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Economic and Food Security Impacts of European Union Farm to Fork Strategies

Jayson Beckman, Maros Ivanic, Jeremy Jelliffe, Felix Baquedano, and Sara Scott

Selected presentation for the International Agricultural Trade Research Consortium's (IATRC's) 2020 Annual Meeting: Economic Implications of COVID-19, December 14-15, 2020, Virtual platform.

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United States Department of Agriculture

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IATRC 2020

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The findings and conclusions in this presentation are those of the authors and should not be construed to represent any official USDA or U.S. Government determination or policy



EU Green Deal: Farm to Fork & Biodiversity Strategies

- Farm to Fork and Biodiversity Strategies were released in May 2020 under the Commission's larger Green Deal
- To promote sustainability, there are four areas of improvement:
 - (1) sustainable food production
 - (2) sustainable food consumption
 - (3) sustainable food processing and distribution
 - (4) food loss and waste prevention
- Our work focuses on (1), specifically, how does changing agricultural inputs affect food production



EU Green Deal: Farm to Fork & Biodiversity Strategies

Input Reductions:

Pesticides (↓50%)

Fertilizers (↓20%)

Land (↓10%)

Antimicrobial (↓50%)

Scenarios Analyzed:

(1) EU-Only

(2) Middle

- EU and closest trade partners

- Import restrictions

(3) Global

Analysis Excludes:

Labeling, animal welfare, and organic production

Environmental impacts

Any changes to productivity



The Middle Scenario

- Countries with high share of agricultural exports to EU join EU's F2F Strategies
 - Africa (from colonial ties and common language)
 - And:

Iceland	Switzerland	Norway	Liechtenstein
Ukraine	Turkey	Albania	Serbia
Egypt	Israel	Tunisia	Morocco

- Reduction of ag trade between countries adopting F2F and ROW in middle scenario (↓50%)

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Approach

- In the first phase of our study, we use a global economic model to examine the potential market and economywide impacts from the adoption of the Strategies
- To examine potential food security impacts, in the second phase of our study, we used the USDA, Economic Research Service's International Food Security Assessment (IFSA) model, which estimates changes in food consumption in developing countries



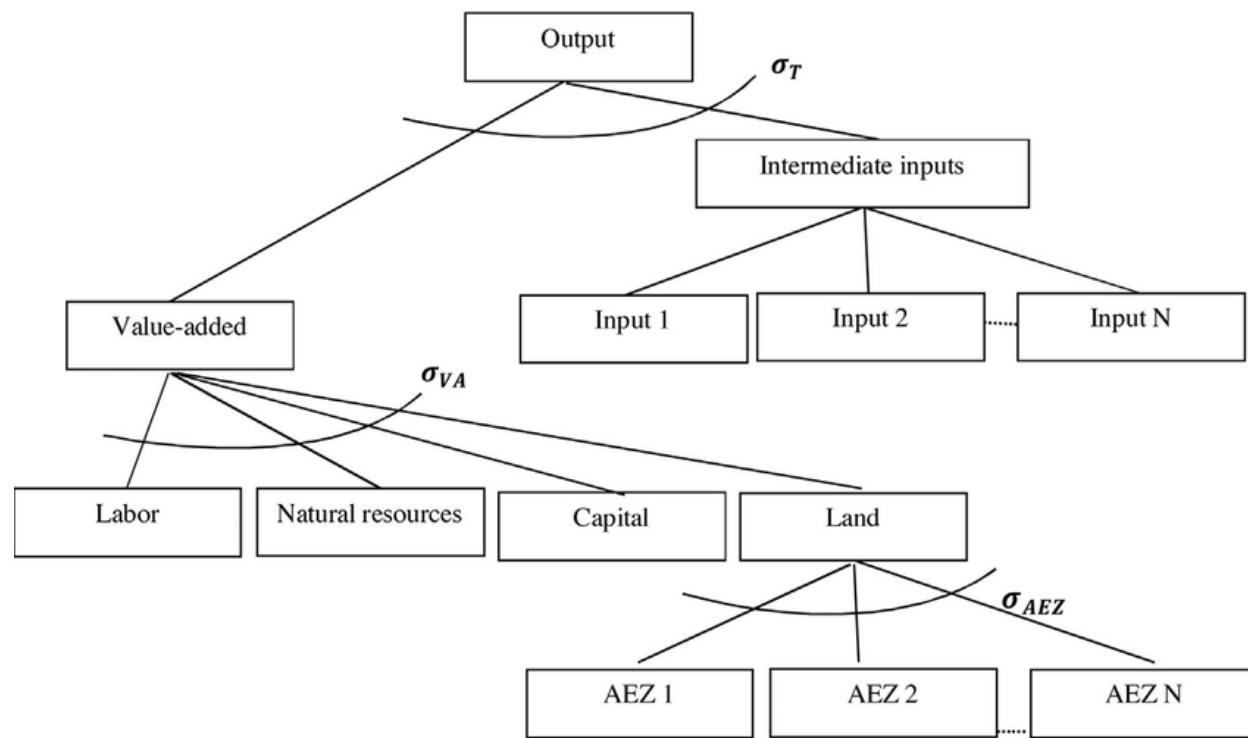
Computable General Equilibrium (CGE) Model

