Trade diversion effects of Preferential Trade Agreements under Tariff Rate Quota regimes

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Outline

The importance of third country policy representation in the ex-ante assessment of FTAs

1. Motivation
2. Trade diversion/creation; measuring impacts on welfare and trade patterns
3. Modelling TRQs in equilibrium models
4. Simple theoretical model of international trade
5. Large-scale equilibrium model of global agriculture: CAPRI
6. Conclusions

Research Objective

How important is the policy representation of third countries when assessing and FTA?

- Focusing on ex-ante assessments made with Applied Equilibrium Models (AEM)
- Current state: often simplified in "real life" impact assessments
- How big is the bias induced by the simplification/ignorance?

How to assess?

- Pick one policy instrument (TRQ) and analyze the impacts in depth
- Contrast different TRQ implementation techniques in AEMs
- Impacts in a small theoretical equilibrium framwork
- Impacts in a large-scale ("mainstream") equilibrium model

Motivation

Global trade liberalisation through PTAs?

- WTO negotiations are stalled
- Are PTAs the second best alternative in thriving for multilateral trade liberalisation?
- Some analysts (optimists) already say:

    Free trade agreements [. . .] are the likeliest pathway to multilateral trade liberalisation.

- Increasing number of PTAs have been negotiated in the last few years
- Two large-scale PTAs are ahead of us: EU-US, Trans-Pacific Partnership
- The ex-ante toolbox for impact assessment needs to be revised

Methodological framework

Hypothetic FTA scenario in an equilibrium framework under different TRQ implementations

- Start in small: first evaluate with a small theoretical modell (3 regions, 1 commodity)
- Extend: realistic EU-US trade deal scenarios with the CAPRI model

Measure the impacts on welfare and trade patterns

- Trade diversion:

    Shift of imports from low cost third country producers to higher cost producers enjoying trade preferences

- Trade creation:

    Higher cost domestic goods are substituted with lower cost imports from new partners

Welfare decomposition and changes in trade

Replace the standard Vinerian framework with *money metric* and measures of *changes in traded volumes*

Money metric

Income equivalent (expenditure) of the utility at constant prices of the initial point

Trade diversion

Shift in imported volumes from third countries to the members of the FTA

Trade creation

Replacement of domestically produced goods with preferential imports in the consumption bundle

Two approaches are in widespread use:

1. Simplified to a fixed tariff equivalent (ad valorem, AVE)
2. Variable tariff rate depending on imports vs. quota limit

Practical problems with tariff calculations (general)

- Selection of correct *Unit Value* (convert specific to ad valorem)
- Suitable *aggregation* method to the level of commodities in the model

Practical problems (TRQ related)

- Set a *shadow tariff* that correctly represents the border protection of marginal imports provided by the TRQ
- With explicit TRQ representation this becomes a calibration issue

Smooth approximation of the two-tiered tariff regime
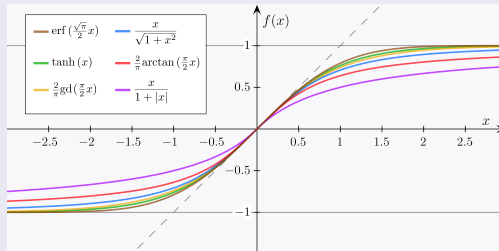
- Family of sigmoid functions
- Applied tariff is the function of imports, pref. and MFN rates
- Great flexibility for calibration
- Used in CAPRI (see later)

Variable tariffs under TRQ (orthogonality constraints)

Complementarity Slackness conditions in an MCP framework

$$Q - I_{in} \geq 0 \perp r \geq 0$$

$$t_{MFN} - t_{Pref} \geq r \perp I_{out} \geq 0$$

$$I \geq I_{in} - I_{out} \perp I_{in} \geq 0$$

- Interpreted as Market regimes under TRQ (under-, overfill)
- Calibration to non-zero shadow rate is only possible when the quota is filled
- $=>$ shifting effective quota levels to handle data errors
- Used in most CGE models (e.g. IMPACT, GLOBE)

