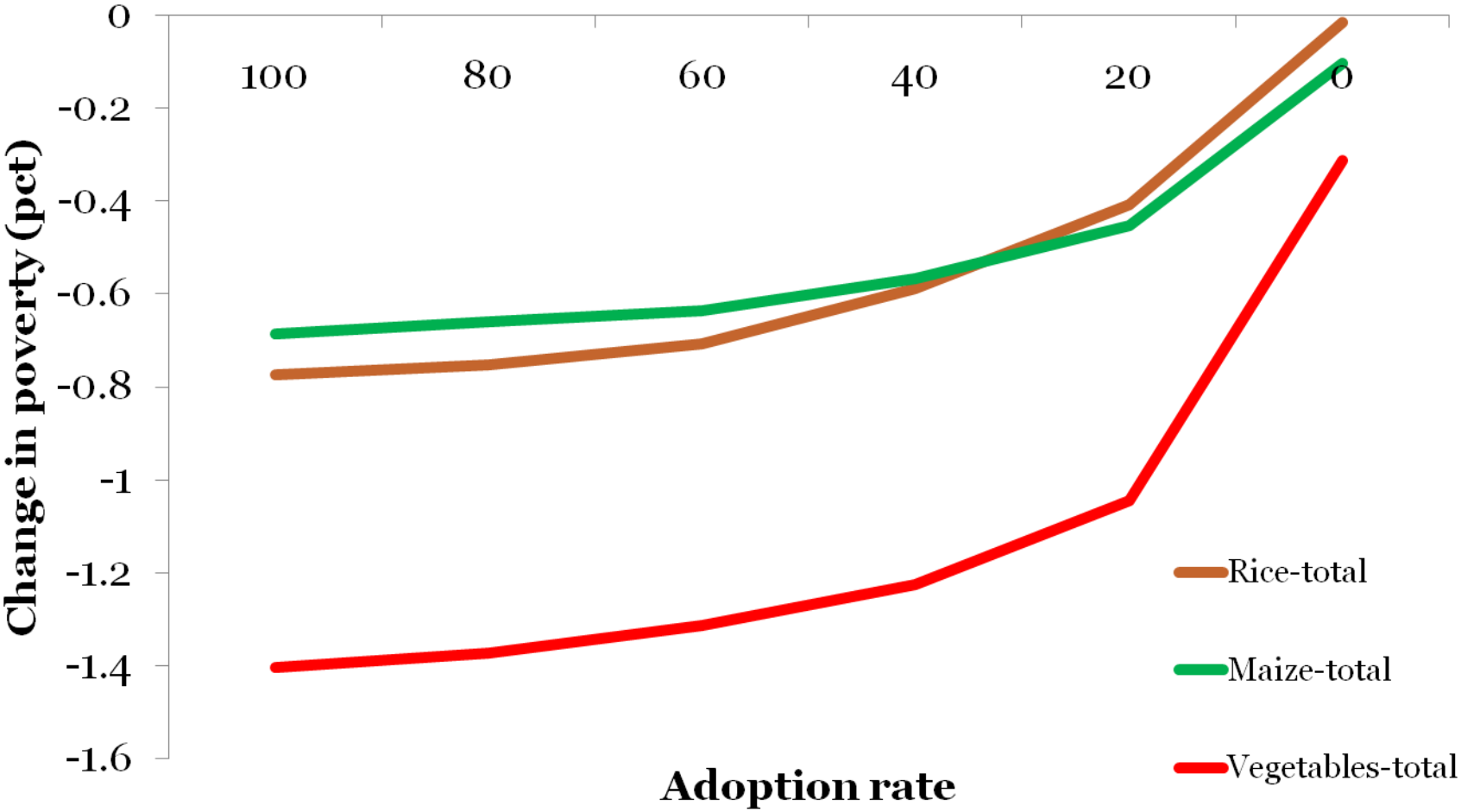


- Simulation: 1 pct additional agric growth per year by region
- Significant regional differences appear:
  - Africa benefits mainly from direct impacts on the price of agriculture
  - Asia benefits manly from wages
  - Latin America and Eastern Europe benefit more equally

