Self-Arming or Self-Harming Trade Policy? Assessing Trade Policies in Low- and Middle-Income Countries

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Recent shocks have brought trade policy back to the limelight

**The New York Times**

Trump Hits China With Tariffs on $200 Billion in Goods, Escalating Trade War
Sept. 17, 2018

**REUTERS**

WTO head says pandemic-related trade barriers are rising
June 14, 2021

**THE WALL STREET JOURNAL.**

Export Curbs Spread Globally, Adding to Food-Inflation Pressures
*Countries have put restrictions on products such as wheat, corn and edible oils since the start of the Ukraine war*
May 25, 2022

**The New York Times**

Climate Change May Usher in a New Era of Trade Wars
Jan. 25, 2023
A secular shift is underway from tariffs to non-tariff measures (NTMs)

Source: Zavala, Fernandes, Haygood, Reed, Reyes (2023).

Note: Light blue line shows average applied tariff rate from TRAINS database. Dark blue line shows average number of NTM measures from ALADI database. Averages are computed across HS 6-digit products and Latin American countries: Chile, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Peru, Paraguay, El Salvador and Uruguay.

NTMs have been replacing tariffs (Kee and Xie, 2024)
But what are non-tariff measures?

- Quotas, licenses, bans
  - Example: ban on imports of fertilizer in Sri Lanka
- Price controls and additional taxes
- Regulatory measures/technical barriers
- Pre-shipment inspections
- Restrictions on the port of entry
  - Example: imports of textiles can only enter Colombia through authorized ports

*NTMs are complex and very heterogeneous*
LMICs are increasing their use of NTMs targeting imports

- Choice due to fiscal pressures and WTO restrictions


Note: Essential goods include medical and food products, global value chain inputs, raw materials, feed, fertiliser and fuel, critical raw materials and related downstream manufactured goods.
But are import NTMs self-arming?

- Import NTMs arm countries to achieve multiple objectives
  - Economic: help infant industries grow, improve country’s terms-of-trade, respond to economic crises
  - Political: respond to lobbying pressures
  - Non-economic: protect environment, public health, safety, and well-being of consumers, and national security
LMICs are arming themselves mostly for economic motives.

Note: Distortive trade measures refer to limits on exports and imports.
Or are import NTMs self-harming?

- Border NTMs are more restrictive in LMICs

**Figure: Coverage ratio**

- Developed countries
- Africa
- East Asia
- Latin America
- Rest of Asia
- South Asia

**Figure: Ad-valorem equivalent**

- Developed countries
- Africa
- East Asia
- Latin America
- Rest of Asia
- South Asia

*Source:* UNCTAD (2023).

*Notes:* Border NTMs are defined as in Ederington and Ruta (2016). Ad-valorem equivalent to NTMs estimated following Kee and Nicita (2022).
Given input-output linkages, NTMs can be especially harmful.

Sri Lanka import ban

Argentina import licenses

Indonesia NTMs on inputs
Harmful import ban: fertilizer-intensive agricultural exports decline by 33% in Sri Lanka

- Exposure to import ban depends on use of fertilizer in agricultural production

Source: Ghose, Fraga, Fernandes (2024).
Harmful import licenses: downstream exporters’ sales decline in Argentina

- Exposure of exporters to import licenses depends on their use of imported inputs

Harmful input NTMs: reduce exporters’ ability to respond to shocks in Indonesia

- Firms facing NTMs on inputs less able to respond to sudden changes in export demand

Source: Cali, Graciano, Ghose, Montfaucon, Ruta (2024).
Economy-wide effects of an NTM on a critical input

NTMs on imports

Fertilizer

Agriculture production and exports

Incomes and welfare

Sri Lanka import ban

Fabrics
Car parts
Micro-processors

Manufacturing production and exports
What are the aggregate and distributional consequences of a protectionist trade policy (import ban) on a critical input (fertilizer) for agricultural production, exports, and welfare?
Sri Lanka imports nearly all fertilizer needed by its agriculture sector
Sri Lanka bans chemical fertilizer imports on May 6, 2021

