

Understanding the research tools for answering trade policy questions

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Points to be raised

- The first stage of EBPM is understanding the needs of policymakers in terms of what policy questions they face.
- The second stage is choosing the right tool(s) from the menu.
 - Often, there is more than one alternative.
 - The choice should be dictated by policy questions.
 - Questions requiring ex-ante and ex-post analyses require different tools.
- Problems would arise if researchers choose the tools that are not appropriate to answer your questions.
 - Policymakers and researchers need to understand the advantages and disadvantages (limitations) of each tool.



Ex-ante and ex-post policy questions

Examples from the impact assessment of FTAs



Policy questions at different stages of policymaking

- Before negotiation of an FTA: An analysis of potential costs and benefits (ex-ante)
 - What a country can supply to its FTA partners? What it can source from the partners?
 - What are expected impacts on production and employment level and composition, welfare, fiscal balance, etc.
 - What are the costs of necessary adjustment policies for the adversely affected sectors?
- After its implementation: An impact assessment (ex-post)
 - Whether the impacts are within the expected range?
 - Whether the expected benefits are fully materialized?
 - Whether further adjustment policies are necessary?



Context of the questions and availability of resources dictate the choice of methodology

- Whether the focus is the impacts at macroeconomic level or industry level ?
- Whether ex-post questions or ex-ante questions are being asked?
- Whether the required data are available?
- How much time and resources (technology, human capital, and money) are available?



Which tools are available?

Examples from the impact assessment of FTAs



Available methodologies

- Simple indicators (descriptive statistics)
- (Sophisticated) econometric models
- Simulation techniques
 - A partial equilibrium model: sectoral analysis
 - A general equilibrium model: economy-wide analysis
- They are complementary with different strength/weakness and different (explicit and/or implicit) assumptions



Before start of FTA negotiation:

What are the potential effects of joining an FTA?



What will be the potential effects of an FTA?

1. Making inferences from trade indicators
2. Estimating the potential effects on an individual product
3. Estimating the potential effects on the whole economy



1) Making inferences from trade indicators

- How much of trade is intraregional?
 - Will the proposed FTA promote trade between trading partners? Are they then “natural” trading partners?
- What is the comparative advantage of each member?
 - Which sectors are likely to have export (import) potential?
- Is export of a particular good regionally oriented?
 - How strong is a regional bias (if there is one)?
- How complementary is trade between a given pair of FTA members?
 - To what extent the export pattern of a country matches the import pattern of a region?
- What is a degree of similarity between partners’ exports?
 - To what extent a country’s export profile overlaps with other FTA members?



Trade indicators

$$\text{Intraregional Trade Share}_i = \frac{T_{ii}}{T_i}$$

$$\text{Regional Orientation}_{cgr} = \frac{\left(\frac{X_{cgr}}{X_{cr}} \right)}{\left(\frac{X_{cg-r}}{X_{c-r}} \right)}$$

$$\text{Intraregional Trade Intensity}_i = \frac{\left(\frac{T_{ii}}{T_i} \right)}{\left(\frac{T_i}{T_w} \right)}$$

$$\text{Complementarity}_{cgr} = 1 - \left\{ \frac{\sum_{\vartheta} \text{abs} \left[\left(\frac{M_{rg}}{M_r} \right) - \left(\frac{X_{cg}}{X_c} \right) \right]}{2} \right\}$$

$$\text{Regional Trade Introversion Index}_i = \frac{(HI_i - HE_i)}{(HI_i + HE_i)}$$

$$\text{Export Similarity}_{cgr} = \sum_{\vartheta} \min \left[\left(\frac{X_{rg}}{X_r} \right), \left(\frac{X_{cg}}{X_c} \right) \right]$$

$$\text{Revealed Comparative Advantage}_{cg} = \frac{\left(\frac{X_{cg}}{X_c} \right)}{\left(\frac{X_{wg}}{X_w} \right)}$$

Note: The list is not exhaustive.



where

T_{ii} = exports of region i to region i plus imports of region i from region i

T_i = total exports of region i to the world plus total imports of region i from the world

