Constant Market Shares Analysis Part I
Decomposition of Values

Capacity Building Workshop
“Enhancing Capacity on Trade Policies and Negotiations in Laos”
May 8-10, 2017
Vientienne, Lao PDR

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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.
Consider the change in a country \((r)\) export value \(X\) between two periods \((0\) and \(1)\), \(X^1_r - X^0_r\).

The rate of growth in exports is \(g_r = (X^1_r - X^0_r)/X^0_r\), so:

\[
X^1_r - X^0_r = g_r X^0_r
\]

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

\[
X^1_r - X^0_r = g_r X^0_r + g X^0_r - g X^0_r
\]

Rearranging gives us:

\[
X^1_r - X^0_r = g X^0_r + (g_r - g) X^0_r
\]

The is called a ‘one level’ CMS decomposition (in export values). It is the most basic decomposition we can undertake.
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).
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:

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

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:

\[
X_r^1 - X_r^0 = gX_r^0
\]  
(World Growth Effect)

\[
+ \sum_i (g_i - g)X_{ir}^0
\]  
(Commodity Effect)

\[
+ \sum_i \sum_p (g_{ir} - g_i)X_{irp}^0
\]  
(Regional Market Effect)

\[
+ \sum_i \sum_p (g_{irp} - g_{ir})X_{irp}^0
\]  
(Competitiveness Effect)

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.”
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).
## Results

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

<table>
<thead>
<tr>
<th>Effect</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Growth Effect</td>
<td>70816.7</td>
</tr>
<tr>
<td>Commodity Effect</td>
<td>-582.2</td>
</tr>
<tr>
<td>Regional Market Effect</td>
<td>41750.1</td>
</tr>
<tr>
<td>Competitiveness Effect</td>
<td>-15256.5</td>
</tr>
<tr>
<td><strong>Total Change</strong></td>
<td><strong>96728.1</strong></td>
</tr>
</tbody>
</table>

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

- 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?