Gains from Trade and the Environment

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What does economic theory tell us about the gains from trade?

• In the absence of distortions trade improves countries’ ability to deal with domestic and international shocks to supply and demand
  • Where differences in competitive market prices are greater than transportation costs arbitrage occurs and trade results in increased total economic surplus

• In the absence of environmental externalities trade optimizes global resource allocation
The Gains from Trade

Competitive markets equate the marginal cost of production (supply price) to the marginal willingness to pay (demand price).

When private marginal cost is equal to social marginal cost and market demand represents the consumers willingness to pay competitive markets work well to maximize total economic surplus.
The Gains from Trade

In the absence of trade, prices can differ a lot across countries
The Gains from Trade

Trade increases economic surplus in both countries
Disruptions in trade have huge economic and potential environmental costs

• Disruptions could be caused by

  • Domestic or regional agricultural policies with objectives such as self-sufficiency in food
  
  • *Ad hoc* and retaliatory trade actions
  
  • animal or plant disease quarantines
Optimizing the allocation of resources is critical for the global commons

Should we move grain to pigs and grass to cows, or pigs to grain and cows to grass?
When do markets not work?

- When Government subsidies and/or unpriced environmental costs artificially lower the private marginal cost below social marginal cost
- When there is a social or public benefit to a good which is not reflected in its demand

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\end{align*}
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Unpriced (External) Environmental Costs Cause Excessive Production

The industry does not face the true cost of production.
Subsidies, taxes, and unpriced externalities reduce the gains from trade

• Import tariffs or other measures to subsidize domestic producers will reduce total economic surplus and impede growth

• Environmental subsidies reduce total economic surplus and erode natural capital

• Domestic subsidies further magnify the impact of externalities

• Gains are maximized when external costs and benefits are reflected in the market
Unpriced (External) Environmental Costs Cause Excessive Production

• Output subsidies increase overproduction and result in economic losses
• Trade can make this effect worse because it flattens the demand curve
Domestic policies reduce the gains from trade and increase threats to the environment

Key findings of the EU Agri Committee of the European Parliament:

• For the bovine meat sector the level of support was 100% of total net farm income
• For the dairy sector the level of support was 49% of total net farm income
• For the cattle sector the level of support was 57% of total net farm income

Source: EU-DG for Internal Policies Research for Agri Committee-
The EU Cattle Sector: Challenges and Opportunities-Milk and Meat, 2017
Current trade flows do not optimize resource allocation

Global livestock production by region (milk and eggs expressed in protein terms). FAO, CC BY-ND
Live hog pricing closely relates to tariffs, non tariff barriers and subsidies

<table>
<thead>
<tr>
<th>Country</th>
<th>Domestic price (own currency)</th>
<th>US dollars (Liveweight/lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA (Iowa-Minnesota) [Weighted Avg.]</td>
<td>70.72 USD/100 lb. carcass</td>
<td>52.33 ¢</td>
</tr>
<tr>
<td>Canada (Ontario) [Base Price]</td>
<td>167.60 CAD/100 kg carcass</td>
<td>46.62 ¢</td>
</tr>
<tr>
<td>Mexico City</td>
<td>33.25 MXN/kg liveweight</td>
<td>79.27 ¢</td>
</tr>
<tr>
<td>Brazil (South Region)</td>
<td>4.88 BRL/kg liveweight</td>
<td>58.87 ¢</td>
</tr>
<tr>
<td>Russia</td>
<td>113.50 RUB/kg liveweight</td>
<td>81.94 ¢</td>
</tr>
<tr>
<td>China</td>
<td>16.77 CNY/kg liveweight</td>
<td>$</td>
</tr>
<tr>
<td>Spain</td>
<td>1.456 EUR/kg liveweight</td>
<td>74.16 ¢</td>
</tr>
<tr>
<td>France</td>
<td>1.536 EUR/kg carcass</td>
<td>66.12 ¢</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>151.63 GBP/100 kg carcass</td>
<td>68.41 ¢</td>
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<tr>
<td>Vietnam (national average)</td>
<td>36,800 VND/kg liveweight</td>
<td>71.83 ¢</td>
</tr>
<tr>
<td>South Korea (national average)</td>
<td>4,481 KRW/kg carcass</td>
<td>$</td>
</tr>
<tr>
<td>Japan * (my estimate)</td>
<td></td>
<td>1.45</td>
</tr>
</tbody>
</table>
Production response to policy distortions can create excessive livestock intensity
And increases the risk of epidemics

One Health: People, Pathogens and Our Planet
Excessive intensity magnifies the scale and speed of damage from animal diseases
The decline in China’s hog inventories accelerated
Putting the ASF pork shortage into perspective

### China pork production deficit

- **40% production decline**: 20 million tonnes cwe
- **20% production decline**: 10 million tonnes cwe
- **Global beef trade**: 8 million tonnes cwe
- **Global poultry trade**: 12 million tonnes cwe
- **Global pork trade**: 5 million tonnes cwe

**Source:** MLA, ABS, USDA

All based off 2018 figures
Normally trade would fill the growing protein deficit in Asia from ASF

• In this case, global meat protein production is so skewed to China that the gap cannot be easily filled by trade.

