Analysis in SMART

Analysing of Tariff Changes Using the Single Market Partial Equilibrium Simulation Tool (SMART)

Structure of the Session

1. Presentation on economic modelling and the SMART model
2. Recap of WITS
3. Description of SMART software
4. Everyone working on problems together
5. Everyone working on problems separately
6. Elasticities and GSIM

Ex Ante Analysis of Tariff Liberalisation

Question

What will be the impact of changing certain tariffs ?

- On trade flows, tariff revenue, welfare etc. from bilateral partners

Methods

1. Indicators to give a general picture (done yesterday)

2. Economic Modelling for detailed predictions

- a) Partial Equilibrium (e.g. SMART, today)
- b) General Equilibrium (doing next 3 days)

Economic Modelling

- Create a model for the economy using economic theory and assumptions

  - Consider different economic actors (households, industries) and activities (production, sales)

- Calibrate the model with real life data

- Change one model parameter, and explore the consequences

Economic Modelling

A very simple example:

- Model (based on economic theory and assumptions):
  - Consumers purchase fruit
  - The amount purchased depends on the price
  - A 1% increase in price decreases the amount purchased by 1%
- Real life data:
  - Amount purchased in 2016 = 100 pieces of fruit
  - Price = $10

Economic Modelling

A very simple example:

- How much fruit will be purchased if the price increases to $12?
  - Price increase = 20%
  - By the model, purchases will decrease by 20%
  - 0.2*100 = 20
  - Hence purchases are predicted to fall to 80 pieces (= 100 - 20)

Economic Modelling

- Two different types of models are partial equilibrium and general equilibrium

- The main difference in these is scope

- SMART is an online software which is based on a partial equilibrium model

- GTAP uses a general equilibrium model
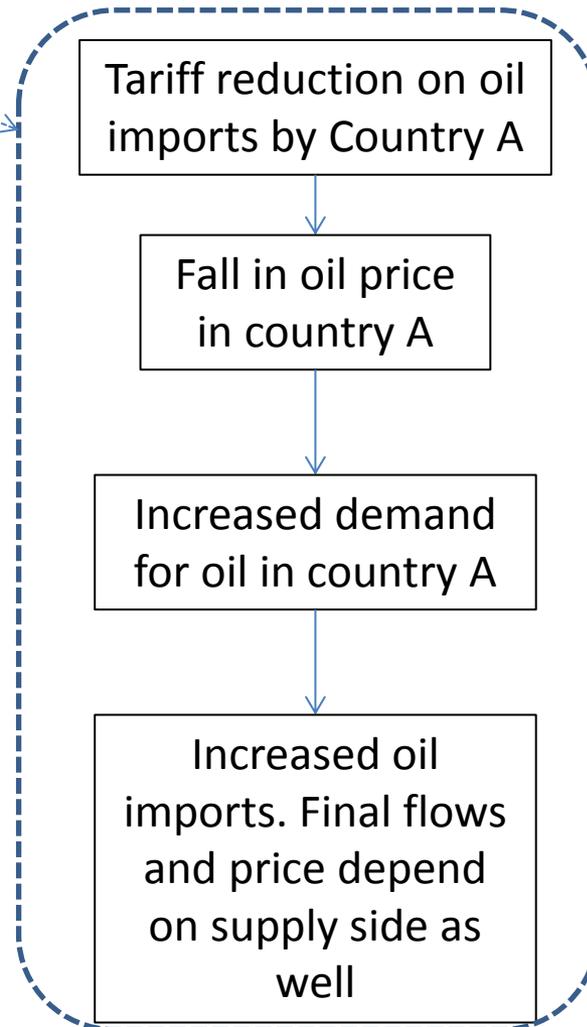
Partial Equilibrium Analysis

- Partial equilibrium means that the analysis only considers one specific market.
  - I.e. It only looks at one good

- Economic interactions with other markets are excluded from the analysis

- The example just given is a very simple partial equilibrium model.
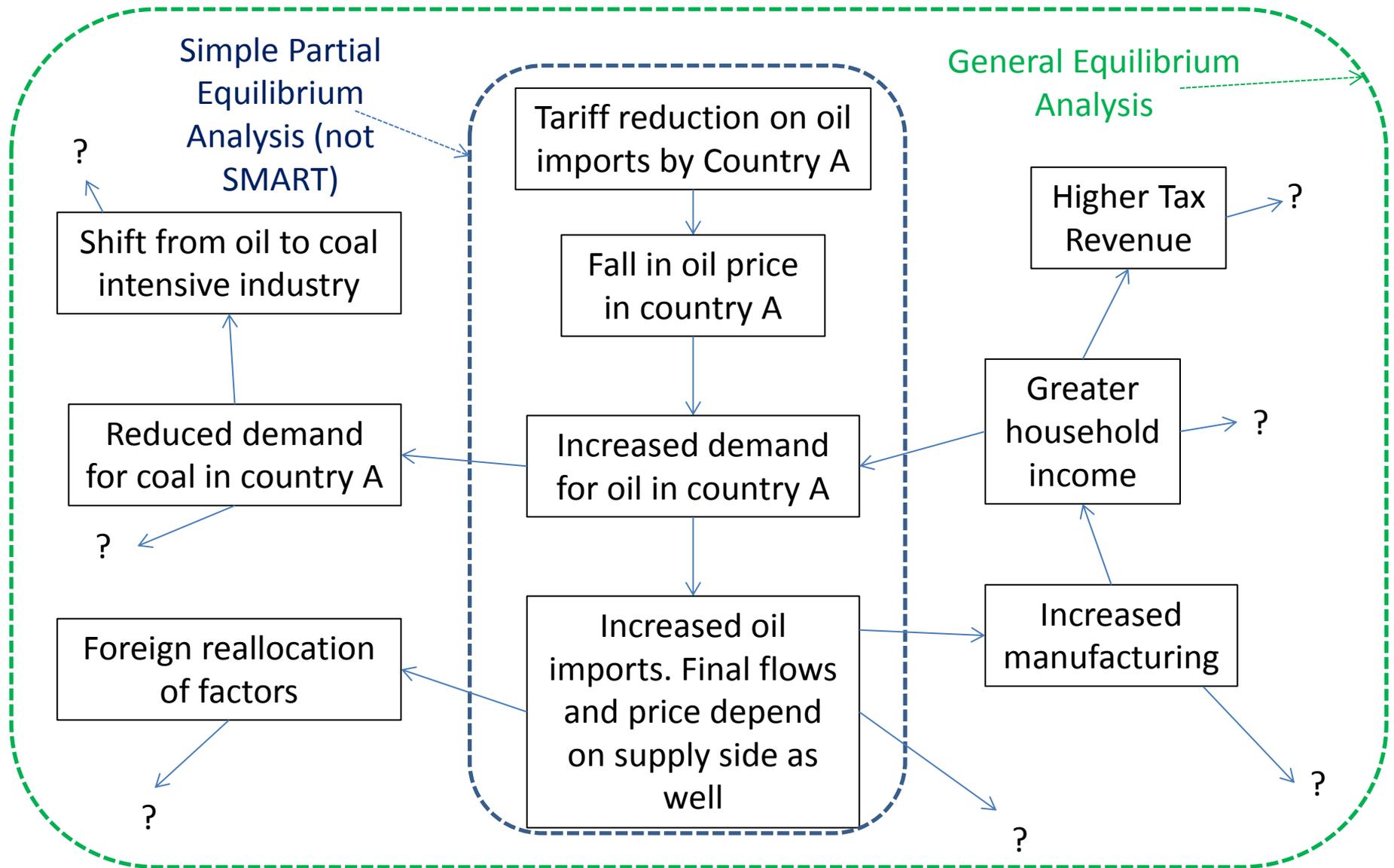
General Equilibrium Analysis

- General equilibrium means that the entire economy is modelled as well as possible

- Linkages between markets are captured
  - Goods used as inputs for production (forward and backwards linkages)
  - Goods being substitutes for one another
  - Factors of production (labour, capital) receiving income from production
  - Etc.

- A powerful general equilibrium model is provided by GTAP (see next sessions)

Tariff Reduction In An Oil Market

Simple Partial
Equilibrium
Analysis (not
SMART)

Tariff reduction on oil
imports by Country A

↓

Fall in oil price
in country A

↓

Increased demand
for oil in country A

↓

Increased oil
imports. Final flows
and price depend
on supply side as
well

Tariff Reduction In An Oil Market

Simple Partial Equilibrium Analysis (not SMART)

General Equilibrium Analysis

?

Shift from oil to coal intensive industry

Tariff reduction on oil imports by Country A

Higher Tax Revenue

?

Fall in oil price in country A

Reduced demand for coal in country A

?

Increased demand for oil in country A

Greater household income

?

Foreign reallocation of factors

Increased oil imports. Final flows and price depend on supply side as well

Increased manufacturing

?

