Trade Liberalization on the EU-US GMO Agreement: A Political Economy Approach

Qianqian Shao  Wageningen University
Maarten Punt  University of Southern Denmark
Justus Wesseler  Wageningen University
GM Regulation and Trade

- **EU: Strict**
  - All food (including processed food) or feed which contains more than 0.9% of approved GMOs must be labelled
  - Import around 30 million tons of GM grain for animal feed per year.

- **US: Not so strict**
  - Voluntary labelling
  - Largest commercial grower of GM crops
    Agricultural imports from the EU growing
Main Idea

• The Transatlantic Trade and Investment Partnership (TTIP)
  • Reduce tariff and non-tariff barriers between the EU and the US: Genetically Modified (GM)
  • Maybe a starting point for a change in GM policy
• Use a political economy model to
  • GM policy: a political rivalry between interest groups (Anderson, Rausser and Swinnen 2013; Graff, Hochman and Ziberman 2009; Qaim 2009, etc.)
  • Describe negotiation over a GM Organism (GMO) Trade Agreement (GTA) and assess effect of negotiations on welfare and lobbying efforts
Main Findings

- Our findings consistent with Grossman and Helpman (1995) and are specific on GMO debate

- A promise of lower GM import costs will intensify lobbying efforts. An agreement will induce a welfare increase for the pro-GM lobby and a welfare decrease for the anti-GM lobby.

- The domestic GM regulation effect will be dampened if trade agreement also allows for increased exports in the domestic country
Structure of the Paper

- Pre-GTA conditions
- A bilateral GTA negotiation
- The GTA effects
- The GTA effects with non-GM exports
Main Assumptions

- Politically determined GM policy
  GM policy compliance cost: $\theta$

- Two countries

![Diagram](Diagram.png)
Main Assumptions (cont.)

- **Production:**
  - 1. Agricultural Food sector
  - 2. Numeraire sector

- **Consumers:**
  - GM consumers $\alpha$ + Non-GM consumers $\beta$ + Indifferent consumers $\gamma$ = 1
Pre-GTA Conditions

- **Groups’ welfare:**
  
  \[ W^\alpha = \alpha w\bar{L} + \pi_G(\theta) + cs_G^\alpha(\theta) + \alpha t_G^0 m^A \]
  
  \[ W^\beta = \beta w\bar{L} + \pi_N(\theta) + cs_N^\beta(\theta) + \beta t_G^0 m^A \]
  
  \[ W^\gamma = \gamma w\bar{L} + cs_G^\gamma(\theta) + cs_N^\gamma(\theta) + \gamma t_G^0 m^A \]

  \( (1) \)

- and \( cs_G = cs_G^\alpha + cs_G^\gamma \)
  
  \( cs_N = cs_N^\beta + cs_N^\gamma \)

- Aggregate social welfare \( W \) is the sum of groups’ welfare.

- FOC→socially optimal GM regulations.
Pre-GTA Conditions (cont.)

- Government payoff function:

\[ G(\theta) = aW(\theta) + C^\alpha(\theta) + C^\beta(\theta) \]  

FOC → politically determined θ

- \[ W^i - (1 + \lambda^i)C^i \geq 0 \]

→ the optimal contribution schedule:

\[ \frac{\partial C^{i*}(\theta)}{\partial \theta} = \frac{1}{(1 + \lambda^i)} \frac{\partial W^i(\theta)}{\partial \theta} \]

\[ \lambda^i \] is the lobbying efficiency.
• Trade policy (politically determined): $t$
  • regulation costs = Non-tariff Barriers (NTBs)
  • $t$ is measured as a tariff equivalent of NTBs
• Domestic GM policy $\rightarrow$ country’s trade policy:
  • high $\theta$ $\rightarrow$ large $t$
• The politically determined GM trade policy:

$$\frac{dG}{dt_0} = a \frac{\partial W(t_0)}{\partial t_0} + \frac{\partial C^\alpha(t_0)}{\partial t_0} + \frac{\partial C^\beta(t_0)}{\partial t_0} = 0$$

(4)
A bilateral GTA negotiation

- **Aim:** reduce the NTBs on GM imports
- **Players:**
  - **Pro-GM lobby:** (potential) profit and CS gain → lobby for lower t and a potentially lower θ
  - **Anti-GM lobby:** may lose the domestic market due to a lower GM price → lobby for same t as previous or higher
  - **Government:** an increase in its payoff because of the welfare and contributions’ change → incentive to start negotiating
A bilateral GTA negotiation (cont.)

- The aggregate welfare of the domestic country under a GTA:

\[
W^B = w\bar{L} + \pi_G^B + \pi_N^B + cs_G^B + cs_N^B + t(m^B - m^A) \tag{5}
\]

\(t(m^B - m^A)\) is the tariff equivalent rents from NTB reduction.

- The government will pursue the GTA only if the change of its payoff after the negotiation is positive:

\[
\Delta G = a(\Delta W) + \Delta C^\alpha + \Delta C^\beta
= a(W^B - W^A) + \left[ (C^{\alpha B} - C^{\alpha A}) + (C^{\beta B} - C^{\beta A}) \right] \geq 0 \tag{6}
\]
A bilateral GTA negotiation (cont.)

