Market access proposals

- The core of the Doha Agenda
- Easy to evaluate the “pain” from reform
- Difficult to evaluate the “gain” from other countries’ reforms
  - Depends on actions by over 150 economies
  - Complex tariff-cutting rules
  - Flexibilities in agriculture and non-agriculture
    - Which products will be selected?
    - What impact will this have on market access?
- How to assess the resulting impacts?
  - Weights on highly-protected products too low
Roadmap

- Outline of market access proposals
- How will the flexibilities be used?
- Implications for tariffs levied & faced
- *Ex ante* estimates of welfare impacts
Non-Agricultural Market Access

- Swiss formula for bound tariffs
  - Highest tariffs cut the most
- No final tariff, $t_1$ above the ceiling, $a$
  \[ t_1 = \frac{a.t_0}{a + t_0} \]
- Developed country ceiling of 8%, ceilings for developing countries, 20, 22, 25%
  - Developing countries have flexibilities
    - eg 20% ceiling with zero cuts on 6.5% of tariff lines, no more than 7.5% of imports; 25% ceiling, no flex
Swiss formula, ceiling of 20%

The diagram illustrates the relationship between the initial tariff and the final tariff, considering the Swiss formula with a ceiling of 20%. The graph shows two curves:

- **Post-Formula Tariff Rate, Swiss Formula Coef 20**: This curve represents the change in tariff rate post-formula application, influenced by the Swiss formula with a ceiling of 20%.
- **Tariff Cut equivalent (SW Coef. 20)**: This curve indicates the equivalent tariff cut due to the Swiss formula, also capped at 20%.

The x-axis represents the initial tariff values, ranging from 0% to 100%, while the y-axis represents the final tariff values, ranging from 0% to 18%.
Agricultural market access

- Tiered formula to cut **bound** tariffs
  - Different coefficients for developed & developing countries
    - Wider bands & smaller cuts in developing countries

- Flexibilities
  - Sensitive products for all countries
    - 4% of tariff lines in developed countries; 5.3% in developing
      - Assume cuts reduced by one third
  - Special products for developing countries
    - 14% of lines; 40% no cut; average-cut of 11%
### Tiered Formula for Agriculture

<table>
<thead>
<tr>
<th></th>
<th>Developed</th>
<th></th>
<th>Developing</th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>A</td>
<td>0-20</td>
<td>50</td>
<td>0-30</td>
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<tr>
<td>B</td>
<td>20-50</td>
<td>57</td>
<td>30-80</td>
<td>38</td>
</tr>
<tr>
<td>C</td>
<td>50-75</td>
<td>64</td>
<td>80-130</td>
<td>42.7</td>
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<tr>
<td>D</td>
<td>&gt;75</td>
<td>70</td>
<td>&gt;130</td>
<td>46.7</td>
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<tr>
<td></td>
<td>Average-cut</td>
<td>Min</td>
<td>54%</td>
<td>Max</td>
</tr>
</tbody>
</table>
Agric cuts & final tariffs, %

Initial Tariff vs. Final Tariff

- Post-Formula Tariff Rate
- Tariff Cut equivalent

Points A, B, C, D indicate specific tariff cut equivalents for initial tariffs.
Selection for product flexibilities

• Highest tariff rule frequently used
  ◦ No conceptual basis
  ◦ Highest bound tariff includes many products with huge binding overhang and no need to cut
  ◦ Many of the highest applied tariffs are on minor products
  ◦ Suggests adverse impacts of flexibilities on average tariffs are very small

• Use Grossman-Helpman political preference function
  ◦ Assume original tariffs reflect political-economy equilibrium
  ◦ Countries select sensitive prods to minimize political costs
  ◦ Get more plausible product lists; large impacts on efficiency; not so large on market access
Grossman-Helpman Preference Fn

\[ G(p, u) = \sum_{i \in L} C_i(p) + aW(p) \]

