



# Introduction

- In the previous sessions we considered various indices that can be used to help evaluate the impact that a preferential trade agreement has on patterns of trade.
- Often we are interested in evaluating how the indices have changed over time.
- One simple way to do so is to construct the indices over a time period and look for patterns.
- Another method is to try and decompose the changes into component parts that can help us to better understand the forces underlying the observed changes.
- In this session we will explore techniques for undertaking decompositions based on the constant market shares (CMS) approach.

# What is CMS Analysis?

- CMS analysis is a technique for decomposing the growth in a country's exports into components that correspond to holding its market shares constant at various levels.
- A country's trade may grow faster or slower than the world average because its export profile is concentrated in commodities for which demand is growing relatively quickly/slowly, or because its regional export profile is dominated by countries that are growing relatively quickly/slowly, because the economy is gradually becoming more or less competitive, or some some combination thereof.
- Preferential trading agreements have the potential to change these effects.
- CMS analysis is designed to help us better understand the relative importance of the various possible drivers of export growth.

# Advantages

- Relatively simple way of analyzing complex growth patterns.
- Strong theoretical foundation (can be derived from the Armington trade model).
- Concisely summarizes key aspects of a large volume of data.
- Can provide insights into competitiveness that are useful for designing export strategy as well as evaluating the impact of existing policies.

# Disadvantages

- It is descriptive not causal.
- Measurement errors in the data flow directly into the results.
- Care must be taken to apply indicators at an appropriate level of aggregation. Trade shares can vary from year to year, especially at a disaggregate level, leading to misleading results.
- This problem can be mitigated by comparing average shares over a longer period, or by constructing moving averages of the decomposed effects.

- There are actually a number of different CMS decompositions in the literature.
- We will start with the original (Leamer and Stern) version, which applies to growth in the value of trade, since this is the easiest to understand.
- In the next session we will look at the Fagerberg and Sollie version, which is applied to the growth in export shares.

# One Level Decomposition of Growth in Export Values

- Consider the change in a country ( $r$ ) export value  $X$  between two periods (0 and 1),  $X_r^1 - X_r^0$ .
- The rate of growth in exports is  $g_r = (X_r^1 - X_r^0)/X_r^0$ , so:

$$X_r^1 - X_r^0 = g_r X_r^0$$

- Let  $g = (X_W^1 - X_W^0)/X_W^0$  be the growth rate in the value of world exports over the same time period. Adding and subtracting  $gX_r^0$  from the right hand side of the expression leaves it unchanged:

$$X_r^1 - X_r^0 = g_r X_r^0 + gX_r^0 - gX_r^0$$

- Rearranging gives us:

$$X_r^1 - X_r^0 = gX_r^0 + (g_r - g)X_r^0$$

- This is called a 'one level' CMS decomposition (in export values). It is the most basic decomposition we can undertake.

# What Does It Mean?

- The first term on the right,  $gX_r^0$ , is called the **world growth effect**.
- This tells us how much the exports of economy  $r$  would have grown between period 0 and period 1 if they were increasing at the same rate as the world average.
- The second term,  $(g_r - g)X_r^0$ , is called the **competitiveness effect**.
- It represents the residual, or the amount that is not explained by the growth of world trade, and must be attributable to something else.
- If competitiveness effect is negative, the country's exports have grown more slowly than the world average, and thus the economy has lost market share.
- If the term is positive the country's exports have grown faster than the world average, and the economy has instead gained market share.



# Two Level Decomposition Across Commodities

- What if different commodities are growing at different rates in world trade, due to changes in the structure of demand?
- In this case we might decide to further breakdown the residual term. Using similar reasoning to before we can show:

$$X_r^1 - X_r^0 = gX_r^0 + \sum_i (g_i - g)X_{ir}^0 + \sum_i (g_{ir} - g_i)X_{ir}^0$$

where  $g_i$  is the world growth rate of exports of commodity  $i$ , and  $g_{ir}$  is the growth rate of exports of  $i$  from country  $r$ .

- This is called a two-level decomposition in commodities.