?

?

Why Use Partial Equilibrium Analysis?

1. *Simplicity*
   - Minimal data requirement (good for countries with limited data)
   - Speed of use (good for limited timeframe)

2. *Disaggregated Analysis*
   - Available general equilibrium models break down the economy into very few groups (57 for GTAP). Effects are estimated for whole sectors (e.g. fish)
   - In contrast, SMART can look at very detailed markets (e.g. Yellowfin tunas)

When to Use Partial Equilibrium Analysis?

So use SMART when:

1. You don't have the data for GTAP

   - E.g. One party to an FTA doesn't have input-output tables/ social accounting matrices

2. You don't have the time for GTAP

   - E.g. Initial exploratory analysis

3. You want to look at a specific product

   - E.g. The effect of a specific tariff removal

The SMART Model: Single Market

- The SMART software uses a simple partial equilibrium model

- SMART only looks at one market at a time
  - I.e. one product/ good

- The SMART model looks at a single importer ('home'), and its relationship with every country from which it imports the product ('exporters')

- What happens if the home country changes a tariff one of the exporters?
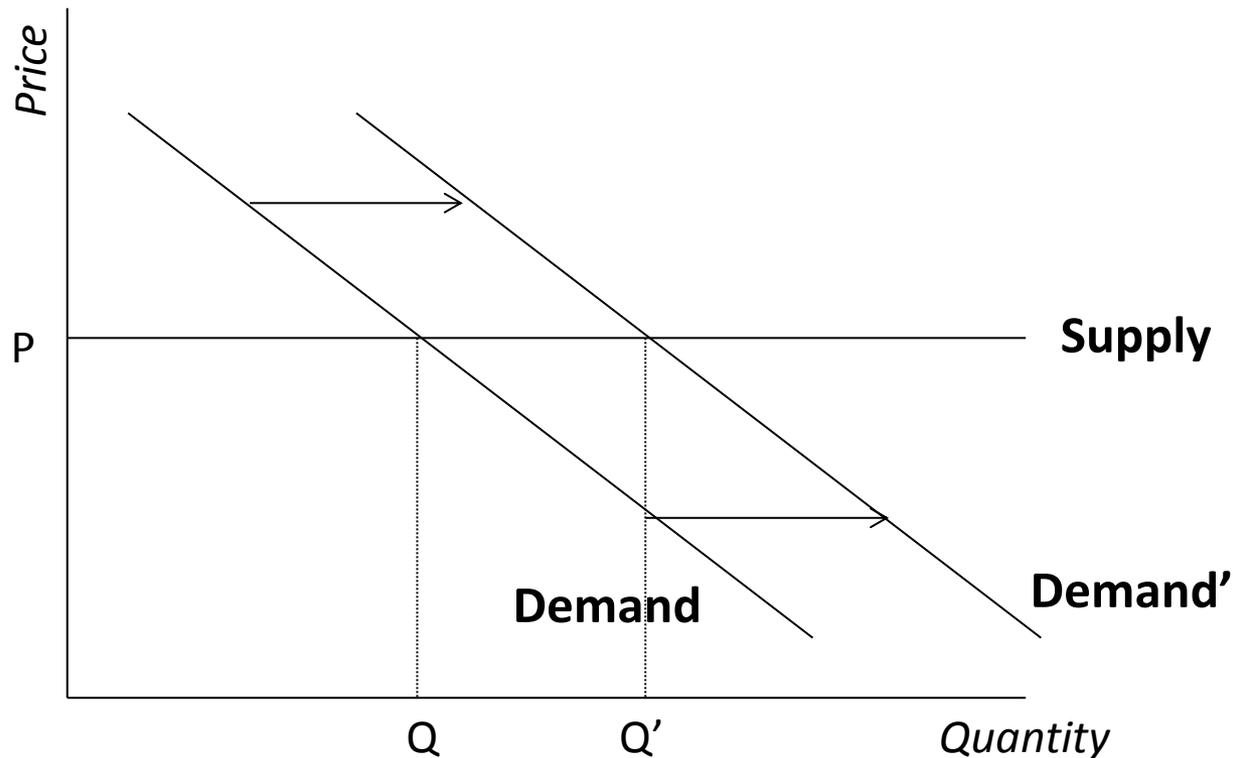
The SMART Model: Supply Side

- On the supply side, different countries compete to supply the product to a given home market
  - Each country provides a different 'variety' of the same good (e.g. Thai tuna, Maldives tuna)

- Supply of a good from an exporter depends on the price that exporter faces
  - All face the world price (normalised to 1 initially)

- The responsiveness of supply to the price is given by the export supply elasticity:
  - % increase in supply given 1% increase in price

The SMART Model: Supply Side

Market for Tuna
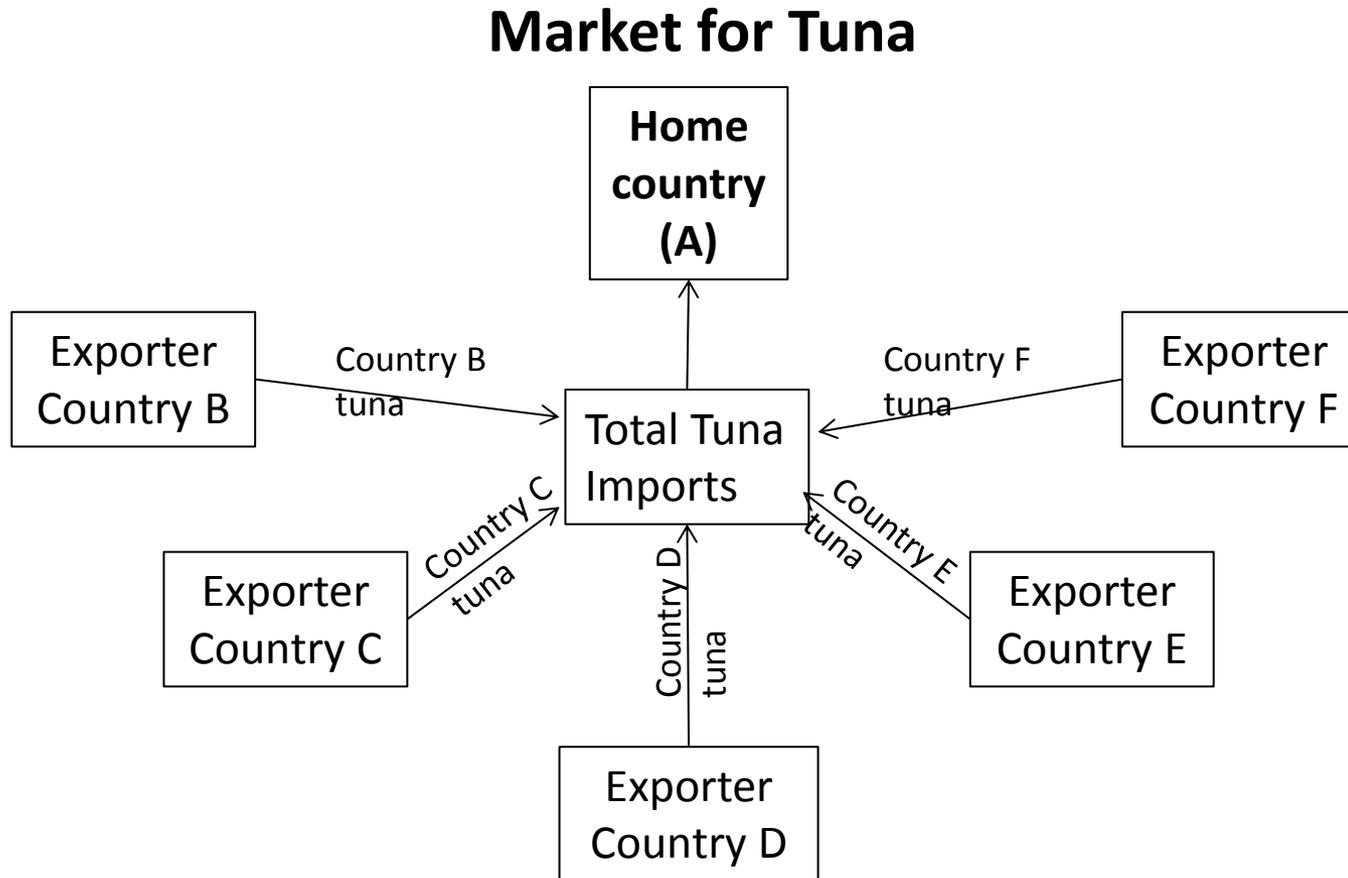
The SMART Model: Supply Side

- SMART assumes an infinite export elasticity

- Quantities traded are demand-determined. Exporters will increase supply to meet increased demand