- \( C_i(p) \) is contributions by lobby \( i \)
- \( W \) is aggregate economic welfare
- \( a \) is weight on welfare costs relative to contributions \( \approx 50 \)
Rearranging & differentiating

\[ G^*(p, u) = \frac{1}{a} \, \mu' C(p) + (-z(p, u) + z_p'(p - p^*)) \]

Where \( z = e(p, u) - g(p) \)

\[ \text{d}G^* = \left[ \frac{1}{a} \, \mu' \frac{\partial C}{\partial p} + (p - p^*)'z_{pp} \right] \text{d}p = 0 \]

First Order Condition for short-run, where output fixed

\[ h + (p^0 - p^*)'z^0_{pp} = 0 \]
Marginal benefits and costs

Marginal Benefits, Costs

\[ \frac{1}{a} \cdot MC \]

\[ h_i \]

\[ \tau_0 \]

\[ \tau \]
Net political welfare
Inferring political costs

\[ \frac{\partial^2 G^*}{\partial p^2} = z_{pp} + z_{ppp}(p - p*) \]

- Need \( G^* \) to be concave in \( p \)
  - \( z \) is, by definition, concave in \( p \)
  - But this does not guarantee \( G^* \) is concave

- Sufficient condition: \( z \) is generalized quadratic
  - Fully flexible—2nd order approx to any function
  - With six-digit tariffs, over 12 million independent coefficients
Implementation

- Apply formulas to bound tariff rates
  - Cut applied rates when new bound below applied

- Include flexibilities
  - Choose lines to minimize loss of political welfare
  - Choose NAMA flexibility regime and products to minimize the loss of political welfare

- Check that agric tariff cuts meet minimum average-cut requirement for developed countries, maximum for developing
  - Adjust cuts if needed
Identify sensitive prods in 3 ways

- Use CES to solve simultaneously by nonlinear integer programming
  \[ G = - z(p, u) + p^* z_{pp} p + z_p (p-p^*) \]
  - Subject to restrictions on # or trade share and rules on reduction of sensitive/special products

- One equation at a time solution with CES

- One equation at a time with estimated elasticities
# Impact of 2% sensitive agric lines (base level and changes in pp)

<table>
<thead>
<tr>
<th></th>
<th>Base</th>
<th>Formula</th>
<th>2% Sens</th>
<th>2% Sens simple</th>
<th>2% Trade</th>
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<tbody>
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<td>Developed</td>
<td>14.9</td>
<td>8.5</td>
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<td>6.8</td>
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<td>Non-LDC Developing</td>
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<td>6.0</td>
<td>3.1</td>
<td>3.1</td>
<td>4.8</td>
</tr>
</tbody>
</table>
Changing # of sensitive products

Developed countries, constraint in % of lines
Developed countries, constraint in % of lines
Developed countries, constraint in % of trade
Developed countries, constraint in % of trade

Applied tariffs - Trade weighted average
Share of sensitive products
Tariff Scenarios

- Base
- Formula
- Flex—Formula plus flexibilities
Cuts in agricultural tariffs, %

- Developed
- Developing

- Formula
- Flex
Cuts in agricultural tariffs faced, %
Cuts in NAMA bound tariffs, %

