

# Implications of Food Price Shocks for Poverty in 2030

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# Motivation

- Food prices expected to rise in the next 15 years
  - On average between 26–63 percent depending on the scenario
- Climate change a factor in rising food prices
  - Conventional development scenario (SSP5): 60 percent of countries experience larger food prices because of climate change
  - Unequal development scenario (SSP4): over 60 percent of countries experience lower food price increases
- The poor can be negatively affected by sudden increases in food prices
  - Sudden increase in food prices in 2008 increases global poverty by over 100 million (Ivanic and Martin, 2008)
- How vulnerable will the poor be to food price shocks in 15 years?
  - The number of poor may differ
  - Their food consumption shares may change
  - The number of net food sellers may also change
  - What is the likely role of climate change in this?

# Overview of the method

- Evaluate the sources of incomes and patterns of expenditure of households at the present time for a number of developing countries
  - Focus on food consumption and production
  - Use household surveys that describe households' total consumption and food production
  - Currently ten countries are included: Albania, Ghana, Iraq, Liberia, Moldova, Niger, Senegal, Sierra Leone, Tajikistan and Vietnam
- Fast-forward household surveys into 2030
  - Alter households' incomes and population weights to match two growth scenarios—a high-growth (SSP5) and low-growth (SSP4) one
  - Apply food price changes depending on presence of absence of climate change
- Measure the vulnerability of extreme poverty to food price shocks
  - Simulate a 100-percent food price shock under all scenarios
  - Consider changes in poverty rates by strata



- Population Growth
  - Projections from World Bank's Health Nutrition and Population Statistics for urban and rural population growth
- Economic Growth
  - Two projections from the International Institute for Applied System Analysis' SSP database
    - Conventional development (SSP5): low socio-economic challenges for adaption, high socio-economic challenges for mitigation
    - Unequal development (SSP4): high socio-economic challenges for adaption, low socio-economic challenges for mitigation
- Food price changes
  - Two sets of projections of food price changes from Potsdam Institute for Climate Impact Research (PIK) that explore scenarios based on possible climate change outcomes
    - No impact of climate change
    - Full impact of climate change

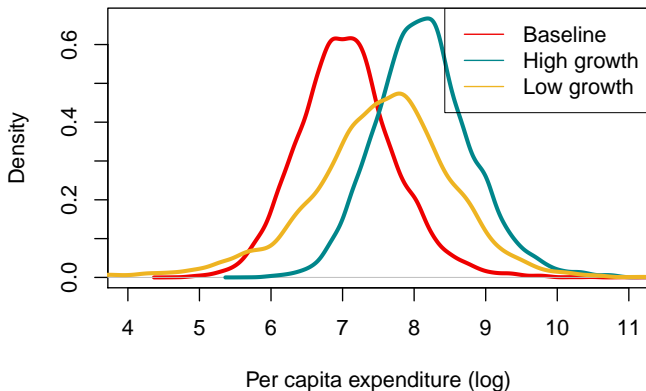
# Scenario descriptions—our sample statistics

- Population growth
  - Total Population Growth of 34 percent (2.0 percent/year)
  - Rural Population Growth of 18 percent (1.1 percent/year)
  - Urban Population Growth of 58 percent (3.0 percent/year)
- Economic growth
  - High growth—174 percent (6.9 percent/year)
  - Low growth—153 percent (5.2 percent/year)
- Food Price Change
  - High growth
    - without climate change—31 percent increase (1.8 annually)
    - with climate change—29 percent increase (1.7 annually)
  - Low growth
    - without climate change—77 percent increase (3.8 annually)
    - with climate change—61 percent increase (3.2 annually)

# Fast-forwarding of households to 2030

- Scale uniformly weights of households to match population growth and makeup
  - We currently consider urban and rural decomposition
  - In the future, we would like to bring additional characteristics to match better SSP4 and SSP5 scenarios
- Increase income of households based on the forecast
  - A uniform increase in household incomes and total expenditure after population adjustment
- Adjust household food consumption based on the change in incomes and food prices
  - Estimate income and own- and cross-price elasticities
    - CDE preferences
    - Parameter estimates from the GTAP database
    - Elasticities calibrated based on parameter estimates and observed consumption shares