T_w = total world exports plus total world imports, which can be twice the value of world exports or twice the value of world imports since the value of world exports should equal world imports

T_{oi} = exports of region i to outsiders plus imports of region i from outsiders

T_o = total exports of outsiders plus total imports of outsiders

$HI_i = (T_{ii} / T_i) / (T_{oi} / T_o)$ and $HE_i = [1 - (T_{ii} / T_i)] / [1 - (T_{oi} / T_o)]$

X_{cg} = exports of good g by country c

X_c = total exports of country c

X_{wg} = world exports of good g

X_w = total world exports

X_{cr} = total exports of country c to region r

X_{cg-r} = exports of good g by country c to countries outside region r

X_{c-r} = total exports of good g to countries outside region r

X_{rg} = exports of good g by region r

X_r = total exports of region r

M_{rg} = imports of good g by region r

M_r = total imports of region r



Requirements

- Bilateral trade data at different levels of aggregation

Possible data sources are, for example,

- UN Commodity trade (so called Comtrade) statistics database (access through [WITS](#) : World Integrated Trade Solution)
- IMF Direction of Trade Statistics ([DOTs](#))
- International Trade Centre: ([TRADEMAP](#))



Advantages

- Relatively easy to implement
 - Data requirements are minimal
 - Computation is straightforward
- Some of trade indicators may be found already computed. For example,
 - [WITS](#)
 - [International Trade Centre](#)
 - [World Bank](#)
 - [UNCTAD](#)
 - [APTIAD](#)
 - TRADESIFT



Limitations

- Interpretation is tricky.
 - Assuming no existing (discriminatory) distortion affects trade profile (structure)
- They cannot provide precise numbers that quantify the effect of an FTA on trade, production, consumption, or welfare.
- They can be meaningless or misleading if data are unsuitably classified.
 - Trade classifications do not match a country's production structure
 - Data are too aggregated



What will be the potential effects of an FTA?

1. Making inferences from trade indicators
2. Estimating the potential effects on an individual product
3. Estimating the potential effects on the whole economy



2) Potential impacts on an individual product

- How an FTA will affect production, consumption, and trade flows in the domestic market for a single commodity?
 - What will be an import increase?
 - What will be an export increase of FTA partners?
 - What will be an export decrease of non-member countries?
 - What will be a fall in tariff revenue?



2) Potential impacts on an individual product

- How an FTA will affect production, consumption, and trade flows in the domestic market for a single commodity?
- Reasons for focusing on an individual product:
 - Its trade is significant in the country's trade balance.
 - It generates substantial tariff revenue.
 - It employs a large share of the country's workforce.
 - Its output contributes significantly to GDP.
 - Firms in the sector may be important political players.
 - It may be located in an important region of a country.
- The in-depth analysis at the level of individual industry or product makes partial equilibrium (PE) approach more appropriate.



What is Partial Equilibrium (PE) analysis?

- The effects of policy actions are examined only in the markets that are directly affected (apples not oranges).
- Supply and demand curves are used to depict the price effects of policies.
- Producer and consumer surplus is used to measure the welfare effects on participants in the market.
- Ignores spillover effects on other industries /countries.



What is Partial Equilibrium (PE) analysis?

- General Assumptions:
 - Country is relatively small.
 - Sector in question is small.
 - No adjustment – short- term impact analysis.
 - Consumer preferences are fixed.
- **No long-term effects** (dynamic effects) such as growth or reallocation of production factors are taken into account.



When to use PE analysis?

- Impacts on trade flows.
- Impacts on domestic prices, government revenues.
- Impacts of change in trade policy in specific markets and products.
- Not good for multilateral liberalizations, e.g. Doha Round impacts.



PE for analyzing trade policies

- Feed the model with a policy shock (and see what will be a result?)
- Analysis of own trade-policy change impact
 - Price (consumers and producers)
 - Quantity imported (diversion and creation)
 - Tariff revenues
- Analysis of change market access impact
 - Quantity exported
 - Producers price



How does PE work?