- Developed
- Developing

- Formula
- Flex
Cuts in NAMA tariffs applied, %
Cuts in NAMA tariffs faced, %

- Developed:
  - Formula: 30%
  - Flex: 20%

- Developing:
  - Formula: 26%
  - Flex: 18%
## NAMA Tariffs Faced, %

<table>
<thead>
<tr>
<th>Country</th>
<th>Base</th>
<th>Formula</th>
<th>Flex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia NZ</td>
<td>2.9</td>
<td>2.0</td>
<td>2.6</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>3.7</td>
<td>1.7</td>
<td>1.8</td>
</tr>
<tr>
<td>Brazil</td>
<td>2.6</td>
<td>1.9</td>
<td>2.2</td>
</tr>
<tr>
<td>Canada</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>China</td>
<td>3.8</td>
<td>2.3</td>
<td>2.5</td>
</tr>
<tr>
<td>EU-27</td>
<td>3.6</td>
<td>2.7</td>
<td>3.0</td>
</tr>
<tr>
<td>India</td>
<td>4.6</td>
<td>3.1</td>
<td>3.6</td>
</tr>
<tr>
<td>Indonesia</td>
<td>3.4</td>
<td>2.2</td>
<td>2.5</td>
</tr>
<tr>
<td>Japan</td>
<td>4.5</td>
<td>3.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Korea &amp; Taiwan Pr.</td>
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<td>2.6</td>
<td>2.9</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>2.1</td>
<td>1.4</td>
<td>2.0</td>
</tr>
<tr>
<td>USA</td>
<td>1.8</td>
<td>1.4</td>
<td>1.5</td>
</tr>
</tbody>
</table>

### World Bank Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Base</th>
<th>Formula</th>
<th>Flex</th>
</tr>
</thead>
<tbody>
<tr>
<td>All countries</td>
<td>2.9</td>
<td>2.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Developing (non LDC)</td>
<td>2.9</td>
<td>1.9</td>
<td>2.1</td>
</tr>
<tr>
<td>High income</td>
<td>3.0</td>
<td>2.1</td>
<td>2.4</td>
</tr>
<tr>
<td>LDCs</td>
<td>2.8</td>
<td>1.5</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Welfare evaln: need to aggregate

- Tariffs (and tariff equiv) are highly diverse
- Typically aggregate from 10,000 tariff lines to 20-25 for quantitative modeling
  - Weighted averages are flawed
    - The higher the tariff, the smaller the weight
  - Enormous waste of information
  - Have the theory and the data to do better
- Anderson-Neary insight
  - Choose aggregators to reproduce the function of interest
National model for aggregation

- Characterize each economy using a Balance of Trade function
  \[ B = e(p,u) - \pi(p) - z_p(p-p^w) \]
  - \( e(p,u) \) = Expenditure need to achieve utility \( u \)
  - \( \pi(p) \) = Profit (GDP) at price \( p \)
  - \( z(p,u) \) = Net expenditure = \( e - \pi \)
  - \( z_p(p,u) = (e_p - \pi_p) \) = Net imports
  - \( z'_p(p-p^w) \) = Tariff revenues
Expenditure & qty aggregators

- Assume imperfect substitution between different goods at tariff line or HS 6 category
  - For 2-stage budgeting, utility functions must be weakly separable & the sub-utility functions homothetic
    - But we assume this every time we use an aggregate
    - Then can write the expenditure function in terms of aggregated prices and quantities

- Within the group, expenditure increases with the price of the good, but at a decreasing rate
  - Slope = $e_p$
Tariff revenue aggregator

- Want a measure that takes account of the fact that increases in high tariffs reduce revenues by more than the quantity loss

- Slope of the tariff revenue function
  - $e_p + (p-p^w)e_{pp}$
  - Becomes negative for large enough tariff
    - The “Laffer curve”
Marginal impacts of tariff change

\[ -\Delta \text{Exp}, \]
\[-\Delta \text{Tariff Rev.} \]

\[ x_1 \]
\[ x_0 \]

\[ 0 \]
\[ t_0 \]

\[ \text{Tariff} \]

\[ e_p + t.e_{pp} \]
Implementation

- Use 6-digit tariff and trade data from MAcMapHS6 v2.1 dataset
- Assume CES sub-aggregators,
  - Closed-form solution for the expenditure aggregator
- The tariff revenue aggregator
  - Must assume imports separable from domestic goods
  - Use weighted-average with weights adjusting
- CES aggregators allow extensive-margin growth
  - As long as the model can represent this
In a global model

