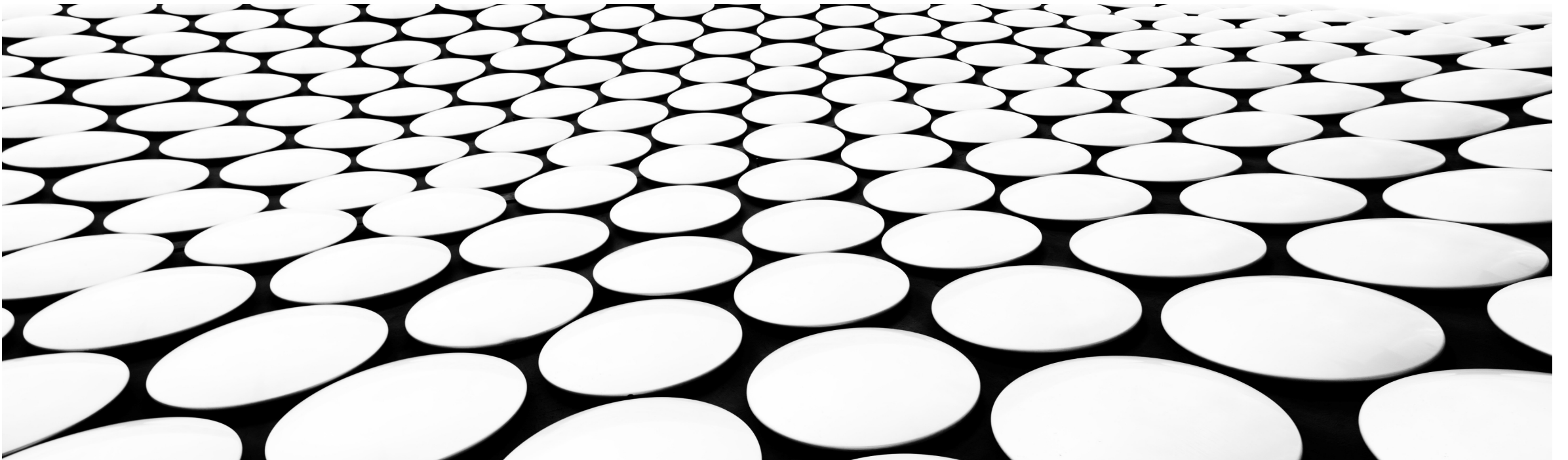

EXPLAINING LACK OF AGRICULTURAL TRADE LIBERALIZATION: A NETWORK APPROACH

DANIEL MAY





CONTENT

- Lack of free trade in agriculture
- The role of intermediaries in the supply chain (market power)
- The International Trade Network Model
- Simulation: effect on international trade of finished food goods
- Extensions