# What Does It Mean?

- The first term is the same [world growth effect](#).
- The second term on the right is called the [commodity effect](#). It represents how much export growth can be attributed to an export profile that is comprised of goods that are relatively slow/fast growing as compared to the world average
- This term will be positive if the goods that are exported by country  $r$  are growing faster than the world average across goods.
- The last term is still the [competitiveness effect](#), representing the residual (now accounting for the commodity composition of trade).

# Two Level Decomposition Across Regions

- Different regional markets may also be growing at different rates, and we may want to factor that into the normalization.
- In this case we might decide to further breakdown the residual term, this time across regions. We can show:

$$X_r^1 - X_r^0 = gX_r^0 + \sum_p (g_p - g)X_{rp}^0 + \sum_p (g_{rp} - g_p)X_{rp}^0$$

where  $g_p$  is the world growth rate of exports to region  $p$ , and  $g_{rp}$  is the growth rate of exports to  $p$  from country  $r$ .

- This is called a two-level decomposition in regions.

# What Does It Mean?

- The first term is still the [world growth effect](#).
- The second term on the right is called the [region effect](#). It represents how much export growth can be attributed to an export profile that is comprised of regions that are relatively slow/fast growing as compared to the world average
- This term will be positive if the countries to which country  $r$  exports are growing faster (as export destinations) than the world average across countries.
- The last term is still the [competitiveness effect](#), representing the residual (now accounting for the regional composition of trade).

# Three Level Decomposition

- The final step is to allow for both sectoral and regional variations by completing both steps.
- The following expression is the complete CMS decomposition:

$$\begin{aligned}X_r^1 - X_r^0 &= gX_r^0 && \text{(World Growth Effect)} \\ &+ \sum_i (g_i - g)X_{ir}^0 && \text{(Commodity Effect)} \\ &+ \sum_i \sum_p (g_{ir} - g_i)X_{irp}^0 && \text{(Regional Market Effect)} \\ &+ \sum_i \sum_p (g_{irp} - g_{ir})X_{irp}^0 && \text{(Competitiveness Effect)}\end{aligned}$$

where  $g_{irp}$  is the rate of growth in exports of commodity  $i$  from region  $r$  to partner  $p$ .

# Summary

- **World Growth Effect:** The part of the growth attributed to the overall rise in world exports.
- **Commodity Effect:** The part of growth attributed to the commodity composition of the countries exports (positive if exports are concentrated in commodities in which world demand is growing relatively quickly).
- **Regional Market Effect:** The part of growth attributed to the regional composition of the countries exports (positive if exports are concentrated in markets which are experiencing relatively rapid growth).
- **Competitiveness Effect:** The residual effect, which captures the difference between the actual export growth and the growth that would have occurred had the export shares remained constant. A positive value is interpreted as an increase in “competitiveness.”

# Application Example

- We will demonstrate using Thailand's export data in 2006 and 2014.
- For this application we need to download:
  - Exports of all goods by HS-2 digit classification, and the total, from Thailand to all trade partners in 2006.
  - Exports of all goods by HS-2 digit classification, and the total from the world as a whole to all trade partners in 2006.
  - The same data for 2014.
- The data needs to be put into the same format as in previous examples.
- [Exploring the Code](#): Open the files 07\_CMS\_Values (the code) and 07\_CMS\_Data\_THA (the data).

**Table:** Decomposition of Thailand's Export Value Change 2006–2014

	Thailand
World Growth Effect	70816.7
Commodity Effect	-582.2
Regional Market Effect	41750.1
Competitiveness Effect	-15256.5
Total Change	96728.1

- Although Thailand's exports rose substantially over the period, most of the increase matched overall growth in world trade trade.
- Thailand did benefit substantially from the favorable composition of its regional export markets.
- Thailand's export competitiveness actually fell slightly over the period.



- Download the data necessary to construct a CMS decomposition for other economies in the region using the same techniques.
- Modify the code to handle the new countries, and generate the decomposition.
- Are economies in the region exhibiting similar or divergent patterns in their export competitiveness?