An example from an analysis on tariff

Input:

- A change in trade policy (tariff)
- Parameters

Output:

- Effect on prices and quantities (volumes) traded
- Trade diversion effect
- Trade creation effect

Most PE software gives you only change in import and exports, but these come from change in prices and quantities.



PE - various effects

Due to tariff liberalization of country A with a partner country B

	Imports from B (tariff reduction)	Imports from A (no tariff reduction)	Domestic Production
Exporter substitution effect	↑	↓	-
Domestic substitution Effect	↑	↑	↓
Demand effect	↑	↑	↑
Total effect	↑	In theory ambiguous (depends on elasticities), in practice almost always ↓	In theory ambiguous (depends on elasticities), in practice almost always ↓



Software for PE analysis

SMART – *UNCTAD/World Bank WITS*

TRIST – *World Bank website – Excel*

GSIM – *(to be implemented in WITS)*



Software limitations

- Results depends on pre-defined elasticities
 - But these can be adjusted into the software
- Trade policy restricted to tariffs (taxes)
- Not well suited to assess policy related to other trade policies or costs
 - Non-tariff measures
 - Cost of compliance
 - Behind-the-border issues
 - Trade facilitations



How to treat non-traditional trade policy?

- Calculate an AVE and plug it into the software, but the policy needs to work the same as a tariffs
 - quotas (impact prices/quantities)
 - trade facilitation (impact prices/quantities)
- Directly calculate the effect of the policy/impediment on domestic prices, and or quantities exported or imported.
 - Build your own PE model, or econometrics



Advantages of using PE Analysis

- PE models can be used to compute trade impacts of trade policy at a very disaggregated level of statistical product classification.
 - This detailed level is very often the level at which trade liberalization and rule of origin in trade agreements are negotiated.
- Easier to implement than general equilibrium
- Less of a black box than general equilibrium
- Less intensive on data requirements
- Easy to change parameters and check for robustness to different assumptions



Limitations

- It ignores the inter-industry effects and the feedback effects of a trade policy change
 - One way to look at it is the short-run impacts of a policy change on a particular industry



What will be the potential effects of an FTA?

1. Making inferences from trade indicators
2. Estimating the potential effects on an individual product
3. Estimating the potential effects on the whole economy



3) Potential economy-wide impacts

- What are the macro-level impacts of an FTA (when interactions between all markets are accounted for)?
 - real GDP
 - trade balance
 - terms of trade
 - import and export prices in a particular sector
 - output and trade in different sectors within the country
 - national welfare (and where will these welfare effects come from?)
- The multi-sectoral trade liberalization makes CGE (Computable General Equilibrium) approach may be more appropriate
 - The direct effects of tariff reductions in individual markets
 - The indirect changes in related markets



What is CGE?

- CGE models are based on the fact that the different markets in a given economy are linked, and changes that take place in one market affects other markets; these changes must be accounted for as they can have back and forth impacts
- CGE models use Social Accounting Matrix (SAM) to capture these various linkages
 - SAM is built upon the circular flow conception of the economic system where each expenditure must be matched by a corresponding receipt or income.
- They take into account cross-sectoral reallocation of factors of production



PE vs. CGE

	CGE	PE
Capturing economy wide linkages	X	
Consistency wrt budget constraints	X	
Capturing disaggregated effects		X
Capturing complicated policy mechanisms		X
Use of timely data		X
Capturing short and med. term effects		X
Capturing long-term effects	X	
Past performance in projecting impacts		



When to use CGE?