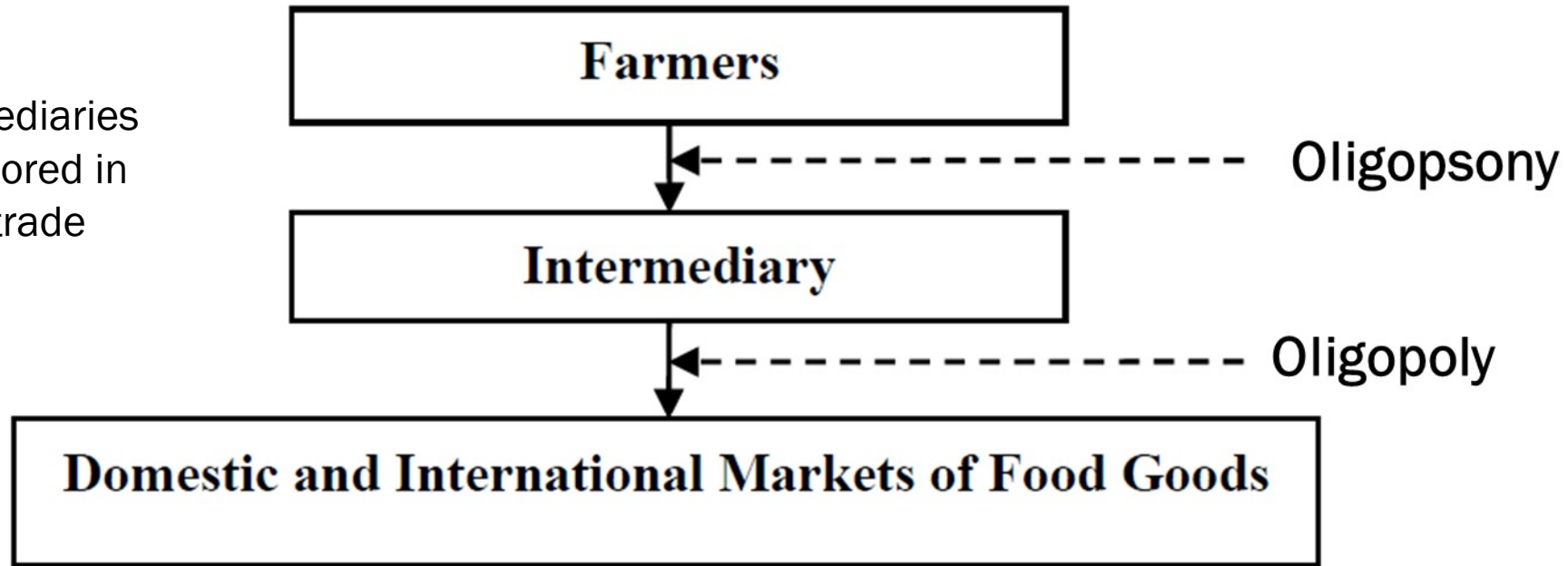


I. LACK OF FREE TRADE IN FOOD AND AGRICULTURAL SECTOR

- Liberalisation of trade in agricultural and food products has been difficult with tariffs still at high levels
- Unsuccessful outcome of a global agreement (Doha)
 - Protectionism
 - Interest groups against liberalisation
- Bilateralism is not leading to global free trade either
- We offer an alternative explanation that have not been explored by the related research.
- This is related to the supply chain of the food and agricultural sector

II. THE ROLE OF INTERMEDIARIES IN THE SUPPLY CHAIN

The role of intermediaries has largely be ignored in the debate on trade



Vertically related food chain.

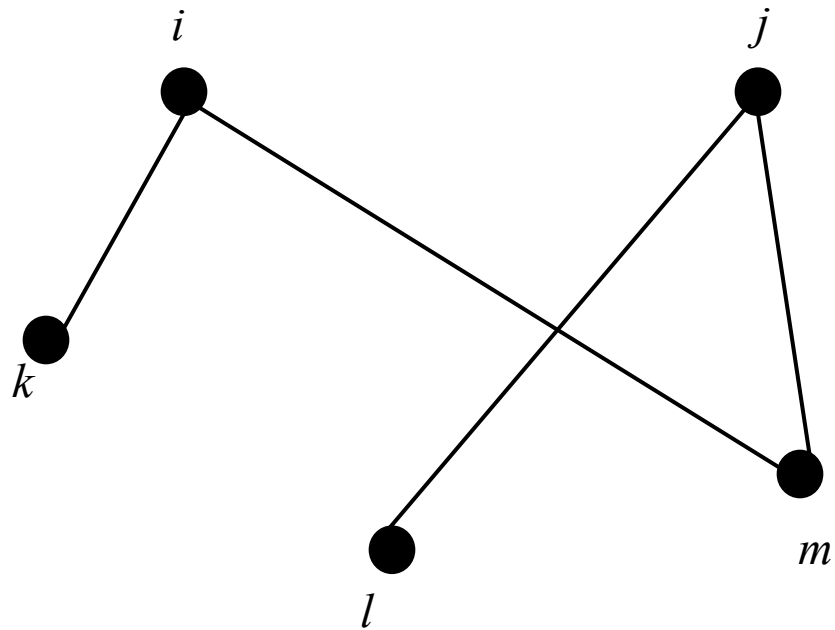
II. THE ROLE OF INTERMEDIARIES IN THE SUPPLY CHAIN

- We argue that the presence of powerful intermediaries in the supply chain can negatively affect efforts to reach global free trade
- Reasons:
 - Increasing marginal cost
 - Policy biases
 - Asymmetry
- In order to model imperfection related to intermediaries, an extension of the International Trade Network developed by Goyal and Joshi (2006) is proposed
- The original model predicts that bilateral agreements will lead to global free trade
- The extended version with intermediaries puts in doubt this optimistic outcome in agriculture