The SMART Model: Supply Side

- SMART can also use an finite export elasticity
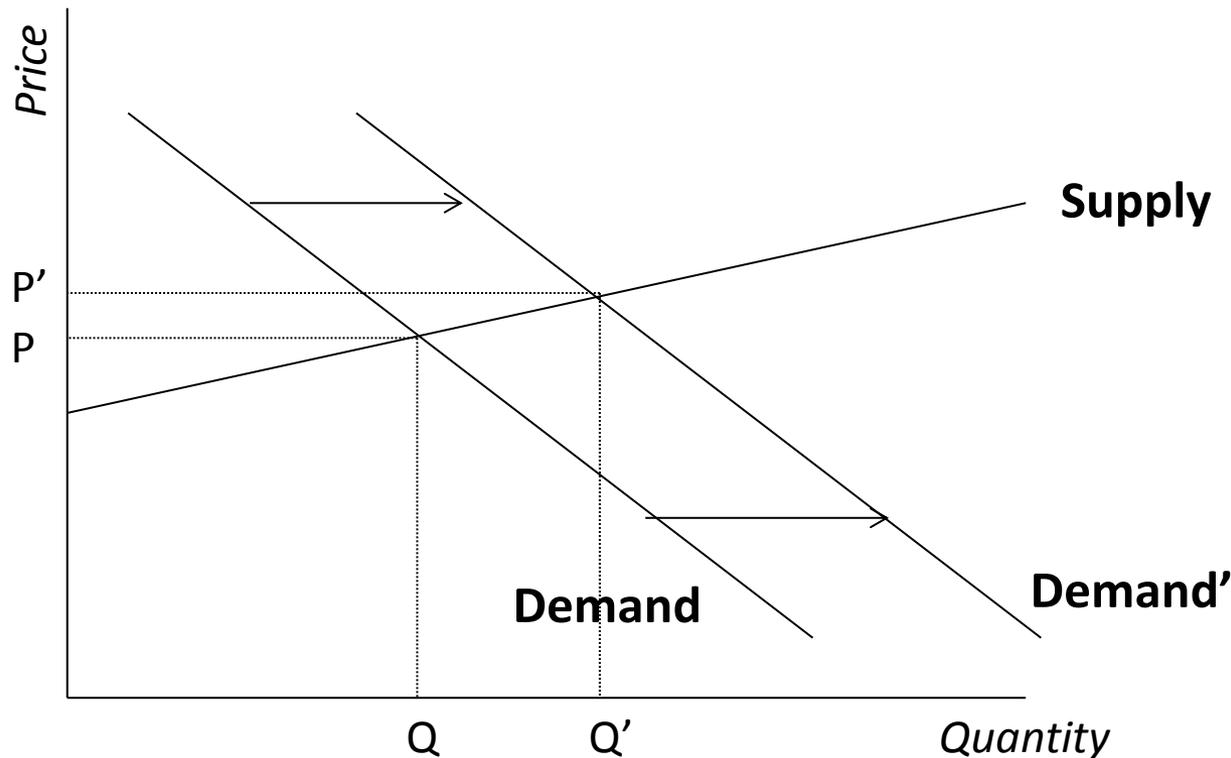
- Changes in demand have price effects. This leads to new problems though (see later)

The SMART Model: Supply Side

- When is an infinite import elasticity justified?

  1. When the key exporters are large compared to the importer

  2. When the importer is a small market for the product

  3. When changes are relatively small

The SMART Model: Tariff Wedge

- Tariffs drive a wedge between the export and import price

- Exporters face the world price for their good (normalised to 1 for all varieties)

- Importers face different prices from each country (i.e. for each variety) due to tariffs:
  - $P^i = 1+t^i$ for each variety i

The SMART Model: Tariff Wedge

- 2 country example – importer and exporter

Price

$P^i=1+t^i$

Tariff wedge

$P^w=1$

Supply

Demand

Q

Quantity
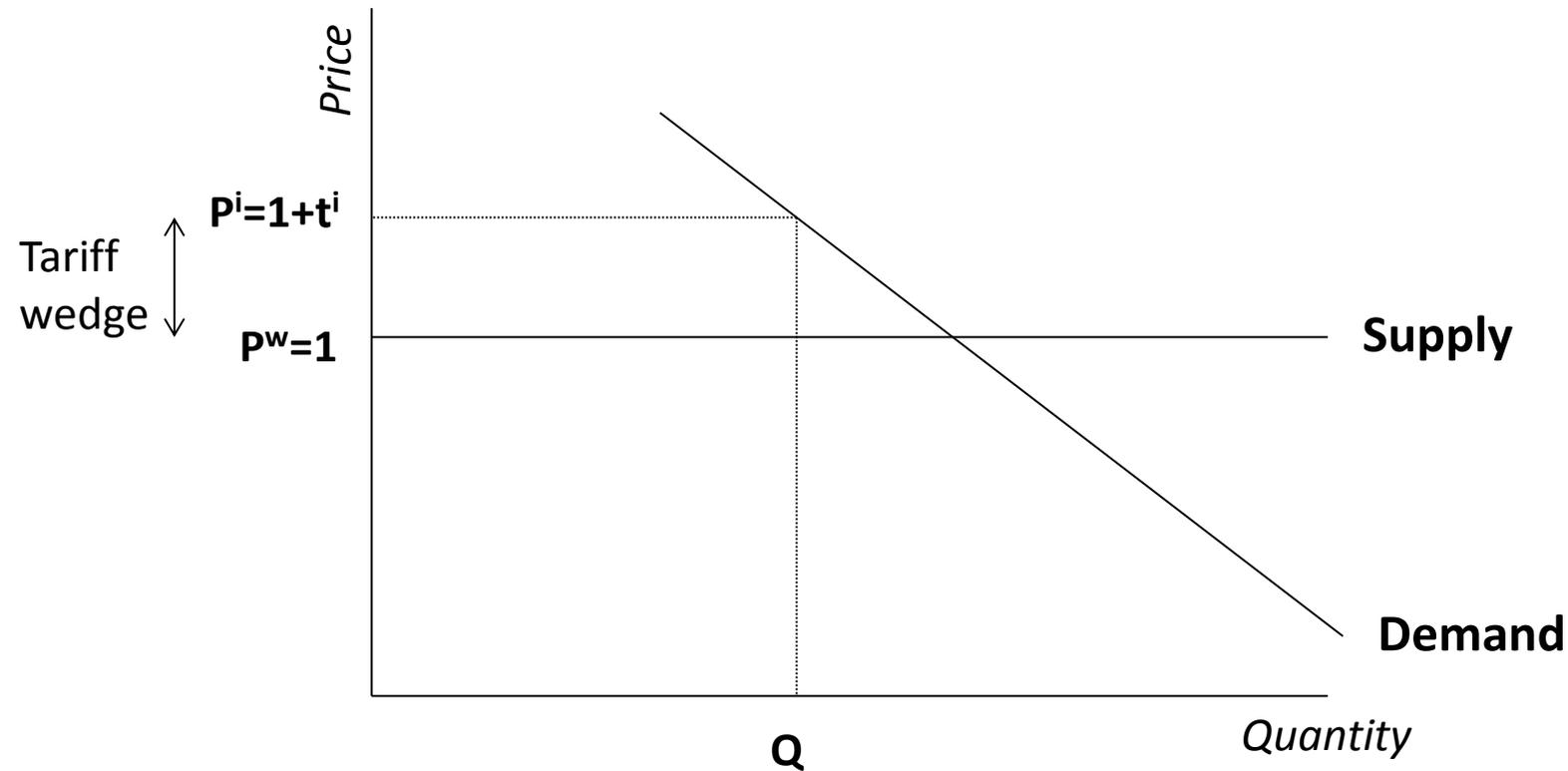
The SMART Model: Demand Side

- A key assumption on the demand side is the Armington/ Substitution assumption
  - Goods from different sources (different varieties) are imperfect substitutes
  - People have a 'preference for variety'
  - People buy similar cars from Japan and from Germany despite different prices. A matter of taste
- Key outcome: Consumers will not just import everything from the cheapest destination
  - Tuna from Thailand may be cheaper than from the Maldives, but consumers will still import some from the Maldives

The SMART Model: Demand Side

Two step consumer optimisation process:

1) Given a general price index (think of a weighted average price), consumers choose the demand for the good

   - i.e. for all 'varieties' together. E.g. Tuna

   - Import elasticity: % increase in demand given 1% fall in the price index

   - The import elasticity is pre-calculated by SMART

The SMART Model: Demand Side

Two step consumer optimisation process:

2) Within the composite good, consumers allocate spending across the varieties

- e.g. Import 50% of Tuna from Thailand, 30% from the Maldives, etc.