- They are useful when sectors interact
 - through intermediate consumption, or
 - their competition for factors of production or for consumers
- ...when the focus is economy- wide impacts of a policy change
- ...when the focus is identifying winners and losers under a policy change

Note:

If the scope of a study is limited to a small sector or short-term impacts, building a partial equilibrium model may be more relevant

- It will be simpler and will allow entering into more details
- Price rigidity may play an important role (impact of a devaluation, short-term impact of trade policy on current accounts)



CGE models for trade policy analysis

- Production
- Consumption
- Government
- International trade

- Two families of models
 - Single country
 - Multi-country



CGE models for trade policy analysis

- Production
 - Several production sectors (to take into account trade policy impacts associated with factor reallocation across sectors)
 - Several production factors: capital, labour, land, natural resources
 - Substitution elasticities between factors and market structure determine supply elasticity



CGE models for trade policy analysis

- Production
- Consumption
 - A representative household allocating its (disposable) income among the goods and services available at the going market price
 - A representative household is assumed to be the owners of factors of production. Households supply their factors of production to firms at the going factor market prices—this determines the supply of factors of production and (indirectly) determines the demand for goods and services
 - The representative household spends its income on consumption of goods (and services) available at the going market price, paying taxes, and/or to save



CGE models for trade policy analysis

- Production
- Consumption
- Government
 - Implementing policy instruments (collecting taxes and tariffs, disbursing subsidies and purchasing goods and services)
- International trade
 - The substitutability between imports and domestic products
 - Export differentiated product(s) to other countries at the prevailing world prices
 - Trade policy changes in a country can affect the world prices and the terms of trade (the ratio of a country's export and import prices) thus the welfare of all other countries.



CGE models for trade policy analysis

- Production
- Consumption
- Governments
- International trade
- Instantaneous market clearing (prices are endogenous)
 - Demand for goods equals their supply, demand for imports equals supply of exports, and demand for factors of production equals the available endowments
 - The new equilibrium level of price-dependent variables can be determined: consumption, production, imports, exports, factor allocation, tax revenues, etc.



CGE models for trade policy analysis

- Production
- Consumption
- Governments
- International trade
- Instantaneous market clearing
- Compute the welfare impact of the trade policy experiment
 - Equivalent Variation (EV) = the amount of income that would have to be given to (or taken away from) the economy before the policy change to leave the economy as well off as the economy would be after the policy change



Limitations of CGEs

- Data requirements and computation complexity prevent from building very detailed models in terms of products
- They tend to be very complicated and inaccessible to non-experts
- To properly interpret the results, one needs to understand the assumptions and mechanisms that underlie the model, and the sensitivity of the results to those
- Most commonly used trade-CGE models are static in nature
 - A policy change such as an FTA is likely to directly affect dynamic phenomena such as capital flows, demographics, and growth rates of output
- An effort to capture dynamic effects is currently being made in the GTAP network.



Software for CGE analysis

GTAP – Global Trade Analysis Project

Major advantages: Multi-market and multi-regional model

Readily available data and software

Table 2.9 The GTAP Model, Free Trade Agreement Analysis, and Developing Countries

Item	Values and Variables	Notes on Implementation from a Developing Country Perspective
Assumptions in the GTAP Model	<p>The standard GTAP model is based on full employment, perfect competition, constant returns to scale, differentiation by national origin (the Armington assumption), and no dynamic effects. These characteristics are modeled with specific functional forms and equations.</p> <p>The modeler has to decide which closure to use (i.e., which set of variables to leave as exogenous). The standard GTAP closure leaves factor endowments, technology, and tax and subsidy rates as exogenous variables.</p>	<p>These characteristics may not prevail in developing countries. For examples of how to change the model to display more appropriate characteristics, see Elbehri and Hertel (2004) and Kitwiwattanachai, Nelson, and Reed (2010).</p> <p>For most FTA scenarios, the GTAP standard closure is appropriate. Exceptions are scenarios with technological changes, endogenous taxes and subsidies, or dynamic effects associated with investment and capital accumulation.</p>
Data included in the GTAP database	Version 7 includes trade, trade protection, and input–output data for 113 countries and 57 sectors from the reference year 2004.	If a developing country has more timely or reliable data, then it can supplement or replace the GTAP trade and trade barrier data used for the analysis.
Important parameters	Important parameters are: goods substitution elasticities, factor substitution elasticities, factor transformation elasticities, investment parameters, and consumer demand elasticities.	Chapter 14 of the GTAP 7 database documentation explains how these parameter values were estimated. Modelers may replace them with other more suitable values.
Output of the GTAP model	Aggregate level outputs are real GDP, trade, terms of trade, and welfare (with sources of welfare changes). Sectoral level outputs are output, trade, and prices.	These results should be subjected to a sensitivity analysis. The RunGTAP program provides this facility.