- Given the inter-industry linkages and competition for global resources, a CGE model is used
 - Captures all regions and sectors in an economy
- GTAP-AEZ explicitly accounts for land-use
 - Land can move (somewhat) between crop, pasture, and forest
- We introduce substitutability between factors of production and fertilizers/pesticides/antimicrobials
- Update the model to 2020
- Medium-run scenario...8-10 years (2030)



Fertilizers/Pesticides/Antimicrobials

- Intermediate inputs (antimicrobials, fertilizers, and pesticides) are not substitutable in the GTAP model
- Change the elasticity to allow for substitution
 - Assume -0.13: half of the value-added elasticity



International Food Security Assessment Model

- Analyzes the gap between projected food demand, and a consumption target of 2,100 calories per capita per day for the poorest 76 countries
- Food insecurity—occurs when estimated per capita food consumption for a consumer at a certain income level falls short of the nutritional target
- Two indicators of food insecurity are defined: (1) **The share of the population that is food insecure** and (2) **The number of food-insecure people**



Scenario (1) EU-Only Adopts Farm to Fork

Impact	EU	US	World
Production	-12%	+0%	-1%
Prices	+17%	+5%	+9%
Imports	+2%	-3%	-2%
Exports	-20%	+6%	
Farm Income	-16%	+6%	+2%
Food Cost [†]	+\$153	+\$59	+\$51
Food Insecurity [*]	---	---	+22 million
GDP	-\$71 billion	-\$2 billion	-\$94 billion

[†]Per capita annual; ^{*} Food insecurity estimates limited to 76 poorest countries in the world.



Scenario (2) Middle: EU & Major Trade Partners

Impact	EU	US	World
Production	-11%	+0%	-4%
Prices	+60%	+1%	+21%
Imports	-10%	-7%	-9%
Exports	-10%	-2%	
Farm Income	+8%	+1%	+4%
Food Cost [†]	+\$651	+\$16	+\$159
Food Insecurity [*]	---	---	+103 million
GDP	-\$186 billion	-\$86 million	-\$381 billion

[†]Per capita annual; ^{*} Food insecurity estimates limited to 76 poorest countries in the world.