While the stated intention was becoming the first country with **fully organic agriculture**, the actual purpose was **protectionist**.
Protectionary import ban worsens trade deficit from agriculture

- Change in trade deficit from agriculture $-34 \text{ MM} + 398 \text{ MM} = +364 \text{ MM}$
- Worsens foreign exchange situation

**Table: Country-level effects**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effect</th>
<th>% Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer imports ($$$)</td>
<td>-$34 \text{ MM}</td>
<td>-16.9%</td>
</tr>
<tr>
<td>Fertilizer imports (kg)</td>
<td>-576 \text{ MM kg}</td>
<td>-88.8%</td>
</tr>
<tr>
<td>Agro exports ($$$)</td>
<td>-$406.7 \text{ MM}</td>
<td>-16.2%</td>
</tr>
<tr>
<td>Net Agro exports ($$$)</td>
<td>-$398.1 \text{ MM}</td>
<td>-20%</td>
</tr>
</tbody>
</table>

Source: Ghose, Fraga, and Fernandes (2024)

Net agricultural exports depend on production, imports, and exports
Sri Lanka’s rice yields declined by more than 30% while rice imports exploded

Notes: The left panel shows the Maha (September-March of the following year) rice yield, 2012-2022. The right panel shows the monthly imports of rice. Red lines in May and November 2021 mark the fertilizer import ban’s beginning and end, respectively.

This decline was not driven by weather-related factors (Ozdogan, Wang, Ghose, Fraga, Fernandes, and Varela; 2024)
Exports decline more for crops more intensive in fertilizer

We present below a novel methodology to study the effects of import restrictions using a quantitative general equilibrium model.
SUPPLY SIDE
Key ingredient: 1. Input output linkages

Fertilizer Intensity: the share of fertilizer in the crop’s production costs (Source: National Fertilizer Secretariat, and authors’ calculations)
Key ingredient: 2. Geographical differences in potential crop yields

Potential crop yield: the district-level average of the crop’s maximum potential attainable yield (in kilograms per hectare) as estimated by an agronomic model that takes into account local geographic factors such as climate and geology (Source: FAO-GAEZ project)
These two key features determine the supply side effects of the fertilizer import ban.

Since regions specialize in producing different crops, there are regional differences in fall in agricultural income due to the ban.
These two key features determine the supply side effects of the fertilizer import ban

- **Nuwara Eliya** (largest decline in agro income) has the largest share of potato (most fertilizer intensive crop) at baseline
- **Gampaha** (2nd largest decline in agro income) is heavily concentrated in rice
DEMAND SIDE
Key ingredient: 1. People eat a variety of agricultural produce sourced from different places

Welfare changes due to the import ban depend on consumer preferences:

1. Substitutability across crops (e.g. maize instead of rice)
2. Substitutability within crops (e.g. how easy is it to give up Sri Lankan red rice for American white rice?)
Key ingredient: 2. Poorer people spend a larger share on food, a feature of most countries

\[
\text{Income elasticity} = -0.66
\]

\[
\log \text{ of household income (residualized)}
\]

\[
\text{Share of income spent on agriculture (residualized)}
\]

Notes: residualized variables are computed as deviations from the regional average. Data source is the 2019 Household Survey.

Poor households susceptible to agricultural shocks because they spend a large share of their budget on food and rely on agro income (Artuc, Porto, and Rijkers; 2024): Household Impacts of Tariffs database
Key ingredient: 3. Land, thus, agricultural income is unequally distributed, a feature of developing countries.

<table>
<thead>
<tr>
<th>Type of household</th>
<th>Number of households</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small landowner (&lt; 4ha)</td>
<td>1,469,622</td>
<td>98.9%</td>
</tr>
<tr>
<td>Large landowner (&gt;= 4ha)</td>
<td>16,014</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Source: Household Survey, 2016
Two key features matter for welfare

- The two key features of most economies in the world but rarely modeled in spatial trade models
  1. Poorer people spend a larger share of their income on food
  2. Land-inequality (income inequality) within and across districts