- Armington/ substitution elasticity: % change in relative demand of varieties given 1% change in relative price

The SMART Model: Summary

Supply Side

- Exporters compete to supply the home country with a good

- Supply depends on price: export elasticity

Demand Side

- Home country total demand for a good depends on price index: import elasticity

- Home country relative demands depends on relative prices: Armington elasticity

How SMART uses the model

Required Inputs

- Values for the 3 elasticities (export, import and Armington/ substitution) for the product

- Data on current (most recent) tariffs applied by the importer on each exporter for the product

- Data on current (most recent) bilateral flows of the product

- The scenario of interest ('counterfactual')
  - E.g. Removing a 20% tariff on country B

How SMART uses the model

What the SMART software does

1. Calculates the % change in the price of each variety and the price index under the scenario

   – E.g. The price of variety B falls by (20/120)%. Every other price remains constant

2. Using the 3 elasticities, calculates the % change in each bilateral trade flow

3. Using the actual trade data, calculates the actual change in each bilateral trade flow
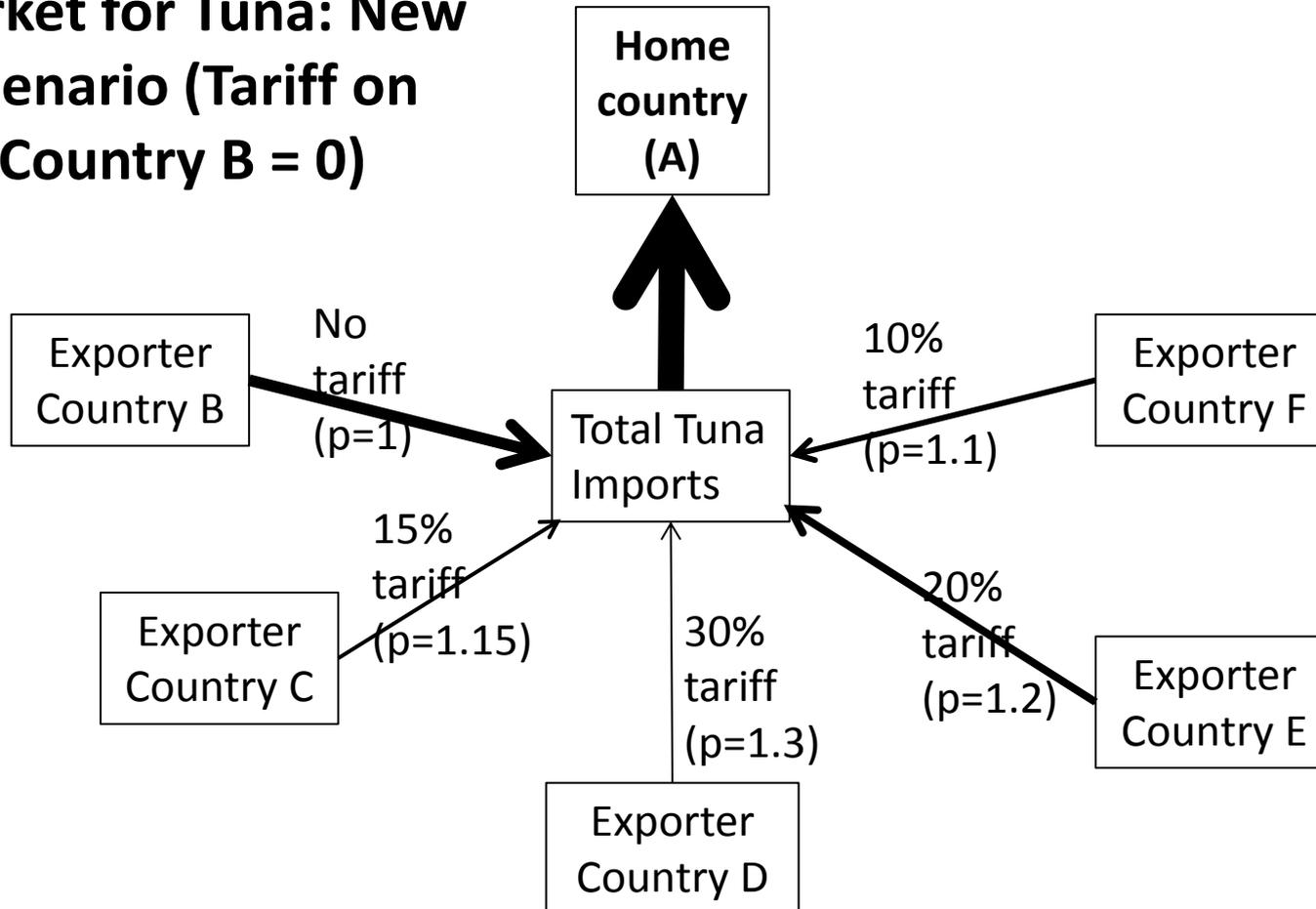
Using the model

Market for Tuna:
2014 Data

Home country (A)

Exporter Country B — 20% tariff (p=1.2) → Total Tuna Imports

Exporter Country F — 10% tariff (p=1.1) → Total Tuna Imports

Exporter Country C — 15% tariff (p=1.15) → Total Tuna Imports

Exporter Country D — 30% tariff (p=1.3) → Total Tuna Imports

Exporter Country E — 20% tariff (p=1.2) → Total Tuna Imports
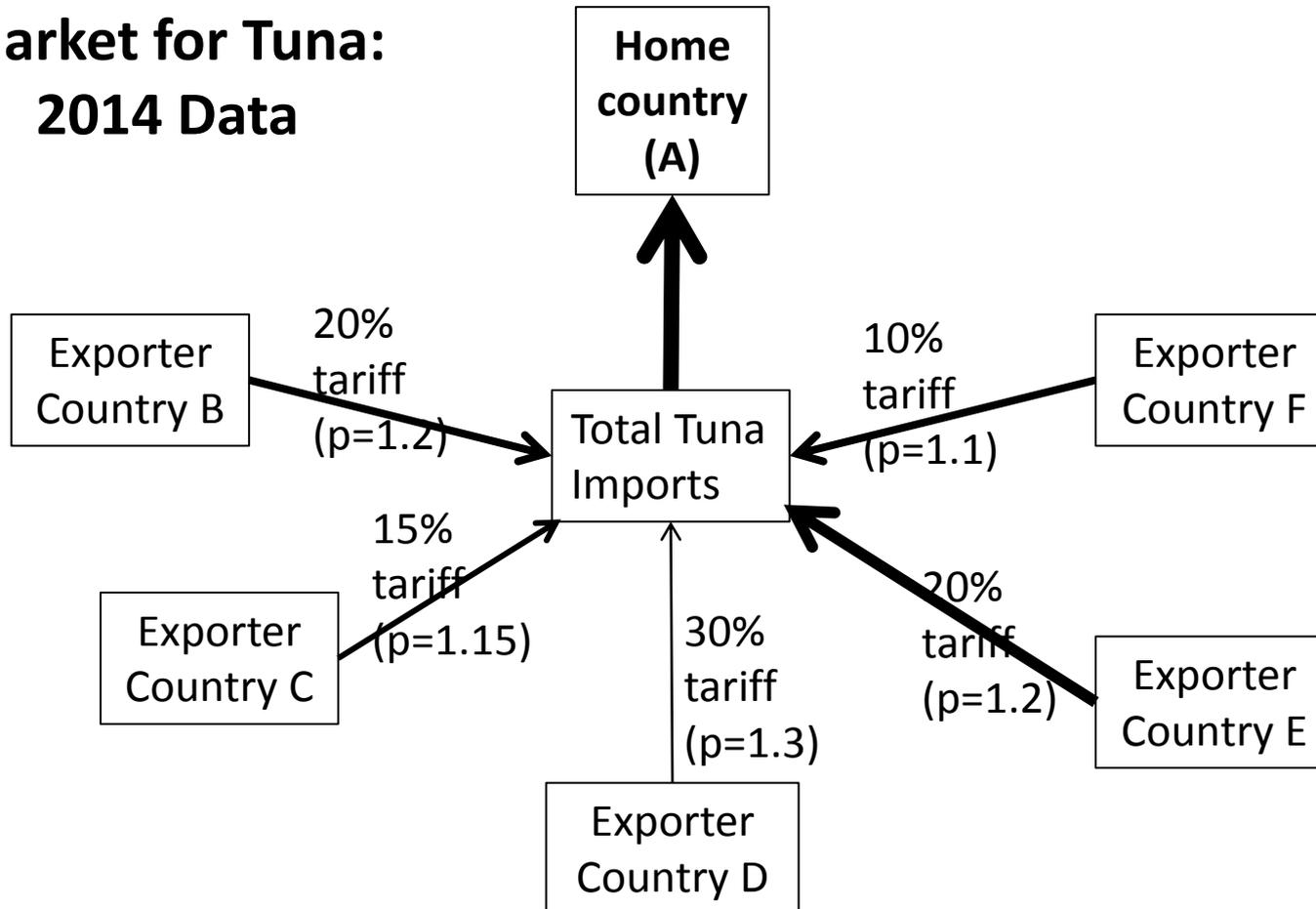
Using the model