III. THE INTERNATIONAL TRADE NETWORK MODEL

Node = Country

Link = bilateral agreement





III. THE INTERNATIONAL TRADE NETWORK MODEL

- The proposed model accommodates the following aspects observed in the food and agricultural sector:
 - Market power caused by intermediaries: oligopoly and oligopsony
 - Political economy: we account more for the role of firms in the food industry and their role in trade policy.
 - Asymmetry in market size

III. THE INTERNATIONAL TRADE NETWORK MODEL

- The farming sector

$$P_j^f(g) = \gamma_j + \theta q_j^f(g)$$

- Intermediaries

$$\pi_i^j(g) = q_i^j(g) \left(\alpha_i - \sum_{j \in N_i(g)} q_i^j(g) - \sum_{k \in N_i(g)} q_i^k(g) \right) - \theta q_i^{j^2} - \theta q_i^j(g) q_{j-i}(g) - \gamma_j q_i^j(g)$$

- Consumers

$$CS_i(g) = \frac{1}{2} Q_i^2(g)$$

- Government

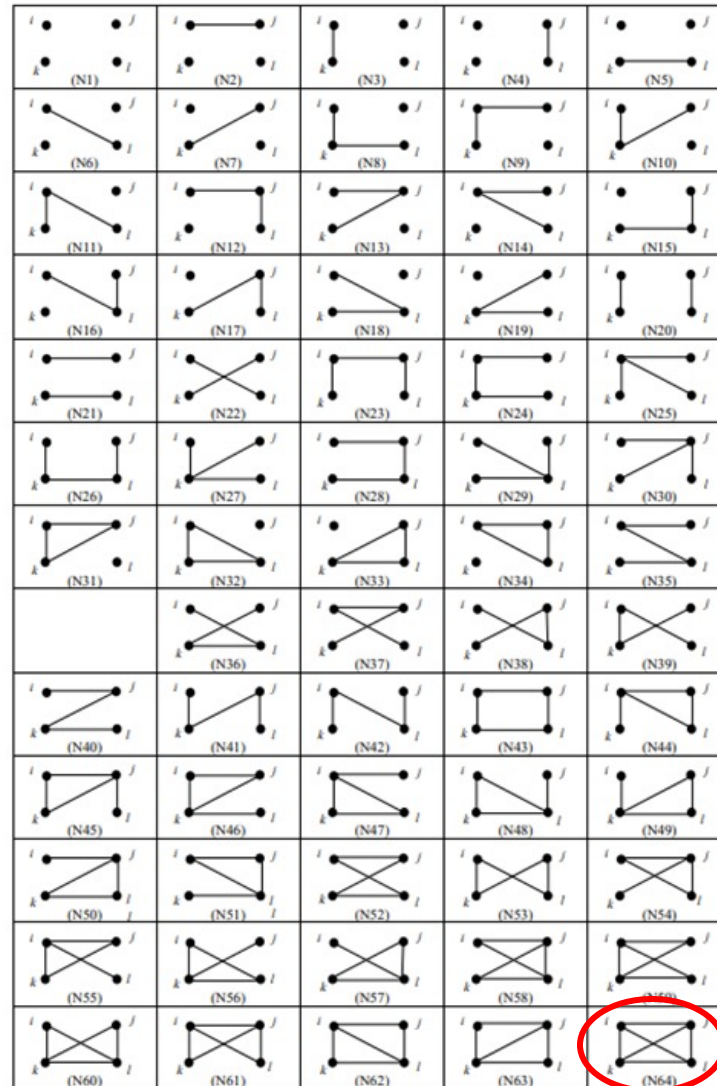
$$W_i(g) = a_i CS_i(g) + b_i \pi_i(g) + c_i PS_i(g) + d_i TR_i(g)$$



III. THE INTERNATIONAL TRADE NETWORK MODEL

- Given the complexity of the model, simulations were carried out assuming a world formed of four countries
- The number of possible networks that can be formed with these countries are shown as follows:

III. THE INTERNATIONAL TRADE NETWORK MODEL

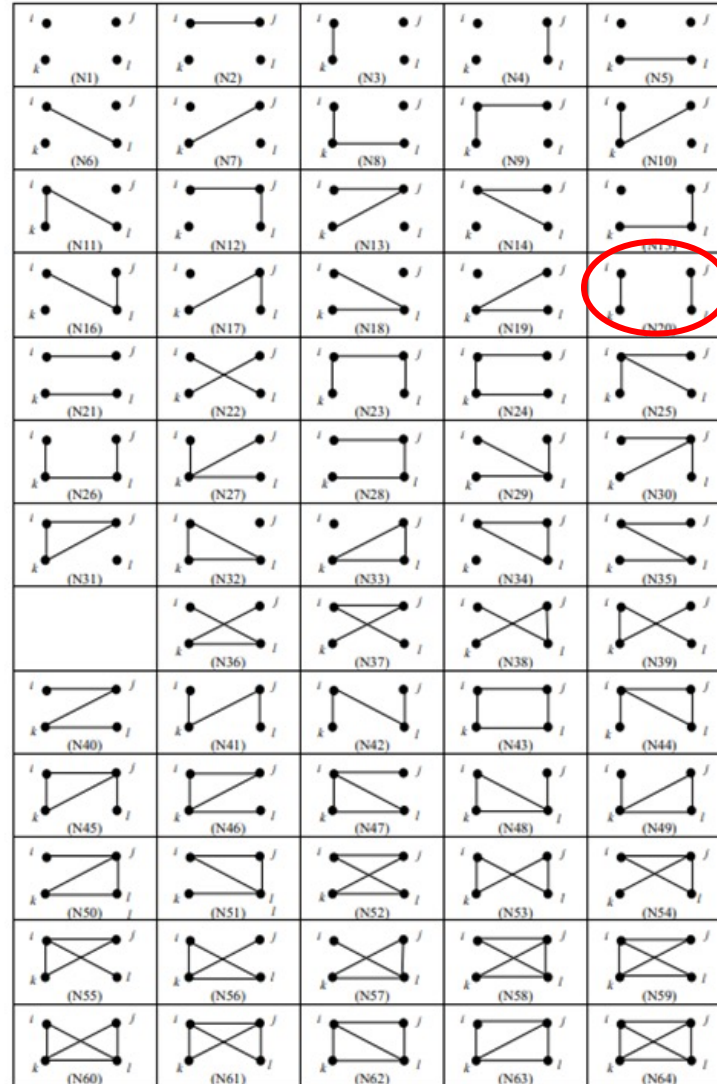


Global free trade

IV. SIMULATION: EFFECT ON INTERNATIONAL TRADE OF FINISHED FOOD GOODS

| | Simulation 1 ($\alpha = 2$ for i and k ; $\alpha = 1$ for j and l) $a = c = b = d = 1$ in Equation 13 $\theta = 0$ in Equation 1 | | | | Simulation 2 ($\alpha = 2$ for i and k ; $\alpha = 1$ for j and l) $a = c = b = d = 1$ in Equation 13 $\theta = 2$ in Equation 1 | | | |
|---------|--|---------------|---------------|---------------|--|---------------|---------------|---------------|
| Network | Country i | Country j | Country k | Country l | Country i | Country j | Country k | Country l |
| N3 | 1.7665 | 0.5424 | 1.7665 | 0.5424 | 0.6592 | 0.2214 | 0.6592 | 0.2214 |
| N4 | 1.7007 | 0.5036 | 1.7007 | 0.5036 | 0.6246 | 0.2036 | 0.6246 | 0.2036 |
| N20 | 1.7813 | 0.5625 | 1.7813 | 0.5625 | 0.6551 | 0.2246 | 0.6551 | 0.2246 |
| N23 | 1.7718 | 0.6769 | 1.7209 | 0.5573 | 0.6260 | 0.3055 | 0.6299 | 0.2301 |
| N26 | 1.7209 | 0.5573 | 1.7718 | 0.6769 | 0.6299 | 0.2301 | 0.6260 | 0.3055 |
| N41 | 1.7209 | 0.6769 | 1.7718 | 0.5573 | 0.6299 | 0.3055 | 0.6260 | 0.2301 |
| N42 | 1.7718 | 0.5573 | 1.7209 | 0.6769 | 0.6260 | 0.2301 | 0.6299 | 0.3055 |
| N58 | 1.6125 | 0.7740 | 1.6125 | 0.7740 | 0.5453 | 0.3646 | 0.5453 | 0.3646 |
| N59 | 1.6935 | 0.7031 | 1.6935 | 0.7031 | 0.5763 | 0.3478 | 0.5763 | 0.3478 |
| N60 | 1.6777 | 0.6379 | 1.7137 | 0.7537 | 0.5915 | 0.2990 | 0.5876 | 0.3561 |
| N61 | 1.7137 | 0.7537 | 1.6777 | 0.6379 | 0.5876 | 0.3561 | 0.5915 | 0.2990 |
| N62 | 1.7137 | 0.6379 | 1.6777 | 0.7537 | 0.5876 | 0.2990 | 0.5915 | 0.3561 |
| N63 | 1.6777 | 0.7537 | 1.7137 | 0.6379 | 0.5915 | 0.3561 | 0.5876 | 0.2990 |
| N64 | 1.6800 | 0.7200 | 1.6800 | 0.7200 | 0.5763 | 0.3478 | 0.5763 | 0.3478 |