• Moreover, trade in soybeans and canola meal along with other hog inputs are massively disrupted with the decline in Chinese hog production by 40%.

• Add to that a tariff war between the U.S. and China and the result is trade disruption with long term economic and environmental consequences.
Trade diversion could result in the further deforestation of the Amazon

China soybean imports: Shares supplied by United States and Brazil, 1995–2019


The U.S. China trade war is changing global production and shifting global land use

- **SCENARIO 1: Brazil alone covers US shortfall**
  - Brazil: 12.9 million hectares of additional land needed
  - Argentina: None
  - Rest (incl. China): None

- **SCENARIO 2: All producers cover US shortfall**
  - Brazil: 5.7 million hectares of additional land needed
  - Argentina: 3.3 million hectares of additional land needed
  - Rest (incl. China): 4.9 million hectares of additional land needed
Also resulting in a massive change in global beef trade

Source: GTA & USMEF; tariff on U.S. beef =37% while Australia pays 6%
The Chinese mainland and Hong Kong account for 44 percent of Brazil's 1.8 million tonnes of beef exports in 2018.

Source: ABIEC
Inefficient beef production systems resulting in higher greenhouse gas emission intensities

Source: Herrero et al. (2013).

As printed on WRI, 2018
Huge environmental costs of suboptimal trade flows

Regions are not equal in GHG efficiency

- Western Europe
- Sub-Saharan Africa
- South and Southeast Asia
- Oceania
- Northern America
- Mid-east and North Africa
- Latin America and Caribbean
- Central and East Asia
- Eastern Europe and Russia

Mt CO₂-eq. in 2014

DATA SOURCE: FAOSTAT 2016. faostat3.fao.org
China’s plan for greater self sufficiency in dairy & beef to cause further economic and environmental costs
Trade could be essential in reducing the GHG emissions globally

Source: FAO, Agricultural Emissions
There is a huge variation in global GHG efficiency in animal protein – North America is among the most efficient.

“Just discouraging a farmer from efficiently producing beef would hurt the climate because some less efficient farmer would likely produce the beef anyway.”

T. Searchinger, Forbes, December 13, 2018

Source: AAFC and FAO
Technology transfer could reduce GHG emissions globally...

LIVESTOCK: GLOBAL TRENDS & CHALLENGES

Africa - USA: Cattle Count & Milk Yield per Cow (2014)

- Total livestock count of live cattle, measured as the total number of live animals at any single time.
- Milk yields measured as the quantity of milk produced per animal in kilograms. This is measured as the weighted-average of production across all milk-bearing livestock.
- Source: FAO - OurWorldInData.org

Cattle Count
- Africa: 312M live cattle
- USA: 89M live cattle

Milk Yield Per Cow
- Africa: 213 kg/animal
- USA: 9766 kg/animal
...and rationalize the use of natural resources
...and the trade in virtual water

Figure 1: Top ten exporters and importers of groundwater depletion embedded in the food trade.

From
Environmental science: Eating ourselves dry
Maite M. Aldaya
Nature 543, 633–634 (30 March 2017) | doi:10.1038/543633a
Notwithstanding environmental issues, the approaching China meat shortage begins to draw in meat from Africa

June 25 2019 First shipment of Namibian beef arrives in China
Trade disruption such as tariff wars have long lasting consequences once investments are made.

Granjas Carroll de México to double pork production.

**Business**

Mexico to raise pork output amid Trump threats.

Mexico imports tons of US pork. But with President Trump questioning free trade, the country expands its own capacities. Mexico's largest pork producer is doubling its sow count and has a lofty goal: to turn the import nation into a pork exporter in the long run.
Undistorted Trade is essential to a sustainable food future

- Reduces the impacts of local supply and demand shocks on prices
- Rationalizes the location of production
- Reduces the impacts of production activities on the environment and climate change
- Improves food security
How do we move toward undistorted trade?

• Reduce production distorting subsidies
• Have policies to price important environmental costs including
  • GHG emissions
  • soil and biodiversity loss
  • non-renewable water use
  • health impacts
• Educate the public, industry and policy makers about the benefits of free trade
• Encourage technology development and transfer to developing countries
The End
Thank you