Market for Tuna: New Scenario (Tariff on Country B = 0)

Counterfactual Vs. Forecast

- Technically, this is counterfactual analysis:
  - What would have changed if tariffs were different
- Not quite the same as forecasts:
  - Forecasts estimate how things will change
  - Counterfactuals explore how things would have been different in the past, given certain changes
  - Forecasts may look at long and short term effects
  - Counterfactuals look at the long term equilibrium
- Selecting a recent year means the difference is limited

SMART Results

- SMART calculates more than just changes in bilateral flows:

  1. Trade Effect: the change in bilateral flows
     - Split into creation, diversion and price effects

  2. Tariff Revenue Effect: Change in Government Revenue

  3. Welfare effect: Change in Consumer Welfare

SMART Results - 1. Trade Effect

- Trade Creation Effect: Extra trade due to a reduction in the import price index

- Trade Diversion Effect: Trade substitution due to asymmetric tariff changes
  - I.e. Imports which were sourced from country C which are now sourced from country B
  - Not quite the normal trade diversion definition

- Price Effect: Increase in trade value due to increase in world price for exports
  - Only if export elasticity is finite

SMART Results - 1. Trade Effect

- Normal trade diversion definition:
  - *'trade is diverted from a **more efficient** exporter to a **less efficient** one by the formation of a free trade agreement or customs union'*
- Difference:
  1. Efficiency is not taken into account in SMART. Diversion can be from a less efficient exporter to a more efficient one
 2. The Armington elasticity assumption means that the exporter with the lowest price will not capture all trade

SMART Results - 1. Trade Effect

Standard Trade Creation and Diversion Summary: *the net trade effect depends on whether the loss of efficiency due to diversion (green rectangle) is greater or less than the gains in efficiency (grey triangles).*
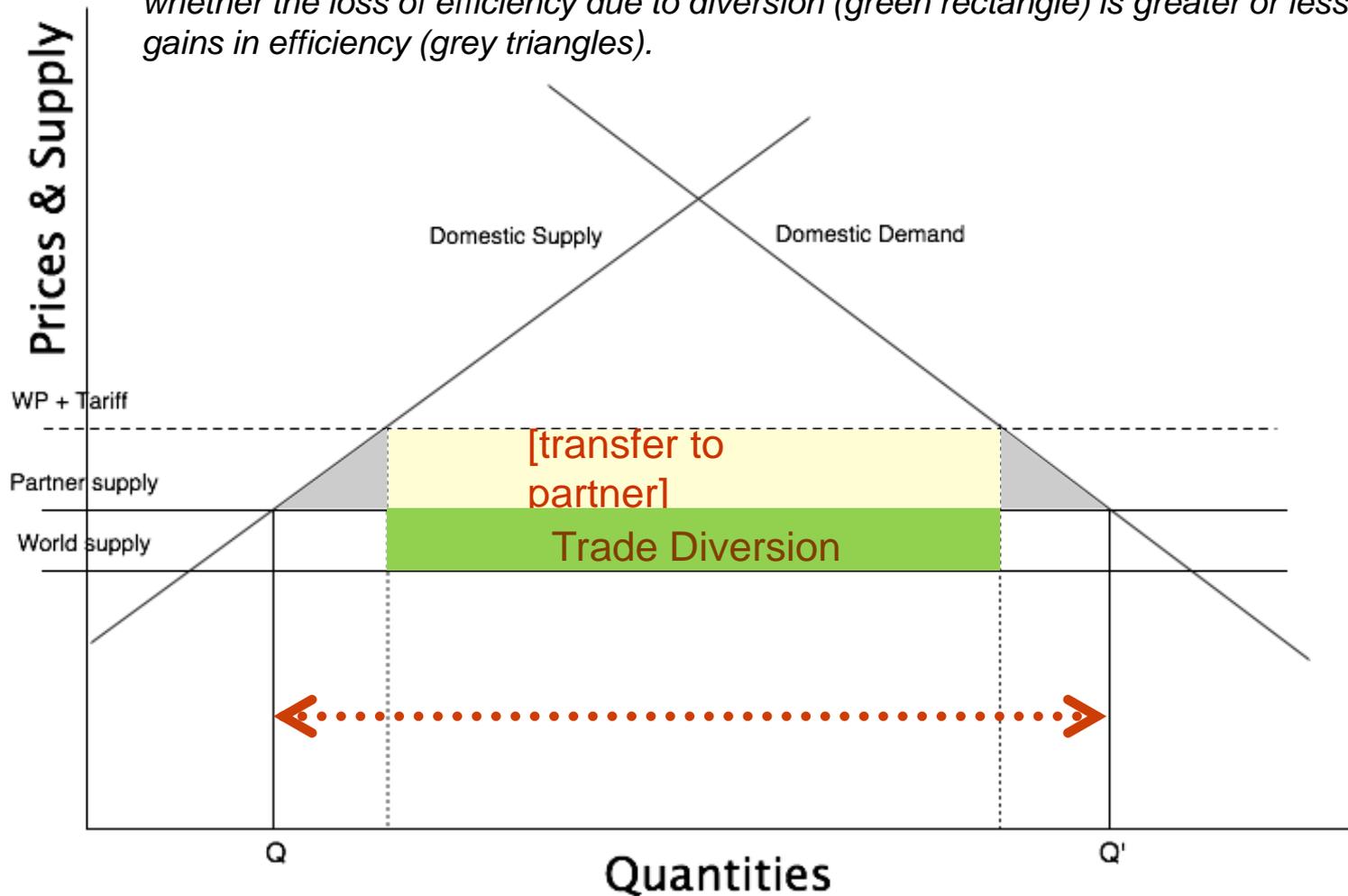
SMART Results - 1. Trade Effect

SMART Trade Diversion and Creation Summary: *Trade diversion occurs due to a relative price change, while trade creation is due to a revenue effect*
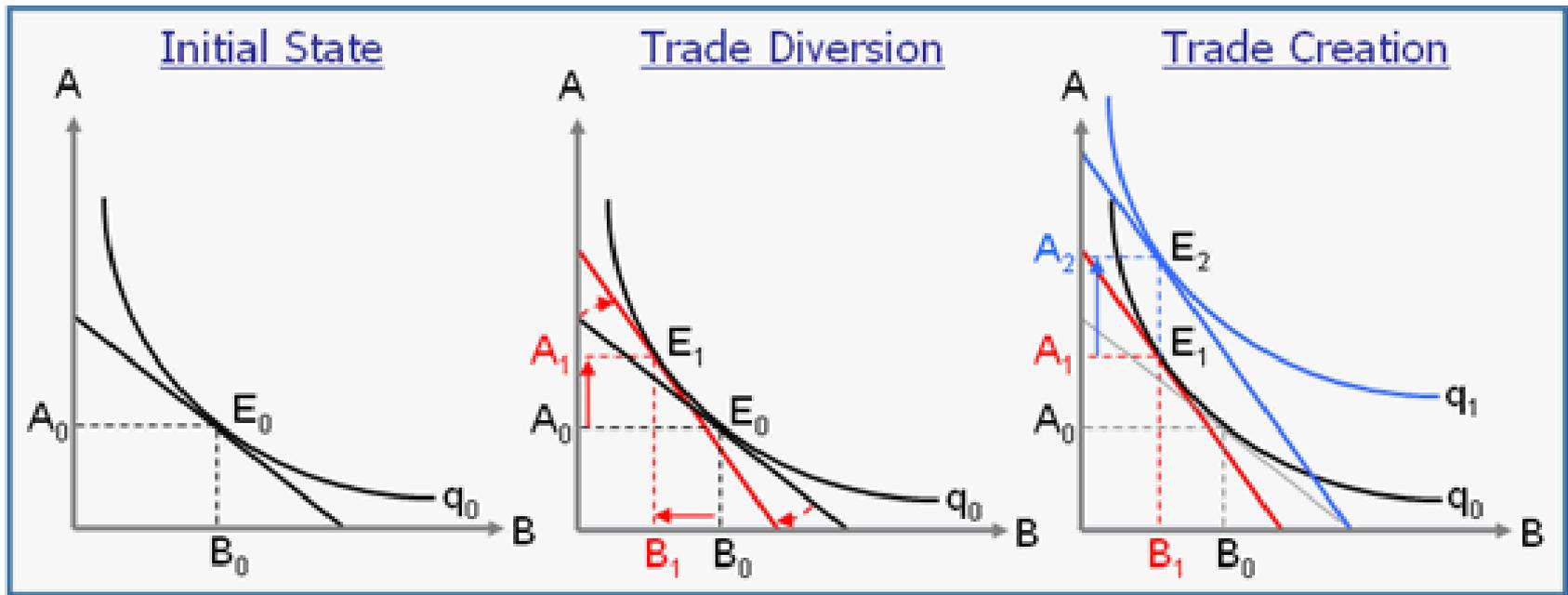
SMART Results - 2. Revenue Effect