- Unilateral stances: positions that the government will choose in response to the domestic interest groups equilibrium contributions: \( \{t_e\}, \; e \in \{D, F\} \)

- The optimal unilateral regime is determined by:

\[
\frac{\partial \Delta G_e}{\partial t} = a \frac{\partial \Delta W(t_e)}{\partial t} + \left[ \frac{\partial \Delta C^\alpha(t_e)}{\partial t} + \frac{\partial \Delta C^\beta(t_e)}{\partial t} \right] = 0
\]

(7)

- The bilateral GTA equilibrium \( t^* \) is a solution when both \( \Delta G_D \geq 0 \) and \( \Delta G_F \geq 0 \).
A bilateral GTA negotiation (cont.)

- The government need to pursue an agreement policy that close to $t^*$ to get a higher payoff during the negotiation.

- The bilateral GTA equilibrium $t^*$ is the Nash Bargaining solution which satisfies:

\[
\max_t \left[ (u_D(t^*) - u_D(t_0))(u_F(t^*) - u_F(t_0)) \right] = \max_t \left[ (\Delta G_D)(\Delta G_F) \right]
\]

\[
\begin{align*}
&u_D(t^*) - u_D(t_0) = \Delta G_D \\
&u_F(t^*) - u_F(t_0) = \Delta G_F
\end{align*}
\]
The GTA effects

- **Pro-GM lobby:**

  Compare marginal welfare effects to the regulation before and after the GTA negotiation:

  \[
  \frac{\partial W^B}{\partial t_G} - \frac{\partial W^A}{\partial t_G} = \alpha (m^B - m^A) + \alpha \left( \frac{\partial c_{s_G}^B}{\partial t_G} - \frac{\partial c_{s_G}^A}{\partial t_G} \right) + \left( \frac{\partial \pi_G^B}{\partial t_G} - \frac{\partial \pi_G^A}{\partial t_G} \right)_{>0} + \left( \frac{\partial \pi_G^B}{\partial t_G} - \frac{\partial \pi_G^A}{\partial t_G} \right)_{<0}
  \]

  More GM imports, and GM price decreases.

  If the marginal loss for the GM firm is small, the marginal benefit will be larger under the GTA.
The GTA effects (cont.)

- Since we have \( \frac{\partial W^i(t)}{\partial t} = (1 + \lambda^i) \frac{\partial C^i(t)}{\partial t} \) for \( i=\alpha,\beta \)

\[
\frac{\partial W^{\alpha B}}{\partial t_G} - \frac{\partial W^{\alpha A}}{\partial t_G} = (1 + \lambda^{\alpha B}) \frac{\partial C^{\alpha B}}{\partial t_G} - (1 + \lambda^{\alpha A}) \frac{\partial C^{\alpha A}}{\partial t_G}
\]

(9)

A larger marginal welfare gain of the pro-GM group will stimulate the group to update its contribution schedule. It will contribute more for a lower \( t \).
The GTA effects (cont.)

**Anti-GM lobby:**

\[
\frac{\partial W^B}{\partial t_G} - \frac{\partial W^A}{\partial t_G} = \beta (m^B - m^A) + \beta \left( \frac{\partial c^B_N}{\partial t_G} - \frac{\partial c^A_N}{\partial t_G} \right) + \left( \frac{\partial \pi^B_N}{\partial t_G} - \frac{\partial \pi^A_N}{\partial t_G} \right) \tag{10}
\]

GM imports large \(\rightarrow\) price of GM food \(\downarrow\), so more consumers from \(\gamma\) group will choose GM food. Non-GM firm will lose its market share.

Since the anti-GM lobby is large in the domestic country, the marginal welfare loss from a smaller \(t\) will be larger under the GTA condition.
The GTA effects (cont.)

- The marginal welfare change after the GTA negotiation

\[
\frac{\partial W^{\beta B}}{\partial t_G} - \frac{\partial W^{\beta A}}{\partial t_G} = (1 + \lambda^{\beta B}) \frac{\partial C^{\beta B}}{\partial t_G} - (1 + \lambda^{\beta A}) \frac{\partial C^{\beta A}}{\partial t_G}
\]

(11)

is larger \(\rightarrow\) anti-GM lobby increases contribution to lobby for a lower marginal welfare loss and keep the import regulation cost as high as feasible.
The GTA effects (cont.)

- The marginal contribution change of the pro-GM lobby is larger than the anti-GM lobby, because the marginal welfare gain from more contributions of the pro-GM lobby is larger.

- As the government enters the GTA negotiation, $\lambda^B > \lambda^A$, so the anti-GM lobby needs to spend more money on lobbying, which also decreases its marginal welfare gain from lobbying.

- The domestic GM debate will be intensive because two lobbies both increase their contributions.
The GTA effects with non-GM exports

- We assume the non-GM firm can export conventional food to the foreign country under the GTA and earns extra profits $E$ from it, so

$$\pi^A_N = (\pi^E_N + E) > \pi^{NB}$$

$$\frac{\partial \pi^E_N}{\partial t_G} < \frac{\partial \pi^B_N}{\partial t_G} < \frac{\partial \pi^A_N}{\partial t_G}$$

- Marginal welfare loss is smaller (compensate by non-GM export earnings), spend less on lobbying

- Domestic debate will be less intensive
The paper investigates the welfare effects of a trade agreement between two countries, two goods (GM and non-GM good), two regulatory standards (high in the domestic and low in the foreign country) and two lobby groups.

- Additional non-GM exports in the GTA negotiation will ease the domestic debate on GMOs.
- The governments are more likely to have agreement on the NTB reduction on sufficient GM imports and non-GM exports through the negotiation.
Next:

- Numerical model to find:
  - Determine $t^*$
  - Optimal lobbying schedules in the negotiation
  - Different regulation effects on groups’ welfare
  - Equilibrium quantity for GM import and non-GM export
Thank you