Simple theoretical model of international trade

Model Features:

- 3 countries (R1,R2,R3), 1 traded commodity (X1)
- Maximize producer and consumer surplus increased with tariff revenues
- Demand side: Generalized Leontief expenditure system
- Supply side: behavioural functions derived from Normalized Quadratic profit func.
- Elasticities are subject to regulatory conditions
- Armington approach for modelling bilateral trade
- The strucuture mimics that of the CAPRI market module

Baseline and scenario assumptions

- Hypothetical scenario: region R1 and R2 negotiate an FTA
- R1 has a TRQ with R3 (third country, rest of the world)
- 3 implementations for the TRQ:
    - fixed AVE
    - explicit representation with sigmoid function
    - explicit representation with orthogonality conditions
- Equal border protection in basline, 25% ad valorem
- Baseline assumption on TRQ:
    - binding quotas with 100% fill rate
    - shadow tariff is half the 25% (SA later)
- Armington substitution elasticities:
    - first tier = 4 (Arm1)
   - second tier = 7 (Arm2)

Impact on trade patterns in the theoretical model

- The TRQ prevents the drop in R1 imports from R3
- Trade diversion impacts are overestimated under AVE repr.
- Trade creation impacts are overestimated under explicit repr.
- No significant difference between the two explicit representations
- Trade creation > Trade diversion => overall positive welfare impact on R1?

measure	region	AVE	Sigmoid	Orthog. cond.
trade diversion	R1	30.8	0.4	0.0
trade diversion	R2	19.8	23.9	24.0
trade creation	R1	109.7	116.4	116.2
trade creation	R2	104.7	101.6	101.6

- Domestic demand for domestic products decreases $=>$ domestic sales $\downarrow$
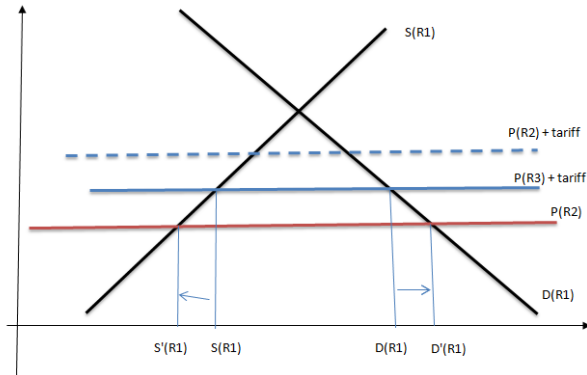
- Foreign demand for domestic goods increases $=>$ exports $\uparrow$
- The change in total demand for domestic production is the compound effect of the above two
- Bigger impacts on domestic sales with explicit TRQ representation:
    - drop in import price of marginal imports from R3
    - BUT the quota remains bound
    - bigger pressure on domestic sales by foreing trade
- Bigger impacts also on exports with explicit TRQ representation
- The overall impact on agricultural profits is ambigous

Impact on welfare in the theoretical model

- Welfare in R3 shrinks (TRQ rent, tariff revenues, agric. profit)
- Change in agr. profit in R1 is of different signs!

region	item	AVE	sigmoid	orth
R1	CSSP	5.3	6.9	6.9
R1	ProfitAgr	0.2	-0.8	-0.8
R1	TrqRent_government		-76.5	-77.3
R1	Tariff_revenues	-81.1	-100.0	-100.0
R1	Total	1.8	2.6	2.6
R3	CSSP	2.3	1.2	1.2
R3	ProfitAgr	-5.1	-2.6	-2.6
R3	TrqRent_exporters		-76.5	-77.3
R3	Tariff_revenues	-9.0	-4.2	-4.1
R3	Total	-0.2	-0.4	-0.4

Table: Welfare impacts (percentage change relative to baseline)

