



RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



2015 Global Landscapes Forum

**Up and Down the Geographical and Temporal Scales:
Integrating Global Trends and Local Decisions to Make the World
More Food-Secure in 2050**

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**Economic Impacts of Climate Change in the
Philippine Agriculture Sector:
Scenarios, Policies and Investments**

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Outline

- Rationale and Objectives
- Methodology
- Impact of Climate Change
 - Commodity Production and Prices
 - Food Security – Childhood Malnutrition and Hunger
 - Economic Welfare in Agriculture
 - Economy-wide Impact of Climate Change
- Key Messages

Rationale

- Sustaining agricultural production growth to help achieve inclusive growth and poverty reduction is a key goal for the Philippine government
- Agricultural growth is a key to broad economic growth
- But agricultural growth has been low, slowing economic growth and employment creation in the Philippines
- Climate change is a threat to agricultural growth, affecting productivity and prices
- Need to develop adaptation policies and growth strategies for agricultural growth

Objectives

- Estimate the economic impact of climate change on Philippine agriculture and, through agriculture, on the economy as a whole
- Examine the impact of climate change on
 - food supply (production and yield levels) and food prices
 - indicators of food security, including number of malnourished children and population at-risk-of-hunger welfare measures (consumer and producer surplus in the agricultural sector)
 - economic benefits and cost to the full economy
- Assess the effectiveness of alternative adaptation strategies, including support for agricultural productivity growth and irrigation investment