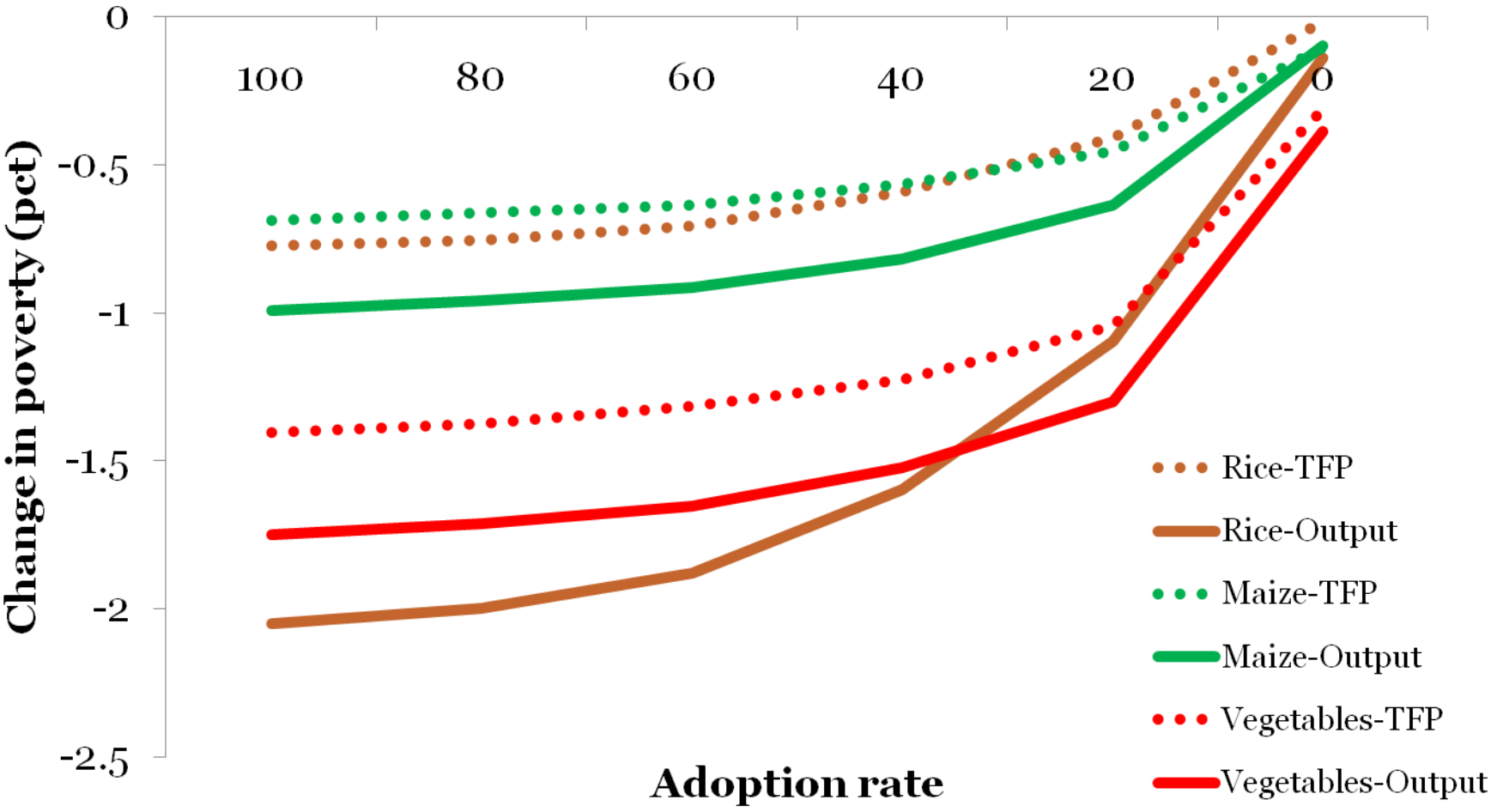
Impact of higher productivity on poverty by commodity (1pct TFP)



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



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



Conclusions

- Higher agricultural productivity tends to reduce poverty considerably
  - Productivity benefits consumers in developing countries through lower food prices
  - Impacts on producers are less clear
    - Type of productivity matters, as does adoption rate
- Agricultural protection generally raises poverty
  - Benefits farmers who are net sellers, but heavy costs to consumers
  - Impacts reduced, but not eliminated, by allowing quantity responses to prices

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 necessary to reach everyone
  - Most of benefits are often realized without reaching households with very small output