- A reduction in tariffs:

    1. Decreases government revenue per import unit

    2. Increases import units

    3. Causes substitution from higher tariff countries to lower tariff countries

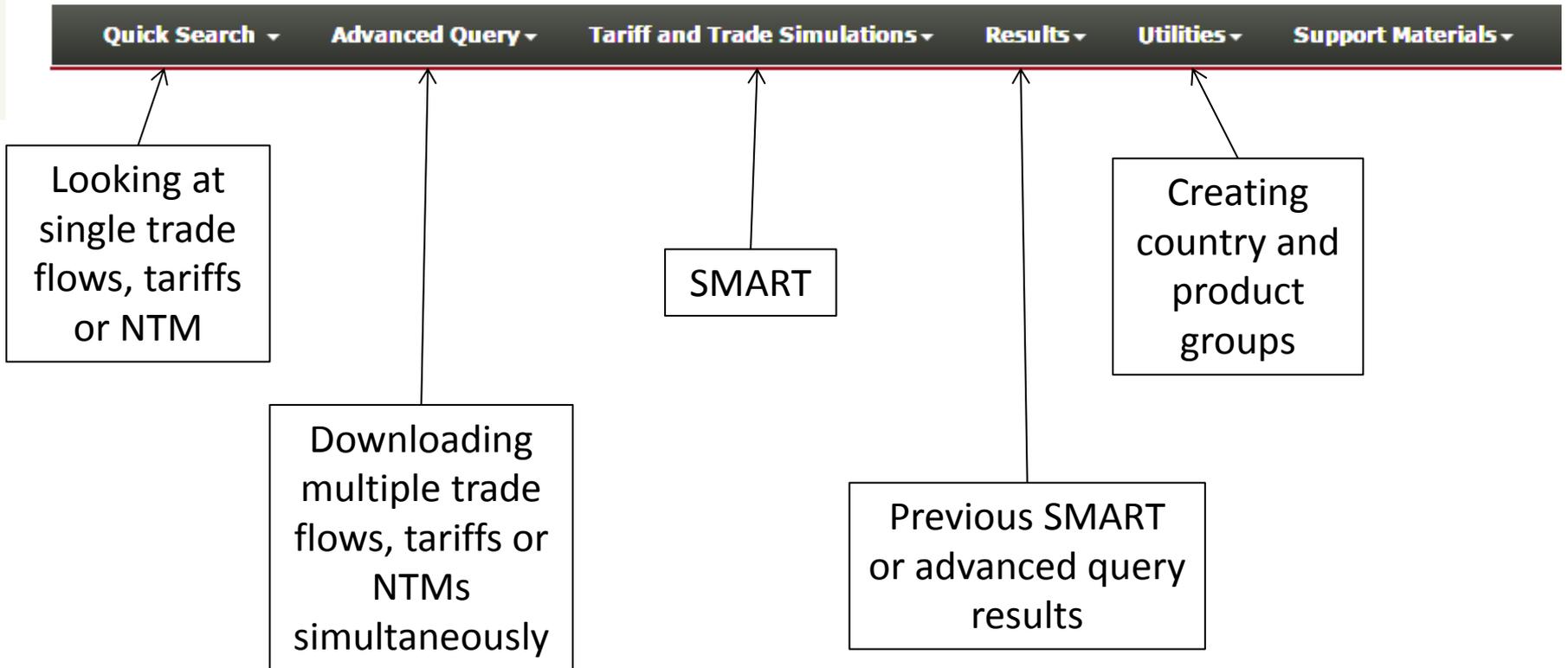- Ambiguous Effect, but likely to reduce tariff revenue

SMART Results - 3. Welfare Effect
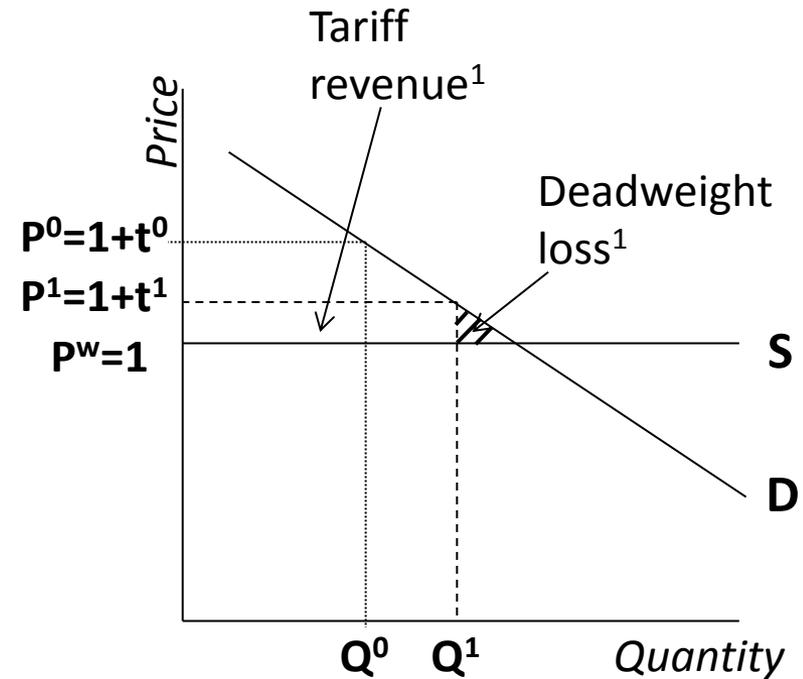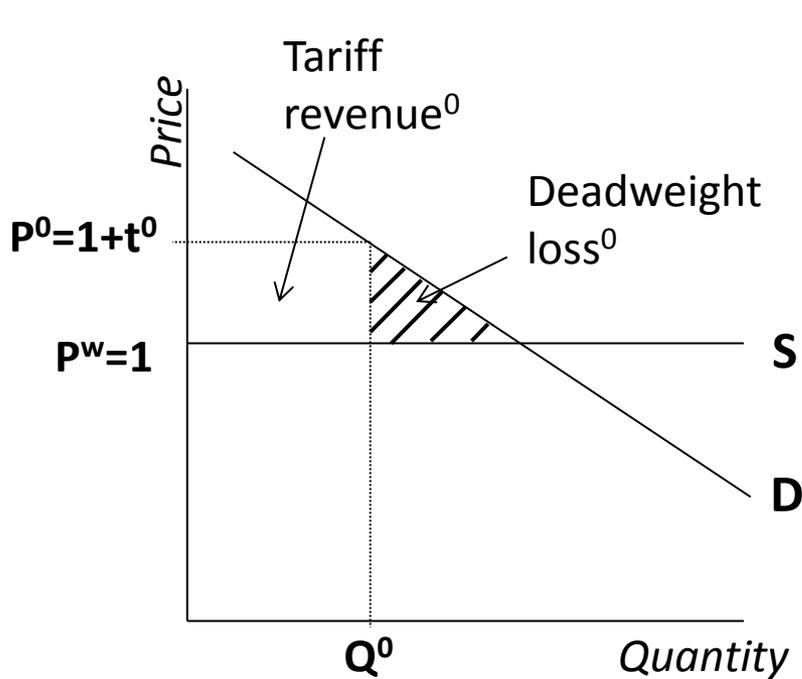
- Welfare effect = reduction in deadweight loss = gains to the economy as a whole

Using SMART Software

- Online software, embedded within the World Bank's World Integrated Trade Solutions (WITS):
  - https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx

- WITS – free to register
  - Almost completely free to use (except bulk downloads)
  - Sources data from COMTRADE, UNCTAD TRAINS, and WTO IDB/ CTS (trade, tariffs and NTBs)

WITS

Quick Search → Looking at single trade flows, tariffs or NTM

Advanced Query → Downloading multiple trade flows, tariffs or NTMs simultaneously

Tariff and Trade Simulations → SMART

Results → Previous SMART or advanced query results

Utilities → Creating country and product groups

Getting used to WITS and SMART

- Let's go through an example together to get used to WITS and SMART:

- *What is the effect of the USA removing import tariffs on leather footwear from China?*
  - On trade, trade creation and trade diversion?
  - On US tariff revenue?
  - On US welfare?