METHODOLOGY

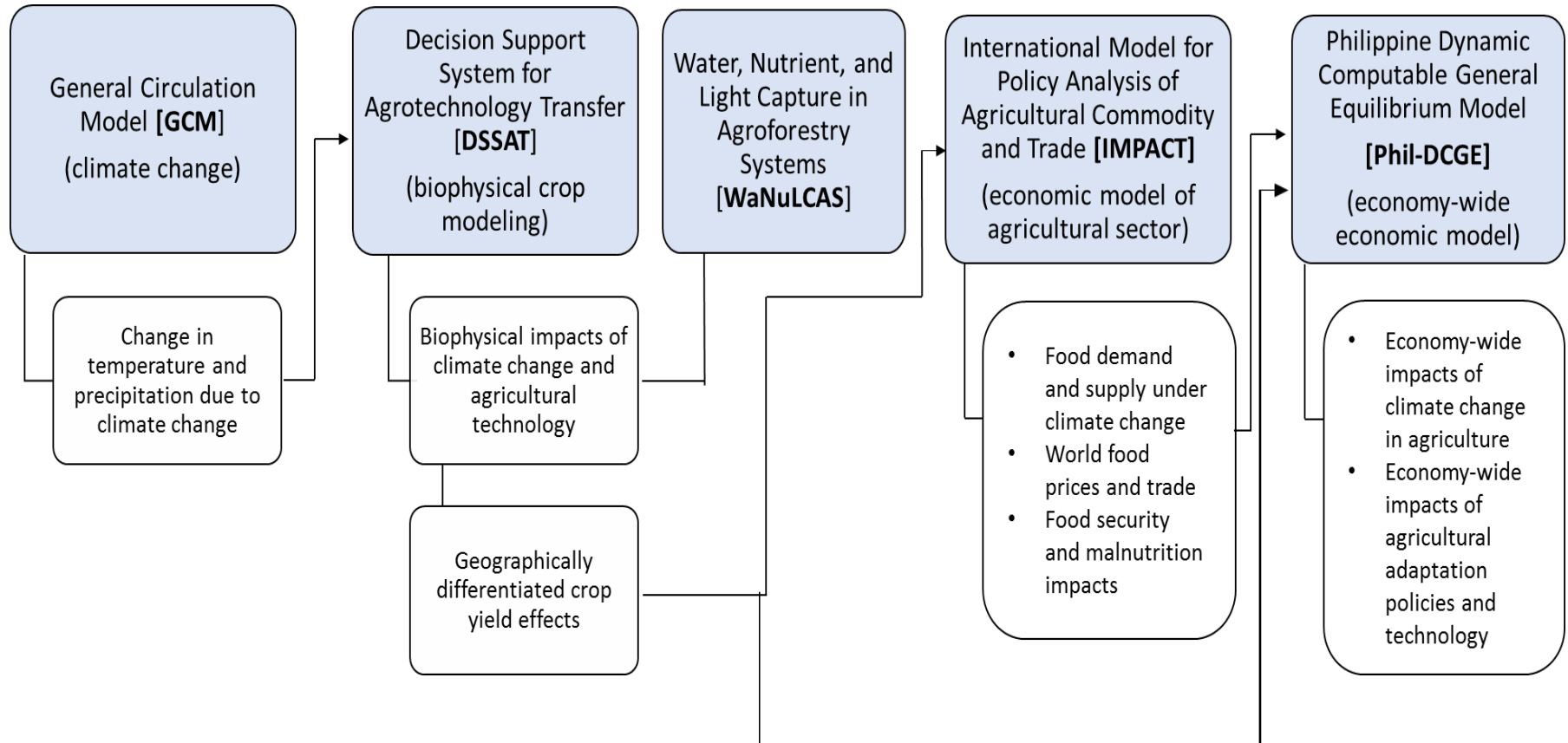
Linked Modeling Approach

Utilized to assess the effects of:

- alternative agricultural policies, technologies, and investments
- macroeconomic policies and institutions