IV. SIMULATION: EFFECT ON INTERNATIONAL TRADE OF FINISHED FOOD GOODS



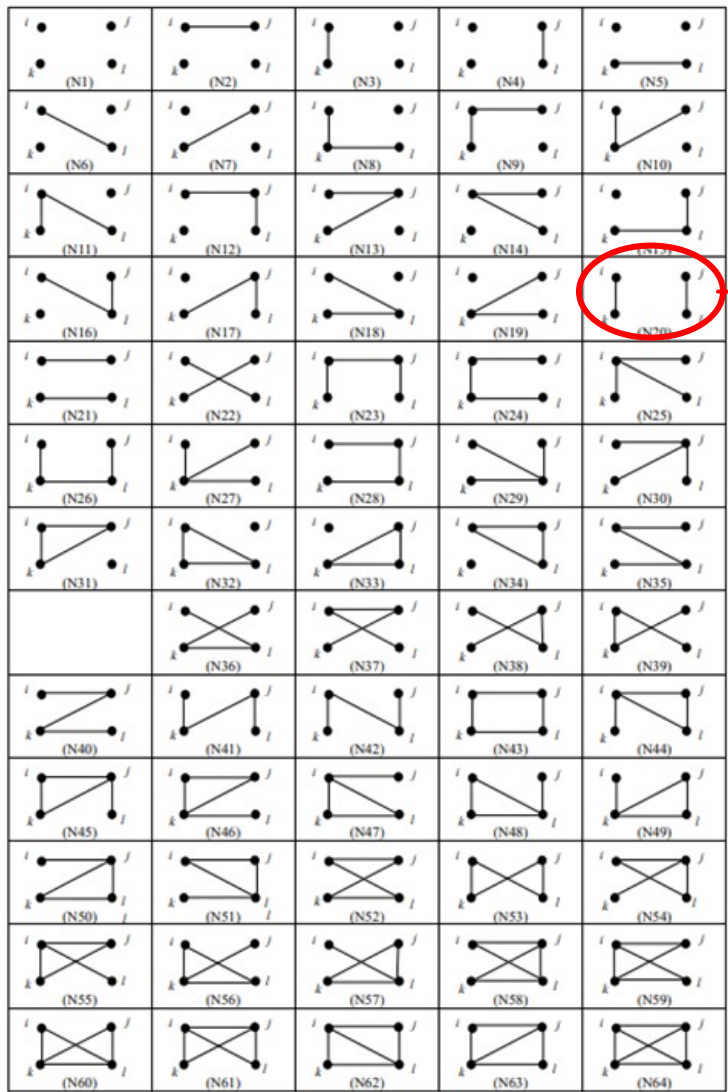
Stable network
under oligopsony:
regionalism