FTA = free trade agreement, GDP = gross domestic product, GTAP = Global Trade Analysis Project.

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Source: Plummer, Cheong, Hamanaka (2010)

After an FTA is ratified and implemented

Ex-post impact assessment



Ex-post policy questions

- Were the preferences utilized?
- Did the FTA raised welfare of the country in question?
- What were the channels of transmission of FTA-triggered trade flows changes to households' welfare?



Were the preferences utilized?

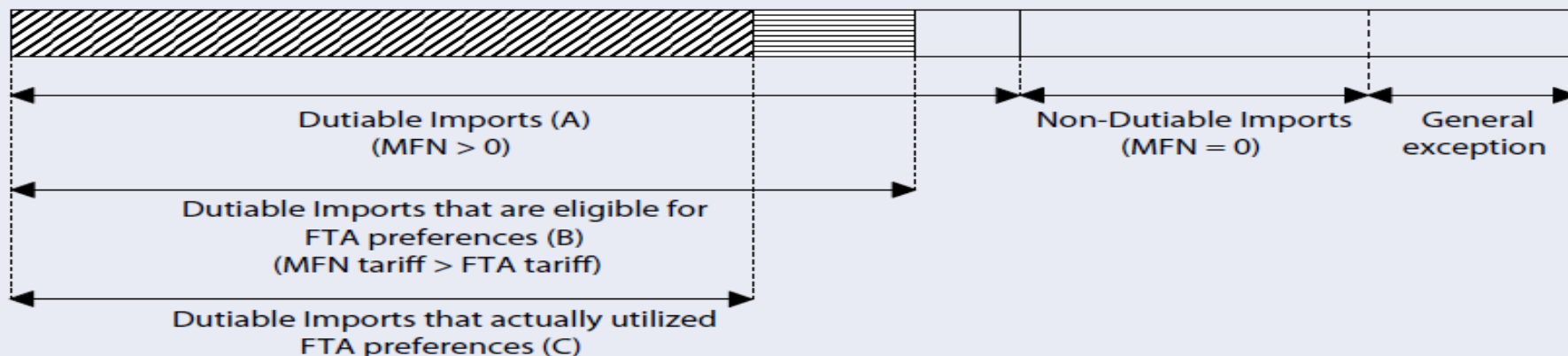
- Do preferences cover all or most of otherwise dutiable imports?
- Have traders used the preferences ? (what is the utilization rate?)
 - How high is the preferential margin and is it high enough to cover the compliance (e.g. RoOs) costs?



Preference indicators

- Preference margin – also known as MOP- (the attractiveness of a preferential regime relative to MFN treatment)
 - MFN-FTA tariff
 - The compliance cost has to be lower than the preference margin for exporters to utilize the preferences.

Figure 3.1 Structure of Imports and Formulas for Free Trade Agreement Preference Indicators



$$\begin{aligned}\text{Coverage Rate} &= B/A \times 100 \\ \text{Utility Rate} &= C/A \times 100 \\ \text{Utilization Rate} &= C/B \times 100\end{aligned}$$

FTA = free trade agreement, MFN = most favored nation.

Advantages and Limitations

- Useful summary measures
- Calculation is simple provided customs data is made available

But

- They do not identify the reasons behind the results

Thus,

- Firm survey may be used to fill the gap



Did the FTA raised welfare of the country?

- Qualitative evaluation
 - Based on Viner's concept of trade creation and trade diversion
- Quantitative evaluation
 - Trade volume and terms of trade indicators
 - Gravity model of trade (an econometric approach)



Did the FTA raised welfare of the country?

- **Qualitative evaluation:** Changes in domestic production and trade affect welfare (based on the Viner concept)
 - + inefficient domestic production is replaced by efficient imports from FTA members.
 - efficient imports from the rest of the world are replaced by inefficient imports from FTA members.



Did the FTA raised welfare of the country?