- climate adaptation strategies on agriculture

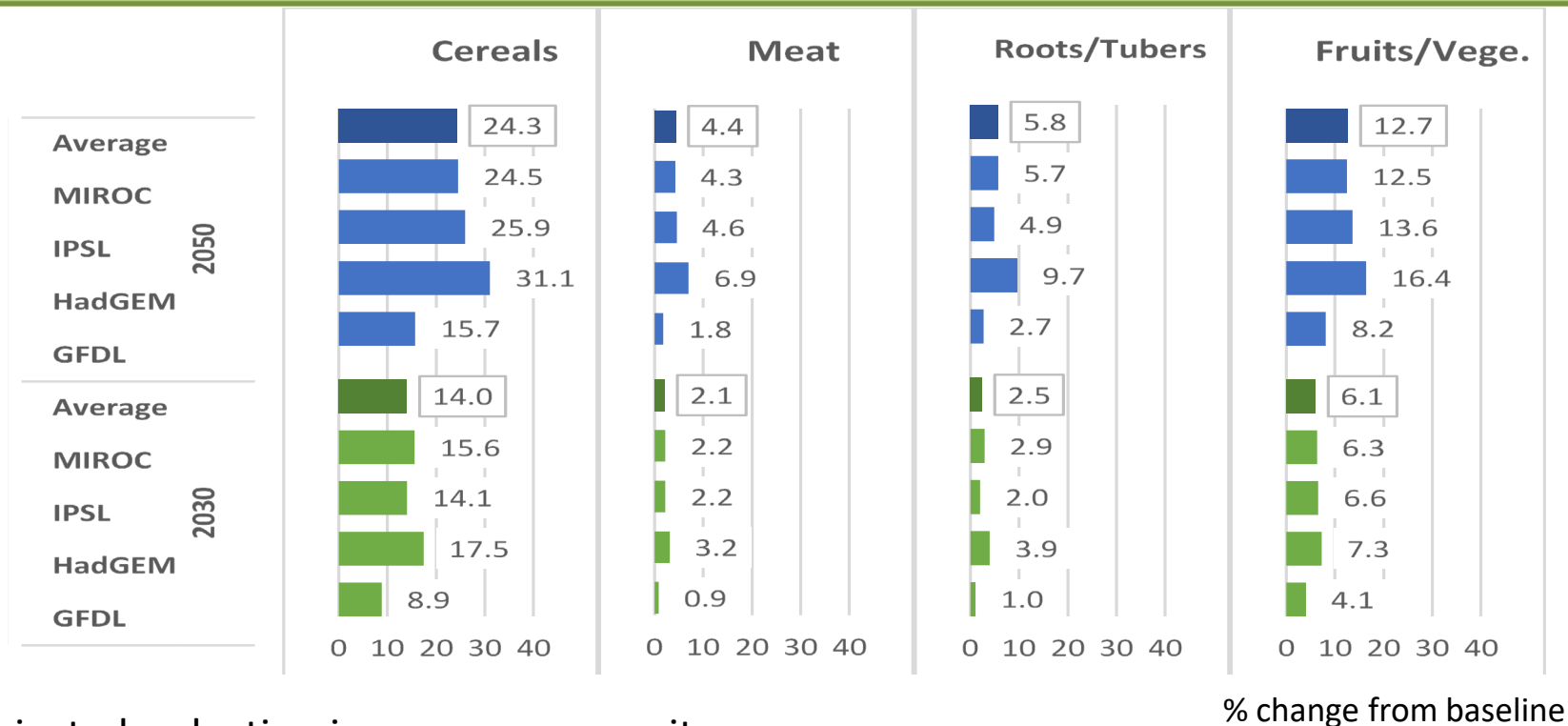
under a range of climate and socioeconomic futures to assess appropriate strategies for agriculture under climate change in the Philippines