- Walras’ law a problem at the global level
  - Can’t solve as income doesn’t equal expenditure
- Distinguish quantities at domestic \( (u_i) \) & world prices \( (x_i^*) \)
  - \[ u_i = x_i^* (1 + \tau_i^R) / (1 + \tau_i^e) \]
- Which allows global adding up
  - \[ u_i (1 + \tau_i^e) p^w = x_i^* (1 + \tau_i^R) p^w \]
Computing aggregates

- Compute the expenditure tariff aggregator $y$ using a domestic price index

  $$P = PCIF \times \left( \sum_i \alpha_i (1 + t_i)^{1-\sigma} \right)^{1/(1-\sigma)}$$

  So  \( \tau^e = \frac{P}{PCIF} - 1 \)
Implementation

- Modify the World Bank LINKAGE model to distinguish quantities at domestic and at world prices
- Calculate the expenditure & tariff revenue aggregators
- Simulate impacts of changes
- Could add modeling of increases in variety
Nesting structure

\[
M(i, r, s) \\
\text{(...)} \\
M^1(i, r, n) \\
\text{(...)} \\
M^2(\text{hs6}, r, n) \\
\text{(...)} \\
\]

Cobb-Douglas

CES \(\sigma_1\)

CES \(\sigma_2\)

\(x(\text{hs6}, m, n)\) \\
\text{(...)}
Parameter estimates

- Great uncertainty about the elasticity of substitution at the six-digit level.

- Averages:
  - Kee, Nicita & Olarreaga $\eta = 3.12$
  - Hummels & Klenow $\sigma_2 = 7.5$
  - Broda and Weinstein $\sigma_2 = 13$

- Consider $\sigma_1 = 2$ or $5$ in this initial study

- Use $\sigma_2$ twice as large (not influential)

- We ignore effects of new varieties
  - Standard models doesn’t allow us to model changes in the number of varieties
<table>
<thead>
<tr>
<th>Country</th>
<th>Full</th>
<th>Formula</th>
<th>Flex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia/N Zealand</td>
<td>16.8</td>
<td>4.8</td>
<td>2.4</td>
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<tr>
<td>EU 27</td>
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<td>39.3</td>
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<td>USA</td>
<td>53.8</td>
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<td>Japan</td>
<td>64.9</td>
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<td>Korea &amp; Taiwan</td>
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<td>-0.2</td>
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<td>China</td>
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<td>India</td>
<td>24.3</td>
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<td>Thailand</td>
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<td>2.6</td>
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<tr>
<td>High income countries</td>
<td>484</td>
<td>141</td>
<td>91</td>
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<td>Developing Countries</td>
<td>241</td>
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<tr>
<td>Sub Saharan Africa</td>
<td>30</td>
<td>6.6</td>
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<tr>
<td>World total</td>
<td>725</td>
<td>202</td>
<td>121</td>
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## Impacts of $\sigma_1$, DDA

<table>
<thead>
<tr>
<th>Region</th>
<th>Weighted Ave</th>
<th>$\sigma = 2$</th>
<th>$\sigma = 5$</th>
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<td>Australia/NZ</td>
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<td>53</td>
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<td>USA</td>
<td>6.4</td>
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<td>26.1</td>
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<td>1.0</td>
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<td><strong>44</strong></td>
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<tr>
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<td><strong>0.6</strong></td>
<td><strong>1.5</strong></td>
</tr>
<tr>
<td><strong>World total</strong></td>
<td><strong>94</strong></td>
<td><strong>121</strong></td>
<td><strong>161</strong></td>
</tr>
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</table>
Conclusions

- Modalities involve deep and sharply-harmonizing cuts in tariffs
  - Together with flexibilities that reduce cuts on self-selected products
- Need careful approaches to predict products for flexibilities
  - Adverse impacts much larger than suggested by *ad hoc* rules like highest-tariff
- Optimal aggregation of distortions increases the estimated real-income gains