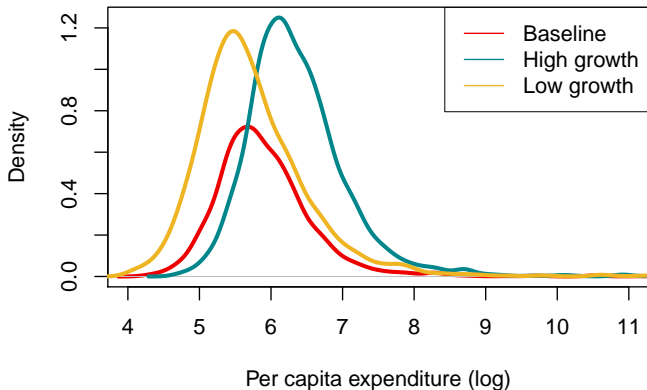
# Change in income distribution in Vietnam



- Real growth between 130 and 190 percent by 2030
- Modest population growth at 9 percent
  - Reduction in rural population by 7 percent
  - Increase in urban population by 39 percent
- Likely improved the standards of living of most people

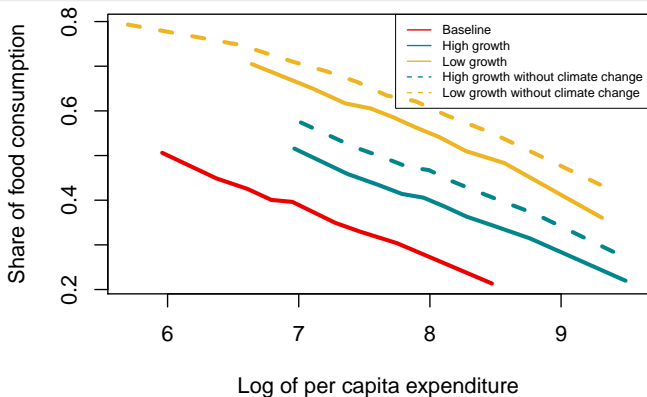


# Change in income distribution in Niger



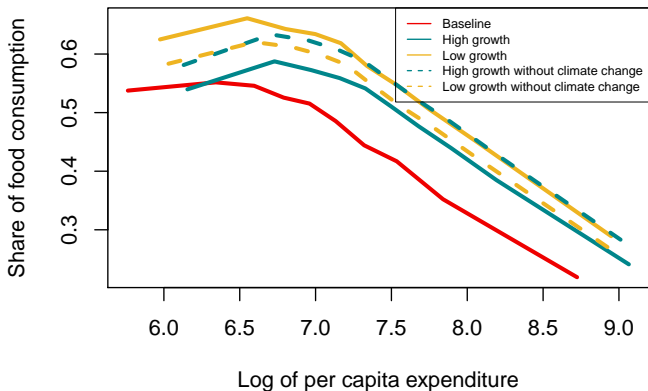
- High economic growth between 130 and 220 percent
- Large population growth of 80 percent
  - Rapid increase in poorer rural population (70 percent)
  - Increase in urban population by over 130 percent likely to squeeze incomes of rural population
- Many worse off within low economic growth scenario

# Change in food consumption shares in Vietnam



- Extreme increases in food prices between 40 and 320 percent
  - Interestingly, food prices increase less with climate change in Vietnam
- Consumption shares likely higher despite higher incomes
  - Number of net food sellers likely to be affected

# Change in food consumption shares in Iraq



- Generally higher food consumption shares for most households
  - The only exception: poorest households in high-growth scenario