Linked modeling system for the assessment of agricultural climate change impacts on the Philippine economy



IMPACT OF CLIMATE CHANGE ON COMMODITY PRODUCTION, PRICES, FOOD SECURITY, AND ECONOMIC WELFARE IN AGRICULTURE

Changes (%) in consumer prices of major agricultural commodities, 2030 and 2050



- Projected reduction in average per capita consumption due to climate change in 2050 compared to the no-climate change:

- Cereals = 3%
- Fruits and vegetables = 2%
- Roots and tubers = 1%
- Pulses = 1%
- Meat = 1%

- Estimated per capita consumption decline for cereals:

- Rice = 3%
- Corn = 6%
- Wheat = 4%

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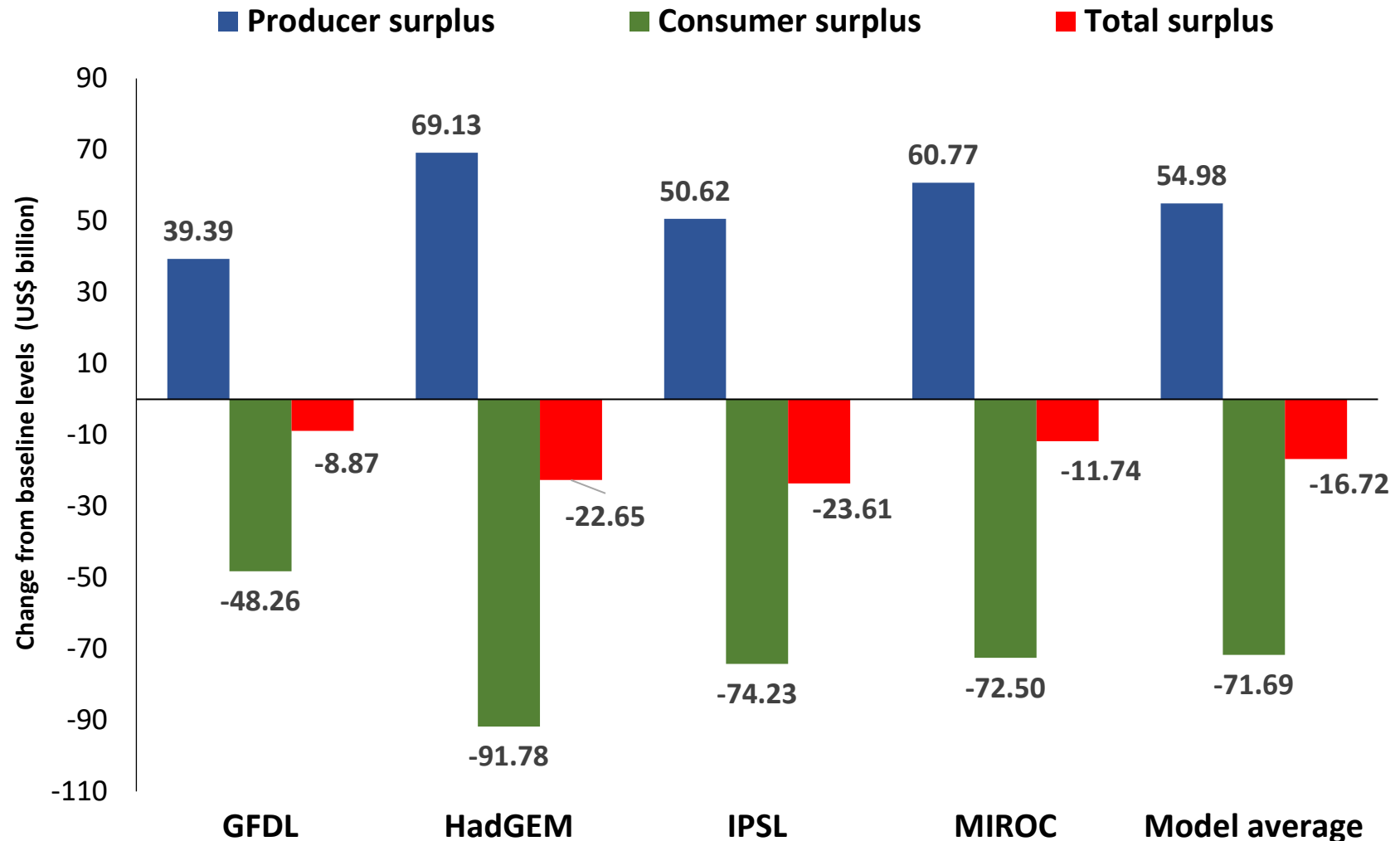
- Malnourished children
 - Baseline scenario
 - 2010 = 3 million malnourished children
 - 2030 = 2.7 million (projected)
 - 2050 = 2.21 million
 - With climate change in 2050 - additional 70,000 children (projected, average across GCMs)
- Increase in number of people at risk of hunger (projected)
 - 2030 = 1.4 million (9% increase compared to no-climate change)
 - 2050 = 2.5 million (17% increase)