Scenario (3) Global Adoption of Farm to Fork

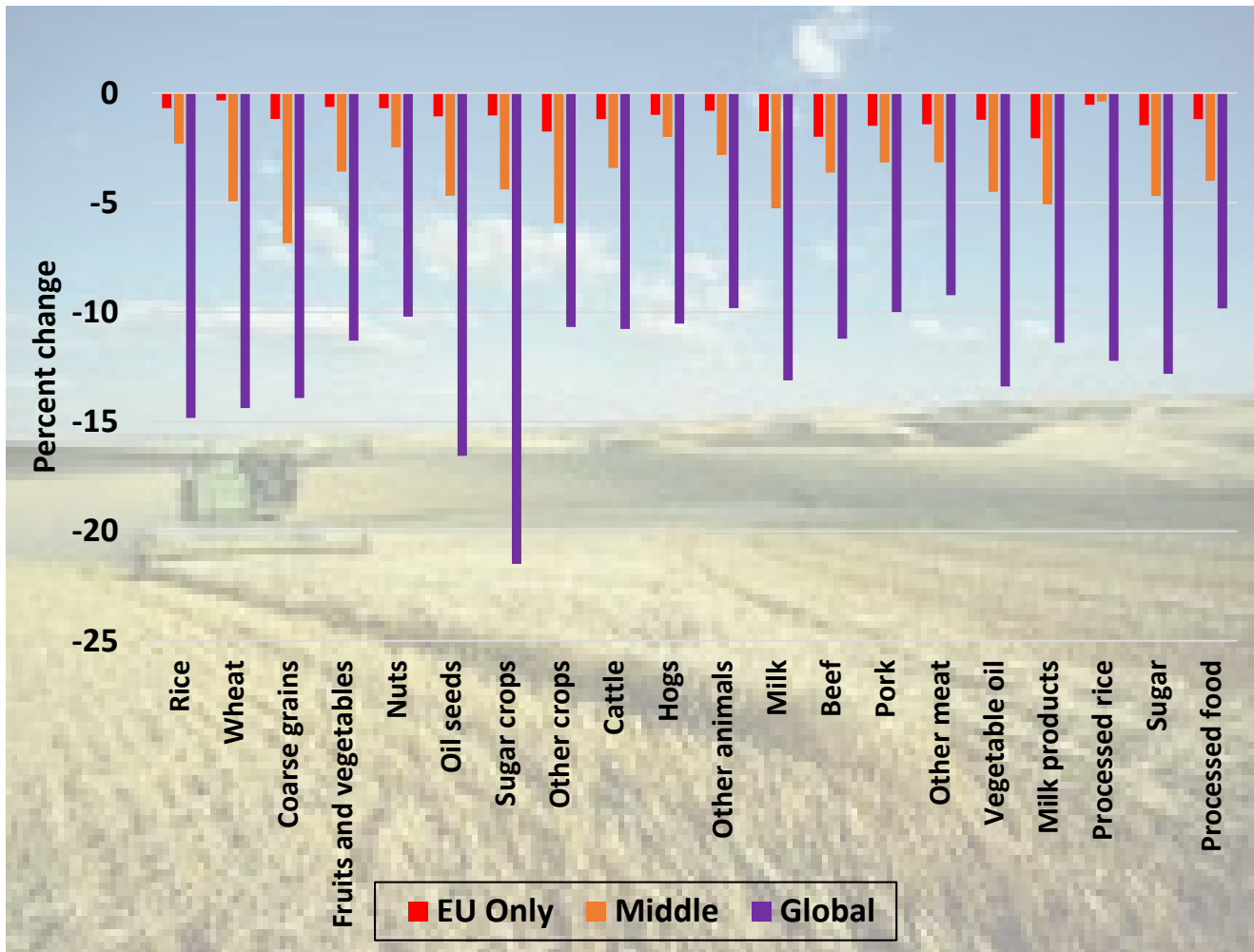
Impact	EU	US	World
Production	-7%	-9%	-11%
Prices	+53%	+62%	+89%
Imports	-5%	-15%	-4%
Exports	+2%	+3%	
Farm Income	+15%	+34%	+17%
Food Cost [†]	+\$602	+\$512	+\$450
Food Insecurity [*]	---	---	+185 million
GDP	-\$133 billion	-\$74 billion	-\$1.1 trillion

[†]Per capita annual; ^{*} Food insecurity estimates limited to 76 poorest countries in the world.