Pre-SMART - Finding an Existing Tariff

- Often useful to find existing tariffs before using SMART

- SMART assumes you know the current tariff level, and asks how you will change it

- Tariff data sources – COMTRADE, WTO IDB and WTO

Pre-SMART - Finding an Existing Tariff

- Can use quick search or advanced query to find an existing tariff

- Suggest using advanced query:
  - Gives in the same form as SMART (HS 6 Digit)
  - Automatically downloads, so can save an excel file

- Suggest using TRAINS data (same as SMART)

Pre-SMART - Finding an Existing Tariff

A. Click on 'Advanced Query' → 'Trade and Tariff Analysis'

B. Create a new query and click 'proceed'. Can return to this query later ('existing query')

Home > Advanced Query > Tariff and Trade Analysis

Tariff and Trade Analysis ❓ 📋
Tariff and Trade Analysis option within the Advanced Query provides you with multiple tariff types an multiple reporters, partners, products, and years in a single query. You can select from your own c reused. This is particularly useful for more complex queries. There are a lot of indicators from averag etc. More details...

◉New Query ⚪Existing Query - Select a Query -   ▼

Query Name: USFootwearTariff

Query Description: Tariffs by the US on leather footwear 640420

Data Source: TRAINS ▼

[Proceed] [Delete] [Reset]

Name: no spaces, short

Description: Spaces, long

Data Source: Use TRAINS

Pre-SMART - Finding an Existing Tariff

C. Select the importing country/ countries

– In this example, the US

D. Select the product/ products:

– Open the products box

– Need to select nomenclature and product

Pre-SMART - Finding an Existing Tariff

Basic Facts about nomenclatures

- Products are divided up into categories
- The most common division is the Harmonised system (HS) nomenclature
  - Three international levels: 2 digit, 4 digit and 6 digit
  - 2 digit most aggregated (e.g. 'Footwear, Gaiters …')
  - 6 digit most specific ('e.g. Sports footwear, …')
- Lets focus on HS for now, as normally this is the most useful nomenclature

Pre-SMART - Finding an Existing Tariff

Basic Facts about nomenclatures

- Harmonised System nomenclature:
  - The HS nomenclature has been updated several times (first 1988/92, most recent 2012)
  - Different countries use different versions (i.e. some are slow to apply updates)
  - HS combined finds the ones used in practice
  - Most countries report trade flows and tariffs using the HS nomenclature

Pre-SMART - Finding an Existing Tariff

Basic facts about tariffs:

- Tariffs are applied by importers to a 'tariff line'

- Tariff lines are normally applied at the HS 8 or 10 digit level. This level is highly specific, and the categories are country-specific

- WITS calculates simple and weighted (by trade) tariff averages for 2, 4 and 6 digit categories:
  - SMART uses the weighted 6 digit averages. This is what you want to find
  - Most often, tariffs in a 6 digit category are identical

Pre-SMART - Finding an Existing Tariff

D. Select the product/ products:

- – Use HS Combined nomenclature, 6 digit aggregation
- – Can also look at groups of products and their average (simple and weighted) tariffs
  - • Plus all individual tariffs within the groups
- – 640420 for this example

Pre-SMART - Finding an Existing Tariff

Pre-SMART - Finding an Existing Tariff

E. Select the exporting country/ countries which face the tariff

– In this example, China

F. Select the year (use 2015 here – 'latest available year is also useful)

G. Select the type of tariff

– See next slides

Pre-SMART - Finding an Existing Tariff

- Tariff types:
  - Ad valorem tariffs (most common): cost per unit value, expressed as a %
  - Specific tariffs: Cost per unit of quantity (e.g. Cost per kilo, cost per goat)
  - Mixed tariffs (e.g. 15% or $5 per kg, whichever is more)
  - Tariff rate quotas: low tariff at first, then higher
- Easiest to work with Ad Valorem:
  - WITS can calculate ad valorem equivalents

Pre-SMART - Finding an Existing Tariff

Tariffs depend on the exporting country

- Most Favoured Nation (MFN) bound tariffs:
  - the highest tariff a WTO country can charge another WTO country
- MFN applied tariffs:
  - The actual tariff charged to other WTO countries
- Preferential tariffs:
  - Lower tariffs charged under FTA or GSP
- Effectively applied tariff:
  - The tariff used (i.e. MFN applied or preferential)
  - This is the most useful choice for SMART

Pre-SMART - Finding an Existing Tariff

G. Select the type of tariff

- Effectively Applied

- UNCTAD AVE method

H. Submit and click 'OK'

Tariff and Trade Analysis ❓ 🗔

Query Name: USFootwearTariff

Importers/Reporters:

Selected
United States -- USA

<<-Modify->>

Products:

Selected
HS - Combined (Selected Classification) 640420 -- - Footwear with outer soles of leather or composition leather

<<-Modify->>

Exporters/Partners:

Selected
China -- CHN

<<-Modify->>

Years:

Selected
2015

<<-Modify->>

Tariffs:

Selected
Include Effectively Applied rates Use AVE estimation UNCTAD Method

<<-Modify->>

| Adjust Years & Submit | Submit | Back |

Pre-SMART - Finding an Existing Tariff

I. Click Download

J. Choose which data you want (normally the default is fine) and click 'download' and then 'ok'

K. Save, and open the excel file with the results

L. The current US tariff on Chinese leather shoes is 20.83

Pre-SMART - Finding an Existing Tariff

- Can adjust the query through 'advanced query', 'tariff and trade analysis', 'existing query'

- Can download results again through 'results'

Pre-SMART - Finding an Existing Tariff

To summarise, look for tariffs that:

1. Are the 'effectively applied tariffs'
2. Are in ad valorem or ad valorem equivalent form
3. Are the 6 digit weighted average for the relevant good
4. Are from the TRAINS database

Here, we have found this for HS category 640420 (leather footwear)

Pre-SMART - Finding an Existing Tariff

Tips

- Can search for multiple importers, exporters, products and years in one query

- Can search for aggregated groups and their average tariffs, plus the individual tariffs

- If the data is not available, it will not be shown

- Save the file as something clear

Tasks

- Find the following data. Each can be carried out in one query:

1. What is the tariff that China employed in year 2015 on German cars of >2500cc (HS category 870333)?

2. What are the tariffs that Vietnam employed in the most recent year with data on sweet drinks (HS 220210) from Thailand and the US?

3. What is the average tariff that India employed in years 2012 and 2013 on tea (HS 0902), plus all 6 digit tea categories, from Sri Lanka and China? *Hint: tick 'include product breakdown' when choosing products*

How to use SMART

- Let's keep going with the first example:

- *What is the effect of the USA removing import tariffs on leather footwear (640420) from China?*
  - On trade, trade creation and trade diversion?
  - On US tariff revenue?
  - On US welfare?

Trade and Tariff Simulations

- Create a query for each analysis
- Can change old queries through 'existing query'
- Can only choose TRAINS as a data source

How to use SMART

1. Create a query

Home > Tariff and Trade Simulations > SMART

SMART ❓

SMART allows analysis of the impact of unilateral, preferential and multilateral trade reforms at home o
prices, tariff revenues, and economic welfare. This market access analysis is a very useful tool that can
from either UNCTAD or WTO. More details…

◉ **New Query** ⚪ **Existing Query**   - Select a Query -   ▼

SMART Query Name: USChinaFootwear

SMART Query Description: Removing US tariffs on Chinese Footwear

Data Source: TRAINS   ▼

[Proceed]   [Delete]   [Reset]

Home   About   Contact   Usage Conditions

Name: no spaces, short

Description: Spaces, long

Data Source: Can only be TRAINS

2. Click 'Proceed'

How to use SMART

3. Select importing country (home country)

4. Select year for analysis:

  - Performs the counterfactual for this year

  - Normally select most recent year with good data

How to use SMART

5. Select the product for which you want to see results

   a) Must first choose nomenclature. HS combined is most commonly used

   b) Can select different levels of aggregation: 2, 4 or 6 digit for HS, or other groupings e.g. Raw Materials

   c) SMART calculates results separately for each HS 6 digit good. These results are then summed for each group, and presented for each 6 digit category)

   d) No point in selecting goods which won't see a tariff change. No outcome will change→Partial Equilibrium

How to use SMART

How to use SMART

6. Create the counterfactual scenario
   a) Add a new scenario, or use an existing one
   b) Name the scenario. This can be reused in other analyses
   c) Select beneficiary countries (those whose exports will face a tariff change)
   d) Select the product(s) that will see a tariff change
      • This must include those chosen in stage 5. Extra products will not change results, but will allow the scenario to be used for other analyses

How to use SMART

How to use SMART

e) Define the tariff change:

- What is the tariff change you want to explore?