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Indirect cost of Malnutrition

- loss of productivity estimated at more than 10% of lifetime earnings (World Bank 2006)
- 10% of GDP/person/year = US \$704
- No. malnourished/year due to climate change = 1.29 million
- Equivalent cost/year = US \$910 million or ₦ 41 billion

Economic impact in agriculture due to climate change, 2010-2050, Philippines

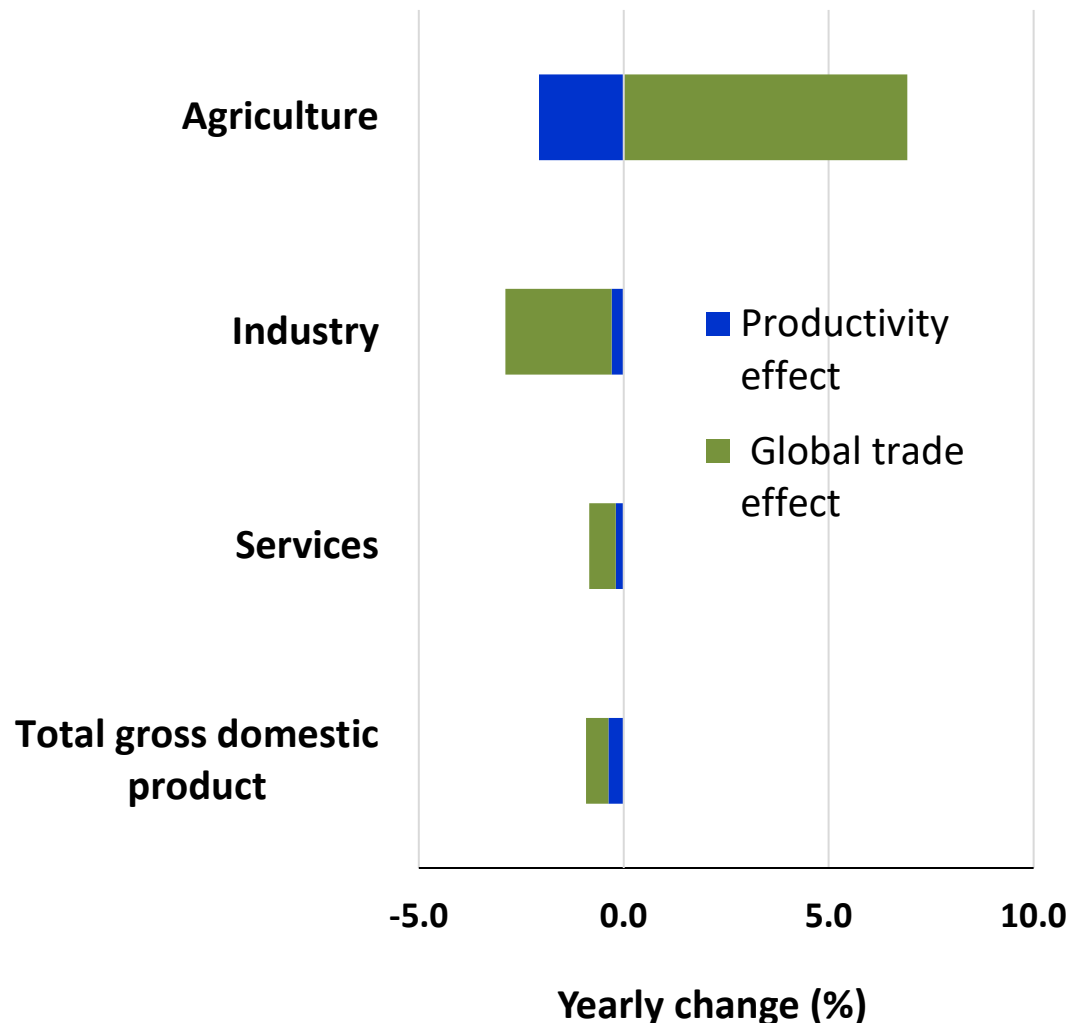


Assessment of Potential Climate Change Adaptation Technologies

- Study assessed the potential of several technologies to compensate for the adverse effects of climate change on crop production and yields, and to boost agricultural productivity growth
- Technologies offer strong potential to deliver productivity gains
 - Combination of optimizing fertilizer use, crop variety, and planting date under climate change can increase rice yields by 11% and corn yields by 8%
- More advanced technologies (e.g. based on varietal traits, like drought and heat tolerance, nitrogen use efficiency; farm management like precision and no till agriculture, integrated soil fertility management; and improved crop protection) can deliver considerably higher crop yields if successfully adopted, in excess of 20%
- Selective investment in cost-effective irrigation expansion increases production and reduces vulnerability to climate change

ECONOMY-WIDE IMPACT OF CLIMATE CHANGE IN AGRICULTURE

Climate change impact on growth in GDP by sector



- Climate change - reduces long-term economic growth, costing Php 145 billion/year
- Higher commodity price gives producers better incentive to grow more crops, especially export crops; leads to higher agricultural GDP
- Downside - higher commodity price reduces consumption directly; causes terms of trade loss and lower real exchange rate, reducing industrial and service sector output

Economy-wide impacts of climate change in the Philippines

Variable	Climate shock (Php billion)		
	Productivity Effect	Global Trade Effect	Total Effect
Annual Cost to Economy	-53.3	-91.6	-145.1
Private Consumption	-42.5	-77.3	-119.5
Investment	-10.1	-198.8	-29.8
Government Consumption	0.6	5.5	4.2