Results:

Change in Global Agricultural Output by Commodity



Major Impacts:

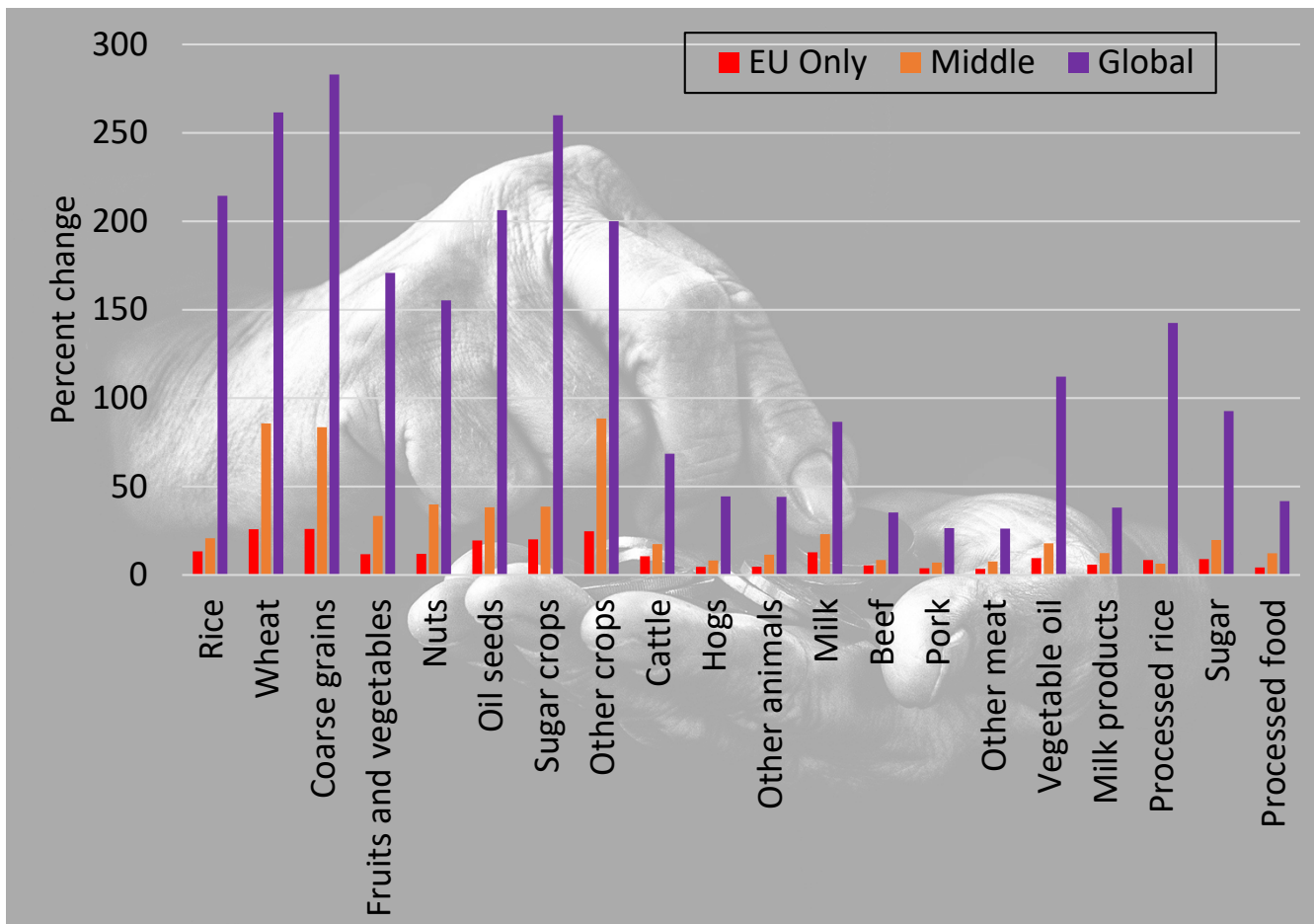
Severe reduction in output across crops, animals, and processed food

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Results:

Global Food Price Changes by Commodity



Major Impacts:

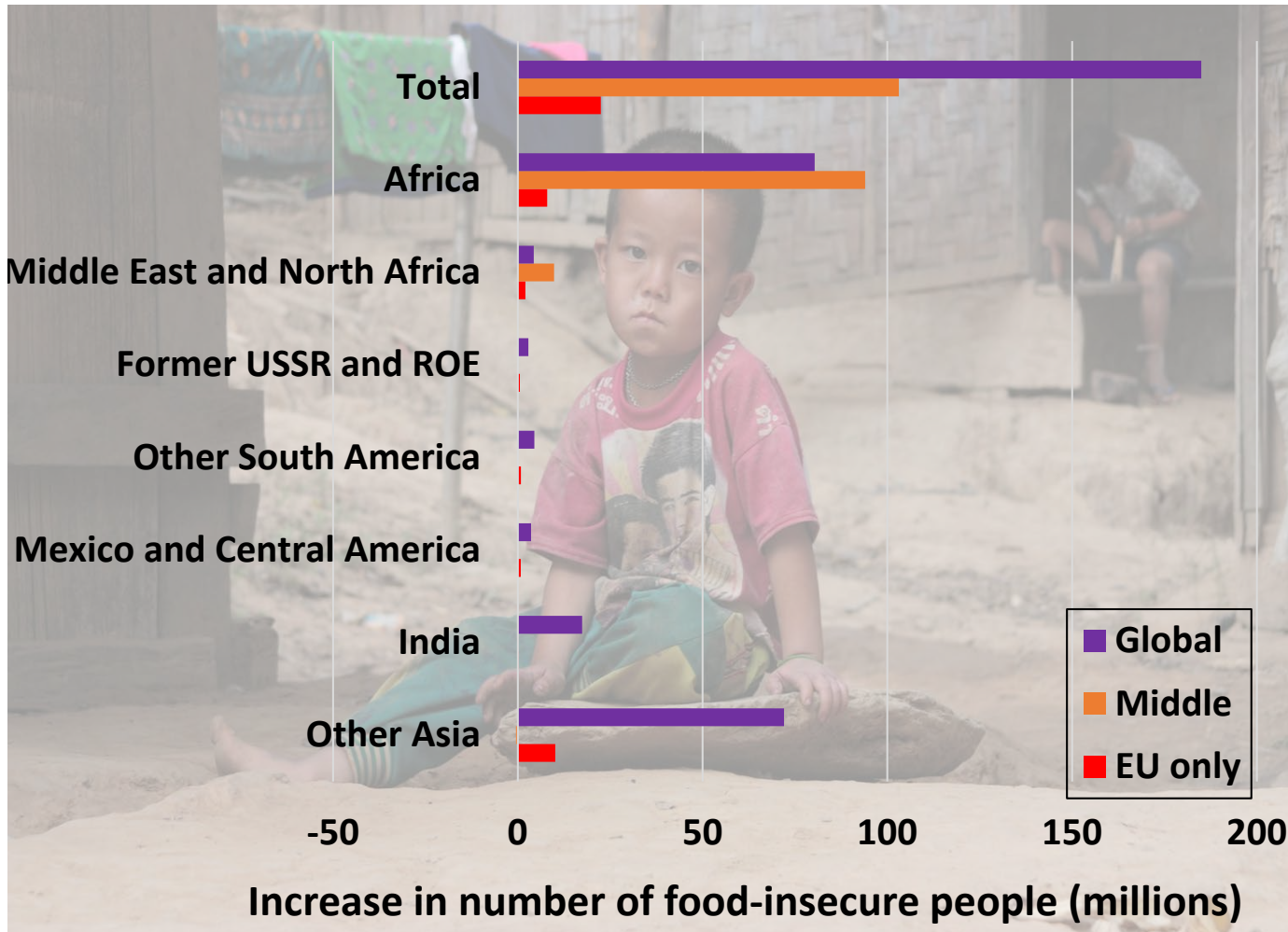
Substantial increases in agricultural commodities and food prices

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Results:

Change in Food Insecurity Headcount (2030)



Major impacts:

Africa and Other Asia account for most of the increase of food insecure people

Reflecting sensitivity to food price increases

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Farming Under EU Green Deal's Farm to Fork

Agriculture input reduction results in:

- Production declines
- Food price increases
- Agricultural trade decreases
- Food insecurity increases
- Economy shrinks