- Qualitative evaluation
- Quantitative evaluation
 - Trade volume and terms of trade indicators
 - Gravity model of trade



Trade volume and terms of trade indicators

- Based on Lloyd and MacLaren (2004) the general equilibrium model of an FTA, the welfare of a member depends on changes in
 - Trade volume,
 - Intra-union terms of trade,
 - Extra-union terms of trade.
- A country's welfare increase if its trade volume and terms of trade improve after the FTA implemented.
- It use observed trade data and the unit value of exports and imports to compute those changes.



$$\text{Change in Trade Volume} = \sum_p t_{mp} u_{mp}^0 (m_p^1 - m_p^0)$$

p indicates a partner country

t_{mp} is the import-weighted ad valorem tariff on imports from partner country p in the base period

u_{mp}^0 is the unit value of imports from partner country p in the base period

m_p^1 is the quantity of imports from partner country p in the new period

m_p^0 is the quantity of imports from partner country p in the base period

$$\text{Change in Terms of Trade} = \sum_p x_p^0 (u_{xp}^1 - u_{xp}^0) - \sum_p m_p^0 (u_{mp}^1 - u_{mp}^0)$$

p indicates a partner country

x_p^0 is the quantity of exports to partner country p in the base period

u_{xp}^1 is the unit value of exports to partner country p in the new period

u_{xp}^0 is the unit value of exports to partner country p in the base period

m_p^0 is the quantity of imports from partner country p in the base period

u_{mp}^1 is the unit value of imports from partner country p in the new period

u_{mp}^0 is the unit value of imports from partner country p in the base period

Advantages and Limitations

- It allows quantifying trade and welfare effects.
- It is backed up by a theoretical general equilibrium model.

But,

- An implicit assumption is that the FTA is the sole driver of those changes.
- A potential solution is comparing the actual value with the counterfactual value (i.e. what would happen if there was no FTA?).
 - Estimating extrapolated values with pre-FTA growth rates.
 - An assumption is the impact of all factors besides the FTA on the trend would be the same regardless of the FTA.



Did the FTA raised welfare of the country?

- Qualitative evaluation
 - Based on Viner's concept of trade creation and trade diversion
- Quantitative evaluation
 - Trade volume and terms of trade indicators
 - Gravity model of trade



Gravity Model of Trade

- The gravity model is an econometric method of estimating trade flows.
 - Tinbergen (1962) compared the size of bilateral trade flows between any two countries to the gravitational force in physics between two objects.
 - Since then, many theoretical models that yield the gravity equation for trade has been produced.
- It was used to analyze the impact of FTAs, GATT- WTO membership, TBTs, NTBs, currency unions, etc. on trade flows.
- The main advantage is that it can control for the effects of other trade determinants besides the FTA, and can therefore isolate the effects of the FTA on trade.



Gravity Model of Trade

The basic gravity model of trade relates the imports of country i from country j (M_{ij}) positively to the sizes of the two countries (Y_i and Y_j), but negatively to the geographical distance between them (D_{ij}):

$$M_{ij} = G \frac{Y_i Y_j}{D_{ij}}$$

$$\ln M_{ij} = G + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + u_{ij}$$

The theoretical work on the gravity equation has emphasized that bilateral trade is not only a function of distance, but also the relative trade costs of the pair from other countries.

- Anderson and van Wincoop (2003) concept of “**Multilateral Trade Resistance (MTR)**”. The higher the MTR, the more the pair of countries should trade with each other and vice versa.

$$\ln M_{ij} = G + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + MTR_i + MTR_j + u_{ij}$$



Gravity Model of Trade

$$\ln M_{ij} = G + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + MTR_i + MTR_j + u_{ij}$$

Several approaches to proxy the MTR:

- One is to use iterative methods to construct the estimates of the price-raising effects of barriers to multilateral trade (Anderson and van Wincoop, 2003).
- A simpler alternative is to control for each country's "remoteness" by using a formula that measures its average distance to trading partners.
- An even simpler –and widely used– method consists of using country fixed effects for importers and exporters (Rose and van Wincoop, 2001).