# Implication of scenarios for poverty rates

Stratum	Baseline level	High-growth	Low-growth
Total population	29.1%	12.6%	18.7%
Farmer headed	31.3%	14.1%	20.5%
Female headed	15.9%	1.2%	11.7%
Male headed	29.2%	12.6%	18.8%
Non-farmer headed	24.4%	10.8%	14.8%
Rural	28.6%	5.6%	14.5%
Urban	19.1%	10.3%	12.9%

Table: Average extreme poverty headcount levels

- Both scenarios likely to reduce extreme global poverty
  - More substantial poverty reduction with higher growth

# Assessment of resilience of extreme poverty to food price shocks

- We simulate a 100-percent food price shock and measure its poverty impact
  - Each country faces the same food price shock similar to one observed in 2008
  - All other prices assumed to remain unchanged
- We assume a short-run closure
  - No time for producers to respond
  - No time for wages to adjust

# Measurement of welfare and poverty

- We use the basic Deaton (1989) framework for assessing households' welfare
  - Net welfare change depends on the net selling position of the household and price changes
- We add substitution on the side of consumption
  - Households follow the CDE preference structure whit estimates from from GTAP database

$$\hat{W}_h = \underbrace{\hat{\mathbf{p}}' \mathbf{s}_h}_{\text{First-order consumption impact}} + \underbrace{\frac{1}{2} \hat{\mathbf{p}}' \epsilon \hat{\mathbf{p}} \mathbf{s}_h}_{\text{Second-order consumption impact}} + \underbrace{\hat{\mathbf{p}}' \mathbf{q}_h}_{\text{First-order production impact}} + \underbrace{\frac{1}{2} \hat{\mathbf{p}}' \mu \hat{\mathbf{p}} \mathbf{q}_h}_{\text{Second-order production impact (ignored)}}$$

- $\mathbf{s}_h$ —household-specific vector of consumption shares,  
 $\mathbf{q}_h$ —household-specific vector of production shares (of total expenditure),  $\mathbf{p}$ —a country-specific vector of price changes
- We ignore production adjustment and wage rate changes
  - Interested in short-run impacts of future food price shocks
- Based on the present poverty lines (PovCalNet), determine which households are in poverty after the shock

# Implication of scenarios for poverty rates

Stratum	Baseline level	High-growth w/o climate change	High-growth	Low-growth w/o climate change	Low-growth
Total population	24.5%	19.2%	18.9%	21.9%	22.8%
Farmer headed	20.9%	16.5%	16.2%	17.3%	18.6%
Female headed	31.5%	29.1%	28.4%	24.3%	27.3%
Male headed	24.0%	18.6%	18.3%	21.2%	22.1%
Non-farmer headed	27.2%	20.2%	20.1%	26.0%	26.5%
Rural	25.6%	24.0%	23.8%	24.4%	25.7%
Urban	26.8%	17.6%	17.4%	24.6%	24.7%

Table: Average changes in extreme poverty headcount following a 100-percent food price shock

- Poverty impact of a 100-percent food price shock declines in all scenarios
  - Largest decline among urban households under the high growth scenario

- Projected growth rate is the major driving force in global reduction of extreme poverty
  - Even though high-growth scenario is likely to improve the outcomes more, the low-growth scenario is still very favorable to extreme poverty
- Resilience to sudden food price shocks does not decline as much as poverty rates do
  - Food consumption shares increase, making households more susceptible to food price changes despite smaller poverty headcount
- Climate change alone appears to be less important for sensitivity to food prices
  - Resilience to food price shocks is not greatly affected
  - However, in the pessimistic growth, avoiding climate change helps households noticeably



# Directions for future research

- Some variability exists among the results among individual countries
  - Need to expand sample to the level of Ivanic and Martin (2014) to cover most of the world's poverty
  - Establish confidence intervals around the results
- Better projections of household characteristics and distribution needed
  - We probably need to match more characteristics in addition to urban/rural population and income growth
  - Work underway to provide more elaborate projections
- Need to consider long-run impacts as well
  - Long-run poverty impacts of higher food prices appear opposite to short-run impacts
  - Does the conclusion change in 2030?