

## Class 6

### Measures of Change and Balance of Payments

## Absolute Change

A simple difference is the most simple “descriptive statistic.”

- Current Value minus initial value.
  - “Current”=CV=Last; “Initial”=IV= First
- Example

“The Nation's international deficit in goods and services decreased to \$711.6 billion in 2007 from \$758.5 billion in 2006.” (Census 2008, February 14)

– 2007 Value-2006 Value= 2007 change

OR

–  $\$711.6b - \$758.5b = \$-46.9b$

## Percent Change

Shows amount of change relative to some base value in an series (similar to an index)

(Absolute change)/initial value\*100

-  $(CV-IV)/IV*100$  [alternately  $(CV/IV)-1)*100$ ]

- (2006 to 2007 Abs. Change)/2006 Value=2007 % Change

OR

-  $\$-46.9b/\$711.6b*100=-6.5\%$  decline in the trade deficit

## Percentage points of change vs. percentage change

- Change relative to the base (percentage change) is different than *the* absolute difference in percentages.
- If the trade in pomegranates made up 30% of the value of Nandustan's agricultural exports in 1995 and 42% in 2005,
  - This is 12 a *percentage point* (1200 *basis point*) and a 40 percent change [ $((12)/30) \times 100= 40\%$ ] in the proportion of export value made up by pomegranates.

## Currency Example

Measure of the percent change in the value of one currency in terms of the other.

- Calculate  $(EXR^{end}-EXR^{initial})/EXR^{initial} * 100$

Example: Percent change in an LCU relative US dollar

1. Make sure you have the rate at which dollars buy the LCU
  - If EXR is in LCU per dollar (1LCU/X\$) calculate  $1/EXR$ 
    - 1997 (125.39¥ per \$1) to 1998 (119.4 ¥ per \$1)
    - $1/125.39=0.007975$  \$ per ¥ and  $1/119.4=.008375$  \$ per ¥
2. Calculate:  $(0.008375-0.007975)/0.007975=5.0\%$ 
  - ALT:  $(0.008375/0.007975)-1=5.0\%$
3. Since the result is positive, the yen *appreciated* 5% against the dollar from 1997 to 1998.

## Proportions and Compound Growth

- We already discussed compound growth in terms of investment.
- If a countries exports grow 10% a year, how much does it grow in five years? 50%?  
= $(Exports \times 1.10)1.10)1.10)1.10) \times 1.10)$   
= $Exports \times 1.10^5$   
= $Exports \times 1.61$   
= $61\%$

## Average Change per Unit of Time (year)?

- Percent change results (Exports):
  - Is it the change for the period divided by the number of periods?  
40.14%/3=13.38%? Seems wrong.
  - OR the average of the % changes for each year?  
(10.87%+12.68%+12.18%)/3=11.91%?
  - Looks good - but not quite

	Total US Exports (\$, Million)	Annual Percent Change
2004	1157250	
2005	1283070	10.87
2006	1445703	12.68
2007	1621808	12.18

[http://www.census.gov/foreign-trade/Press-Release/current\\_press\\_release/press.html#prior](http://www.census.gov/foreign-trade/Press-Release/current_press_release/press.html#prior)

## Calculating the Average Annual Percent Rate of Change

- Current year divided by initial year and raise to the power of one divided by the number of units of time. Subtract one from the result and multiply by 100.
  - $((CV/IV)^{1/n}-1)*100$ 
    - Where CV is current value, IV is initial value, and n=units of time in period.
    - $=(((1621808/1157250)^{(1/3)}-1)*100$
    - =11.91% (11.910%) almost but not the same as mean annual change (11.907%)
  - Over time and with greater variation this can have a bigger effect.
  - Remember you need 4 data points to show change over THREE time periods.

## “Annualized” Percent Rate of Change

- A “straight line” projection of change for an entire period from a portion of that period.
- $((\text{Percent change} / 100 + 1)^n) - 1) * 100$ 
  - Where n is the number of portions of time, usually 12 (months in a year) or 4 (quarters in a year), hence “annualized change” or “change at an annual rate.”
  - Note that if you are starting from scratch and not with a *percent* change you do not need to divide by 100  
$$= (((((102666 - 102213) / 102213) + 1)^{12}) - 1) * 100 = 5.45\% = \text{January annualized change}$$
- Different than year-on-year percent change (12.18%)

## Noise

- Error and events can obscure long term trends
  - Remember where error can come from
    - See earlier lecture
- One fix is too focus on longer time periods in which significant change is likely to occur.
- But this really does not address the issue.

## Moving averages

- Moving averages simply average observations or summary statistics over a number of time periods in period one, and then for each subsequent period add one new period and drop the oldest period.

Daily Export Volume in millions of US dollars

	Mon	Tues	Wed	Thurs	Fri
Exports	500	400	100	400	350
% change		-20%	-75%	300%	-13%
Rolling avg.			333.333	300	283.333
% change				-10%	-6%

## Seasonality

- A regular pattern in the data, such as seasonal foods.
  - Christmas turkey exports to Europe
- When a regular pattern is discernable you do a seasonal adjustment.
- Exports rise 125% in December and falls off 75% in January. Divided by expected difference.

Turkey's Exported to Europe in Millions

	December	January	Percent change
Unadjusted	35.3	1.3	-96.3
Adjusted	28.24	1.7	-93.9

## Context

- Seasonality is a way of putting data “in context”
- You need to decide how to make meaningful comparisons.
  - E.g. Was a change large relative to past changes, the size of the economy, expectations.
  - Is trade a large part of the economy?
  - Was growth in exports met by the growth in imports?
  - Is \$700 billion a significant expenditure for the US?
    - \$2,241.69 per-capita
    - 22.7% of the 2006 Total Unified Budget
    - 5% of US GDP (2007)

## Balance of Payments

- What goes out must come back in...
  - Counts what crosses the border
- Accounting 101
  - Debits=Credits (Double entry accounting)
  - Current=Capital (money=purchases)
  - Build up to Balances
- 1. Balance of Trade and Services (X-M)
- 2. The current account = (net income + net current transfers)
- 3. The capital and financial account = (net direct and other investments + reserve assets)

## Balance of Payments

- Balance of Trade and Services (X-M)+ the current account balance +the capital and financial account balance=“the bottom line”
- The bottom line +/- net errors and omissions = Zero = The overall balance

## Balance of Trade

- Imports of goods and services
- Exports of Goods and services

## BOT Indicators

- Import penetration
  - Imports/GDP
- Commodity breakdowns
- Compressability
  - Necessities vs. luxuries
- Sources
  - How diversified and robust are its relationships?
- Exports of goods and services
  - Similar concepts can be applied
- Trade balance
  - Defecit=Investment exceeds savings (resource gap)
- Overall trade as a percent of the economy
  - Measure of world openness