- The specified change will be applied to all tariffs considered (in this example, there is only 1)

- New rate: all tariffs are replaced with this rate

- Maximum rate: tariffs above the stated rate are replaced with that rate

- Linear cut: A percentage reduction in each tariff

- Swiss formula: Reduces all tariffs below the stated amount. Initially smaller tariffs are reduced further

How to use SMART

Formula
- ⦿ **New Rate**
- ◯ **Maximum Rate**
- ◯ **Linear Cut**
- ◯ **Swiss Formula**

| 0 |

⦿ **Swiss Formula Coefficient (a)** 16 %
◯ **Goal For Cut in Average Tariff** %

Proceed   Cancel

- In this example, we are exploring what happens when the tariff is reduced to 0
  - Could also use a maximum rate of 0, or a linear cut of 100% (equivalent)

How to use SMART

7. Choose elasticities:
    – The import elasticity is currently system defined and cannot be changed
    – The higher the substitution (Armington) elasticity, the more the trade diversion
    – Export elasticity of 99=Infinite. <99 = finite.
    – All products under analysis must have the same elasticity
    – For now, use the default elasticities (see later for where to find better ones)

How to use SMART

8. Choose if SMART uses current actual or bound rates:

   – Default is actual (effective rate)

   – Bound is useful to compare current to potential trade deals

How to use SMART

9. Click 'Save and submit' and 'OK'

10. Click 'download' and 'OK'

11. Save and open the folder with results

12. Can download the results again through 'results'

SMART Results

- SMART produces 6 excel spreadsheets with the results:
  1. Detailed Data
  2. Exporter View Report
  3. Market View Report
  4. Revenue Impact Report
  5. Trade Creation Effect Report
  6. Trade Welfare Effect Report

- There seems to be little reason behind presenting the results this way!

SMART Results

1. Detailed Data

- Partner (exporter) ISO number (but not name) for every exporter of the good
- Current trade value from each exporter
- Current tariffs, and counterfactual tariffs for each exporter
- Elasticities (the same for each exporter)
- Trade Effect (plus creation, diversion and price effects) for each exporter
- Bound rate
- Product Code
- Home country ISO

SMART Results

2. Exporter View Report

- Exporter and importer names and codes

- Nomenclature and product chosen

- For each exporter, exports before and after, and the difference

SMART Results

3. Market View Report

- The product(s) and nomenclature chosen
- The importer name and code
- Total imports before and change
- Total revenue before and change
- Consumer welfare change (called 'Consumer Surplus', but this is badly named)

SMART Results

4. Revenue Impact Report

- The product(s) and nomenclature chosen
- The importer name and code
- The total change in government revenue
- The total change in trade
- The initial and new trade
- The old and new weighted average tariff

SMART Results

5. Trade Creation Effect

- Exporter and importer names and codes

- Nomenclature and product chosen

- Trade effect (plus creation, diversion and price effects)

- The old and new simple average tariffs

SMART Results

6. Trade Welfare Effect Report

- The product(s) and nomenclature chosen
- The importer name and code
- The total trade effect
- The consumer welfare effect (the same as the consumer welfare change in 3)
- And new and old weighted tariff rates

Some Questions

If US tariffs on Chinese leather footwear were 0 in 2015:

1. How much are Chinese exports of leather footwear to the US calculated to have increased?

2. How much of this is trade creation, and how much trade diversion?

3. Why is there no price effect?

4. How much does US welfare increase by?

5. What does the weighted US average tariff on leather footwear become?

Some Questions

If US tariffs on Chinese leather footwear were 0 in 2015:

6. What is the calculated change in Brazilian exports of leather footwear to the US?

7. What is the calculated change in Chinese exports of trousers to the US? (Trick question!)

8. What is the change in Chinese welfare? (Trick question!)

Some Tips

1. Extract the data that you need into a single new excel spreadsheet (or better, use Stata) for analysis

2. We've only looked at one 6 digit product. SMART can look at several simultaneously (but independently)

   - Can look at groups (e.g. 2 digit, 4 digit or other). Sums each 6 digit good within

   - Can look at different tariff cuts for different goods simultaneously. Needs multiple scenarios in the same query

   - If products have differing elasticities, they need to be explored in different queries

Some Tips

3. SMART is importer focused:

   – Change between home (importer)'s relationship with all exporters

   – If you are looking at how much your country will increase exports, then you need to consider each market separately.

   – SMART not set up well for analysing increased exports with regional trade agreements

      • Need a query for each export market

4. Can look at changing tariffs on several exporters simultaneously

A second example

- *What is the combined effect of:*
1. Thailand removing tariffs on tractor & large vehicle parts (HS 8708) from Japan and Germany
2. Thailand reducing tariffs on tractor & large vehicle parts(HS 8708) from China by 50%
- *All Armington elasticities = 2*
- *All export elasticities = 99 (infinite)*
- *Note that this is 4 digit:*
  - *look at individual and group effects*

A second example

- Some interesting results:
  - Germany and Japan increase exports for every 6 digit category
  - China experiences an overall export increase
    - But many 6 digit categories see trade falls
    - Trade diversion outweighs trade creation for China
  - All other countries only see trade reductions (as expected)
  - Tariff revenue drops by 75%

A Task

- You work for the government of Australia
- Australia is considering a trade deal with India
- India will remove tariffs on the 2 digit category 71 (natural or cultured pearls, precious stones ...)
- Elasticities are default (1.5 and 99)

1. What are the current tariffs?
2. What will be the effect on Australian exports to India?
   - For 2 digit category 71?
   - For each 6 digit category?
3. What will be the effect on Indian welfare? Can we find the effect on Australian welfare?

Tip: Use data from 2013. Choose the 2 digit category, and 6 digit categories will be displayed automatically

A Second Task

- China has signed a free trade agreement with India and Russia. Tariffs 271012 and 271019 will be reduced by 90%
- The Armington (substitution) elasticity is 1.5 for the category 271012, and 2 for the category 271019
- All export elasticities are infinite (99)

1. What are the original tariffs?
2. How do imports change (for each partner and good)?
3. How does Chinese revenue change?
4. How does Chinese welfare change?

Tip: Different elasticities require different queries. Use separate queries for each good, and sum these together in excel

Further Details: Where to Find Elasticities

- The three elasticity values are vital to results:
  - Bigger import elasticity=more trade creation
  - Bigger Armington elasticity = more trade diversion
  - Bigger export elasticity = more price effect
- Import elasticity is pre-calculated by SMART, and cannot be changed
- But how can we get sensible values for the other two?
  - Can use default values. But we want something better

Further Details: Where to find Armington Elasticities

- GTAP has estimates for broad economic sectors

- Please download the excel spreadsheet which has found the GTAP estimate for each HS code

- Note: these are much higher than the default

- This is an exciting field of current research. Check academic papers for any newer and better results

Further Details: Where to find Armington Elasticities

- Current papers with data include:
  - Hertel et al. (2006), *How confident can we be of CGE-based assessments of Free Trade Agreements?* (GTAP Armington elasticities, and more)
  - Caliendo et al. (2016), Tariff Reductions, Entry and Welfare: Theory and Evidence for the last Two Decades
  - Feenstra et al. (2014), *In search of the Armington elasticity*

Further Details: Export Elasticities

- SMART works best with infinite export elasticities
  - With finite elasticities there is an issue: knock-on effects on exports to other countries are not looked at
  - I.e. Exports to the home (importer) country and other importers are not substitutable
- If a finite elasticity is required, use a sensible estimate:
  - GTAP uses mostly in the range 0.5-1.5
  - The smaller the main exporters, the smaller the elasticity

Further Details: Export Elasticities

- However, a better choice for finite export elasticities is GSIM:
  - Downloadable software, also through WITS
  - Models the world trade of a good, not just bilateral trade
  - More thorough, but more complex

Further Details: Elasticities

- Can also calculate elasticities yourself using previous data
  - Regression analysis
  - Error correction models
  - Country-specific results, but tough to do well
- See Imbs and Méjean (2010), *Trade Elasticities*
  - Good overview, very complex
- Statistics departments may have already done this:
  - Check!

Further Details: Nomenclatures

- All the analysis above has been carried out using the HS nomenclature
  - World Customs Organisation nomenclature
  - Trade flows and tariffs are almost always measured in this nomenclature
  - Allows some useful groupings (raw materials, intermediate goods etc.)
  - Can create own product groups in WITS (in utilities)

Further Details: Nomenclatures

- May sometimes want to use other nomenclatures (SITC, GTAP)
  - Different product groups
  - Coordinating with other analysis
- Can do this automatically in SMART
  - Just select the relevant nomenclature. Smart transfers from HS to this
- May need to convert some data from one form to another yourself (e.g. Elasticities)
  - Use concordance tables (from WITS, UNStats etc.)

Further details: Potential SMART improvement

1. Adjustable import elasticities
   - Will require a similar process to find best estimates as for other elasticities

2. Tariff line calculations
   - Calculations carried out at the tariff line, rather than the HS 6 digit level
   - Will allow more detailed analysis

Conclusion

- SMART is a partial equilibrium trade model, looking at a single market

- SMART analysis is quick and simple, but limited theoretically

- SMART gives results for counterfactual trade flows, tariff revenue, and importer welfare