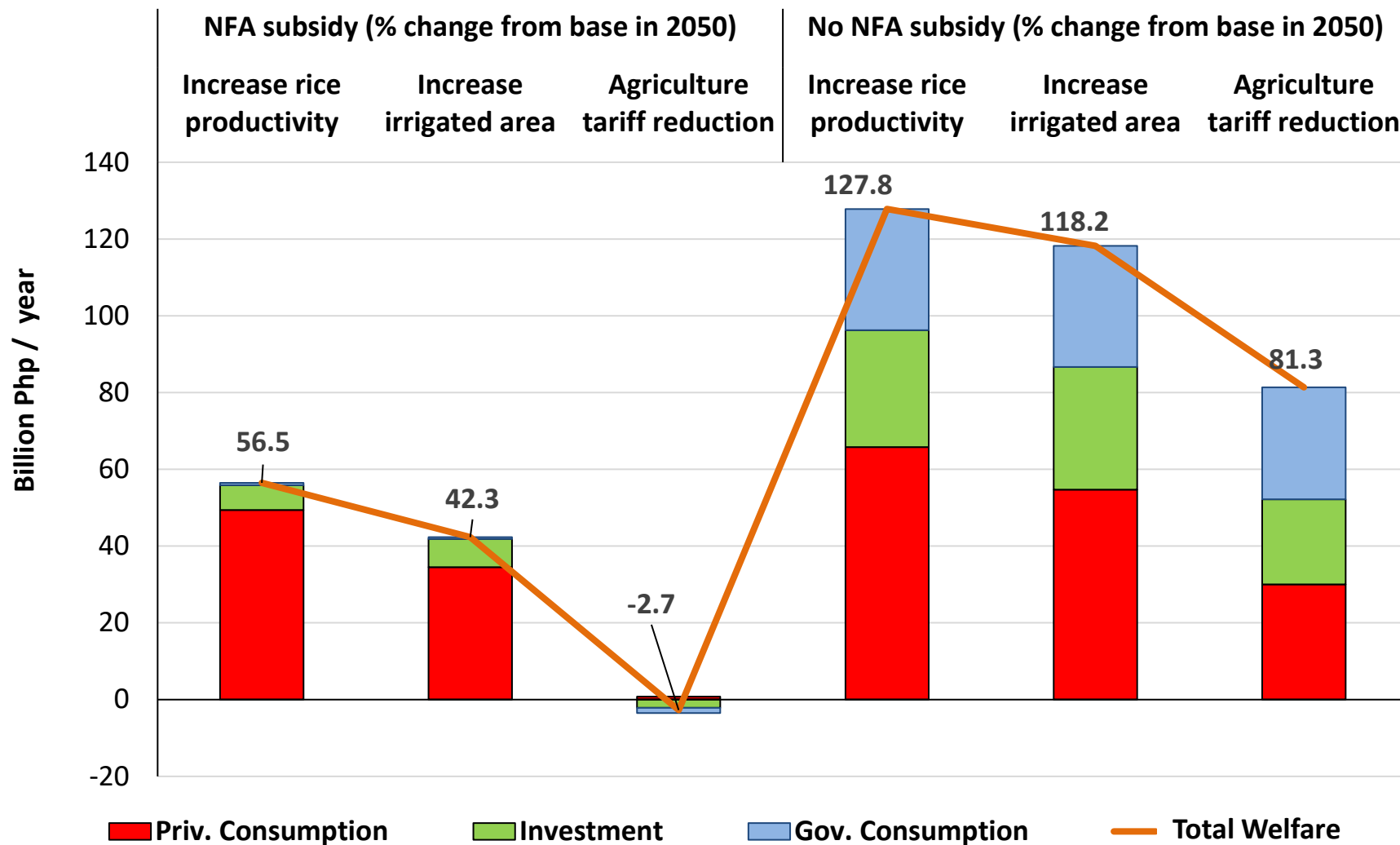
Source: Authors' calculation from Phil-DCGE simulations results

- Climate change – projected to cost the economy Php 145 billion per year
- Welfare loss - reduction of private consumption and total investment - mainly influenced by increase of commodity prices, loss in real exchange rate and lower household income level

Adaptation Strategies

- Three types of adaptation strategies introduced that promote higher domestic rice production in the future
 - First strategy: *Rice productivity – increased investment in rice research and development*
 - Second strategy: *Irrigation investment increases*
 - Third strategy: *Agricultural tariff reductions*
- Each adaptation strategies are assessed under climate change, with and without the rice self-sufficiency policy
- Six scenarios: three adaptation strategies, with and without rice self-sufficiency policy

Welfare impact from different adaptation strategies with and without climate effect, 2010-2050



KEY MESSAGES

Key Messages

- PhP 186 billion per year cost of climate change:
 - Php 41 billion from increased malnutrition
 - Php 145 billion in economywide losses
- Climate change reduces crop productivity growth, increases food prices, and reduces food security
- Large negative effects on the rest of the economy:
 - increased international commodity prices cause terms of trade and real exchange rate losses
 - reducing growth in industrial and service sectors and consumer welfare

Key Messages

- Investment in increasing rice and other crop productivity growth such as irrigation investment and agricultural tariff reduction shows significant impact in reducing the negative climate effects
- Reduction of expenditures on rice market interventions and transfer of savings to investment in agricultural research and development and rural infrastructure - promoting technological change in agriculture that would generate large economic benefits for the Philippines
- Supporting climate change adaptation policies
 - Development of real-time weather information systems to support farmers decisionmaking
 - Improved agricultural extension employing innovative methods such as information and communication technologies
 - Stronger seed industry to facilitate the adoption of new varieties

Key Messages

- Way forward to achieve food security under climate change - shift the focus of policy to productivity and efficiency-enhancing measures
 - R&D to develop technologies appropriate for local conditions
 - Irrigation and flood control development
- Requires reorienting food security policy toward facilitating rather than inhibiting trade, competition, and crop diversification to achieve inclusive access to food while generating long-term productivity and income growth



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THANK YOU!