This is observed
in the real world

IV. SIMULATION: EFFECT ON INTERNATIONAL TRADE OF FINISHED FOOD GOODS

| Simulation 3 ($\alpha = 2$ for i and k ; $\alpha = 1$ for j and l) $a = b = d = 1$, and $c = 1.2$ for i and k in Equation 13 $a = b = d = 1$, and $c = 0.8$ for j and l in Equation 13 $\theta = 0$ in Equation 1 | | | | | Simulation 4 ($\alpha = 2$ for i and k ; $\alpha = 1$ for j and l) $a = b = d = 1$, and $c = 1.2$ for i and k in Equation 13 $a = b = d = 1$, and $c = 0.8$ for j and l in Equation 13 $\theta = 2$ in Equation 1 | | | |
|--|---------------|---------------|---------------|---------------|--|---------------|---------------|---------------|
| Network | Country i | Country j | Country k | Country l | Country i | Country j | Country k | Country l |
| N3 | 1.7665 | 0.5424 | 1.7665 | 0.5424 | 0.6927 | 0.1984 | 0.6927 | 0.1984 |
| N4 | 1.7007 | 0.5036 | 1.7007 | 0.5036 | 0.6524 | 0.1819 | 0.6524 | 0.1819 |
| N20 | 1.7813 | 0.5625 | 1.7813 | 0.5625 | 0.6893 | 0.2005 | 0.6893 | 0.2005 |
| N23 | 1.7718 | 0.6769 | 1.7209 | 0.5573 | 0.6592 | 0.2771 | 0.6631 | 0.2053 |
| N26 | 1.7209 | 0.5573 | 1.7718 | 0.6769 | 0.6631 | 0.2053 | 0.6592 | 0.2771 |
| N41 | 1.7209 | 0.6769 | 1.7718 | 0.5573 | 0.6631 | 0.2771 | 0.6592 | 0.2053 |
| N42 | 1.7718 | 0.5573 | 1.7209 | 0.6769 | 0.6592 | 0.2053 | 0.6631 | 0.2771 |
| N58 | 1.6125 | 0.7740 | 1.6125 | 0.7740 | 0.5738 | 0.3322 | 0.5738 | 0.3322 |
| N59 | 1.6935 | 0.7031 | 1.6935 | 0.7031 | 0.6083 | 0.3158 | 0.6083 | 0.3158 |
| N60 | 1.6777 | 0.6379 | 1.7137 | 0.7537 | 0.6236 | 0.2701 | 0.6199 | 0.3239 |
| N61 | 1.7137 | 0.7537 | 1.6777 | 0.6379 | 0.6199 | 0.3239 | 0.6236 | 0.2701 |
| N62 | 1.7137 | 0.6379 | 1.6777 | 0.7537 | 0.6199 | 0.2701 | 0.6236 | 0.3239 |
| N63 | 1.6777 | 0.7537 | 1.7137 | 0.6379 | 0.6236 | 0.3239 | 0.6199 | 0.2701 |
| N64 | 1.6800 | 0.7200 | 1.6800 | 0.7200 | 0.6083 | 0.3158 | 0.6083 | 0.3158 |

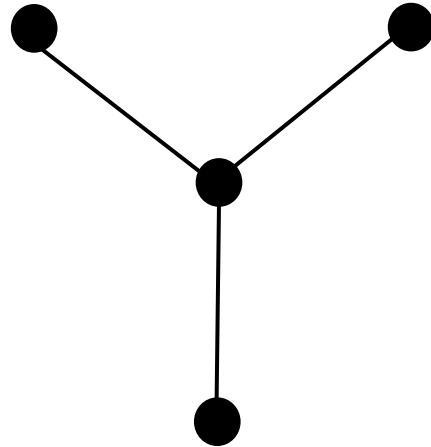
IV. SIMULATION: EFFECT ON INTERNATIONAL TRADE OF FINISHED FOOD GOODS



Stable network
under oligopsony:
regionalism

V. EXTENSIONS

- Centrality: explains lack of a global agreement in agriculture



V. EXTENSIONS

- Side payments (intra and inter-nodes): Strategy to rich global free trade
- Asymmetry in farmers' productivity: Leads to regionalism
- Product differentiation: ongoing
- Calibration with real data: ongoing



Thanks