- Our framework introduces both features in the class of spatial models

- More land/ income unequal district (given mean land size/income) $\rightarrow$ low agro spending $\rightarrow$ smaller agro sector $\rightarrow$ larger manufacturing $\rightarrow$ larger outside option for workers when negative shock hits the agricultural sector (e.g., the fertilizer import ban)
Welfare effects on workers from fertilizer import ban

Geographic Heterogeneity #1: Worker suffers little if her region has large manufacturing employment “buffer” that can easily absorb her.
Welfare effects on farmers from fertilizer import ban

Geographic Heterogeneity #2: Worse effects in regions specialized in fertilizer-intensive crops \( (\rho = -0.90). \)
Overall welfare effects of fertilizer import ban

Table: Welfare (cross-district average) in terms of income (equivalent variation)

<table>
<thead>
<tr>
<th>Agent type</th>
<th>Equivalent variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worker</td>
<td>-2.26%</td>
</tr>
<tr>
<td>Repr. Farmer</td>
<td>-15.83%</td>
</tr>
<tr>
<td>Repr. Agent</td>
<td>-4.48%</td>
</tr>
</tbody>
</table>

- Worker (sectorally mobile) suffers less than farmers
- Farmers (whose income is attached to agriculture) suffers more.

Fertilizer intensity of a district should thus strongly correlate with GDP loss.
GDP declined by 5.8% in fertilizer-intensive relative to less fertilizer-intensive districts

- a. Fertilizer’s importance in local economy
- b. Fall in (log) income predicted by model
- c. Fall in (log) income implied by change in nightlights (4/2021 - 1/2022)

Geographic mobility in the long-run can attenuate negative welfare effects (Artuc, Bastos, and Lee 2021; Ghose, 2024)
Summarising our framework to study the effects of import restrictions

A general framework with many regions producing crops with differing fertilizer intensities + land inequality + trade with the rest of the world

Example applications:
1. How would the effects of a quantitative restriction on intermediate imports differ from the effects of a tariff?
2. How does the global fertilizer crisis affect countries dependent on imported fertilizers?

Matching trade, national accounts, price and satellite data:
- Number of workers and farmers
- Wages and crop prices
- Crop production and cultivation area at granular pixel level
- Trade policy: import ban

Sri Lanka’s gazettes
Lessons learned 1: collecting the right data is fundamental

- Frequent and consistent data on NTMs is crucial for their impact to be assessed and for policy dialogue on NTM reform

- But the only global NTM dataset, UNCTAD Trade Analysis and Information System (TRAINS), does not include a time dimension

- Nascent data and research efforts to collect better NTM data are country-specific:
  - led by researchers: Argentina
  - led by World Bank: Sri Lanka and Indonesia
Lessons learned 2: economic impacts of NTMs

- NTMs (as opposed to tariffs) act as fixed costs which reduce firms’ resilience to shocks
  - Import approval and port of entry restrictions in Indonesia prevented firms from taking advantage of opportunities to expand and diversify exports

- Restrictive policies on imports of critical inputs can be harmful: reducing production, exports and welfare
  - Impacts are unequally distributed across space and economic agents
  - Input-output linkages are crucial to consider in analysis of impacts of NTMs

- Protectionist NTMs on inputs can back-fire: instead of saving foreign exchange they increase trade deficit
Open questions: how can trade policy be leveraged to foster development?

- NTMs on imports of critical inputs can pose risks

- What are other policy options available to LMICs? And how do different policies interact?

- Restrictions on exports of critical materials are being used to foster value added of domestic industries
  
  - Can this strategy be successful?

  - EU presented a complaint against Indonesia’s nickel export ban at the WTO, Indonesia appealed but given the WTO appellate body crisis, Indonesia is keeping the ban
What can we at the World Bank do?

1. Deepen the collaboration between country teams and DEC, fostering more case studies with rich data collection and estimation of impacts

2. Contribute to upgrading of trade policy data so it is better fit to address the many open questions

3. Bridge gap with research community to encourage more work on impacts of NTMs and implications for development outcomes
Thank you!

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References

Progress in NTM data collection: Sri Lanka’s gazettes

- Hand-code gazettes on imports and exports regulations (March 2020-October 2022) identifying HS-8 products with import bans