Using the gravity model for an FTA analysis

- At the aggregated level, gravity equations have been used extensively to assess, ex post, the effect of FTAs.
 - One of the seminal contributions in this area being Frankel, Stein and Wei (1995).
- The crudest way to do so is to include a “dummy” (zero/one) variable marking pairs of countries linked by the FTA in the set of gravity regressors.



An example

$$\ln M_{ij}^t = G + \beta_1 \ln Y_i^t + \beta_2 \ln Y_j^t + \beta_3 \ln D_{ij} + TradeCreate + TradeDivert + MTR_i + MTR_j + YEARS + u_{ij}^t$$

TradeCreate = 1 when both the importing and exporting countries are members of the FTA in year t (Otherwise, *TradeCreate* = 0)

TradeDivert = 1 when the importing country is a member of the FTA in year t , but the exporting country is not. (*TradeDivert* = 0)

Note:

TradeCreate measures trade creation, while *TradeDivert* measures trade diversion.



Advantages

- Data for the gravity model is widely available.
- The model has a high level of explanatory power.
- Although a theoretical gravity model could be complicated, there are established standard practices that facilitate the work of researchers.
- It allows controlling for other trade-related variables and quantify any changes in a country's trade due to the FTA.
- These quantitative estimates may then be used in welfare calculations.



Cautions and Limitations

Quantitative results should not be over-sold because the econometric technique has its own limitations.

- The model may yield misleading results if the data is inaccurate, or important variables are omitted from the estimation.
- The fact that FTA membership are likely to be endogenous to trade flows make the estimation is prone to endogeneity problem
 - Natural trading partners are more likely to form FTAs if governments decide to form them on welfare grounds.
- Results may differ depending on whether or not zero trade flows are included in the dataset.
 - Potential solutions are increasingly discovered by the literature



Conclusions

- A tour d'horizon of some of widely used tools for EBPM.
- There is more than one answer to a policy question. The choice is dictated by:
 - Policy questions
 - Data availability
 - Technical capability of research institutes
 - Time and resources
- Alternative model, sometimes, give conflicting results, but they are actually complementary.
 - Understanding underlying assumptions the tools is the key to properly interpret the research results
- To get the research-based evidence relevant to policy decisions, policymakers could play important roles:
 - Communication between researchers and policymakers to make research more relevant to policymakers' needs
 - Improve data accessibility
 - Building technical capacity of local research institutes



Thank you!

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Annex



Software for PE analysis

SMART – UNCTAD/World Bank WITS

Trade creation – Trade Diversion - Revenues

Major advantage: QUICK! data needed is already in WITS

Features:

- Tariff fully reflects on price ($P_{ijk} = P_w (1 + T_{ikj})$)
- No demand effect, demand is fixed.
- Quantities are calculated on the basis of pre-defined elasticities
 - Import demand elasticity (pre defined)
 - Export supply elasticities (infinite or fixed)
 - Substitution elasticities across varieties (computed from trade and price data)
- Trade creation = Change in tariffs * Imports * d. elasticity
- Trade diversion = Imports * tariff gap * subst elasticities.
- Revenues = change in tariffs * quantities.



Software for PE analysis

TRIST – *World Bank website - Excel*

- Provides effects of trade policy reforms on *revenues, imports and prices*
- Major advantage: Based on data for actually collected revenue so collection efficiency and exemptions can be taken into account, includes revenues on VAT and excise tax (surcharges).
- Disadvantage: Underlying data is provided only for few countries.
- Allows for change in domestic demand due to lower prices



Software for PE analysis

- **GSIM** (to be implemented in WITS)
 - Better treatment of World Market
 - SMART: heterogeneous products (NZL apples exported to EU are different than these exported to the US)
 - GSIM: models world market for each product
 - Implications
 - World prices are endogenous (change in demand due to trade policy affects world prices)
 - if demand of good g increases, it is not supplied only from the country where tariff has been reduced but from other countries as well.
 - Homogeneous varieties (NZL apples are the same, wherever exported)