Sensitivity Analysis on Armington elasticities

- Trade diversion increases with the Armington elasticities
- Explicit repr.: trade diversion only when substitution between domestic and foreign is limited but substitution among trading partners is elastic
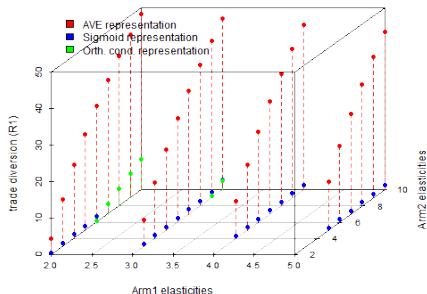
S.A. ctnd., shadow rate in the calibration point

Trade diversion occurs only if the shadow rate in calibration point is below 9% (by explicit TRQ representation)

shadowrate	SIM_AVE	sim_sigm	sim_orth
2.50	30.78	23.78	23.78
3.50	30.78	20.53	20.53
4.50	30.78	17.20	17.20
5.50	30.78	13.81	13.81
6.50	30.78	10.34	10.34
7.50	30.78	6.82	6.82
8.50	30.78	3.23	3.23
9.50	30.78	0.90	0.00
10.50	30.78	0.63	0.00
11.50	30.78	0.51	0.00
12.50	30.78	0.44	0.00

Table: Trade diversion in R1

Short introduction to CAPRI

- Comparative static, partial equilibrium model
- Iterative link between (a) supply models of the EU and (b) global market model
- PMP models for the EU supply
- Nonlinear system of equations solving for the Kuhn-Tucker conditions of maximizing consumer and producer surplus increased with tariff revenues
- Market module covers 77 countries and 47 commodities
- Two-stage Armington system for bilateral trade
- Explicit policy representation for
    - bi- and multi lateral TRQs
    - export subsidies
    - public intervention
    - flexible levies
    - and the entry price system for fruits and vegetables in the EU

Introducing AVE representation of EU tariffs

The AVE-rate of the TRQ depends on the fill rate:

- *below 90%:* AVE=Preferential rate
- *90-99%:* AVE=average(Preferential, MFN)
- *above 99%:* AVE=MFN rate

Reminder on unit values (UV) in CAPRI:

- Weighted average of single bilateral UVs and world UVs
- Weight: probability that the observed single unit values were created with a fitted normal distribution

Reminder on tariff aggregation in CAPRI:

- From HS6 to CAPRI commodities
- Combination of 3 weighting schemes: 1 naive bilateral trade weighting 2 weighting with average world import values 3 simple arithmetic mean

EU-US FTA scenario with CAPRI

Scenario setup (EU-US FTA):

- Full liberalisation for agricultural commodities
- Same scenario is run with explicit TRQ repr. and AVE repr.
- NTBs and other sectors of the economy are not included (partial impacts)

Impacts on trade patterns:

- EU imports from third countries decrease to a greater extent under AVE repr. ($\rightarrow$ trade diversion)
- Significant differences among commodities (market regimes differ)
- Most pronounced difference for meats (fall in 3rd country imports: -88% AVE, -1% sigmoid)

Welfare impacts:

- Negligible total welfare impact
- BUT the sign of the change in agricultural profits is different in the two scens. (+ AVE, - sigmoid)
- Similar impacts as with the theoretical model, but more cross-effects

	AVE representation	Sigmoid representation
Total	0,0%	0,0%
Consumers welfare	0,0%	0,0%
Profit of Agriculture	1,0%	-0,7%
Tariff revenues	-32,7%	-15,1%
TRQ Rent (to government)		-2,6%
TRQ Rent (to exporters)	-16,1%	-20,0%

Conclusions

- Neglecting explicit policy representation might have a significant impact on simulation results (+/- Agric. profits)
- AVE representation overestimates trade diversion effects
- Explicit represenations overestimate trade creation impacts
- Impacts on agricultural profits are highly dependent on
  - calibration point (shadow rate, fill rate, import shares, relative prices, . . .)
  - policy representation with third countries
  - model parameters (Armington-, supply and demand elasticities, etc.)
- Demonstrated sensitivity to calibrated quota rents and Armington elasticities

Further resources: http://trialsolution.github.io/shortcapri/
Thank you for your attention!