

Chapter 1 : Introduction

EE312

Read: Froyen Ch.1-2, Mankiw Ch.1-2, Williamson Ch. 1-2

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Part I

Measuring Economic Activities

- **Macroeconomics:** the study of the aggregate level of economic activity.
- Macroeconomics is the **science** that has been developed for the purpose of policy-making decision.

“ Science begins with a measurement. ”

Lord Kelvin (William Thomson, 1st Baron Kelvin), a famous physician.

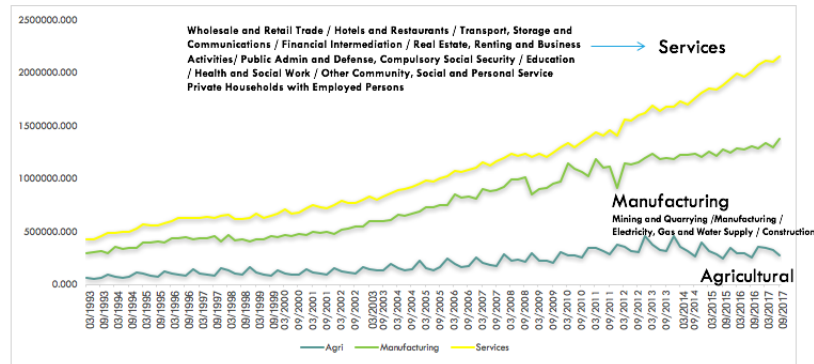


- The sentence was quote in the Bank of Thaland Governor's speech, September 2016
 - Advancement in Science begins with observations
 - “Measure” is a very essential fundamentals for discovering and learning process.
- Policy-making decision requires information; data is so important for making judgment on the desirability of alternative policies. Normally, we need to know if aggregate activities are slack (too weak) or tight (too strong). Indicators for these measurements? This is usually referred to measuring **GDP, inflation and labor market outcomes**.

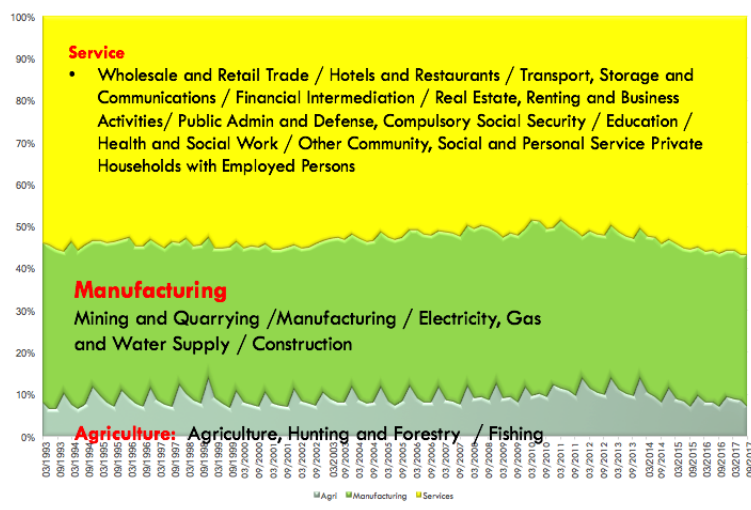
1 Measure Gross Domestic Product (GDP)

- In Thailand, the statistical agency that is responsible for measuring and producing data for these aggregate activities is NESDB.
- Starting from 1993, NESDB has made available the data in quarterly basis.
- Reporting statistic has some lagged periods of the announcement for 1.5 months.
- Approach for the calculation: Income, Production (value-added), Expenditure. All three give the same result.

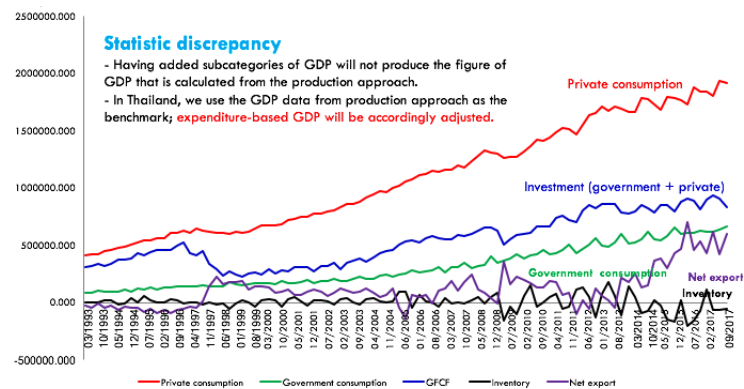
Deeper look into Thai Data: Production-based Nominal GDP



Sectoral share to market-value GDP (Nominal GDP)



Expenditure-based GDP and its nominal component



1.1 Nominal GDP

- We can not aggregate units of production; we then aggregate the value of products.
- **Nominal GDP** must be calculated in value terms, uses the current-year prices for the current year quantities of final goods.
- Nominal GDP growth includes the combined effect of changes in prices and quantities.
- **What is problematic of the measurement using nominal value?**

1.2 Real GDP :

- We can not aggregate units of production; we then aggregate the value of products.
- **Problematic of the measurement using nominal value.**
- Real-based measurement: eliminate the price effect Methods: Fixed base year and Chain-volume-measure (CVM)

1.3 Real GDP : Fixed base year

- $\text{Price Index}_t = \frac{P_t}{P_{\text{base year}}} \times 100$ (*many choices of the formula; the prices and the weights used)

- $\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{Price Index}} \times 100$

- Example: Real VS. Nominal (Review)

Example 1.

Year 2016 : A farmer produces 100 tons of corn worth \$30,000. (Price of corn = \$300 a ton)

Year 2017 : The farmer produces 100 tons of corn worth \$40,000. (Price of corn = \$400 a ton)

Example 2.

Year 2016 : A wage earner earns 300 Baht a day, price of meal = 30 Baht a meal, he/she can buy meals.

Year 2017 : A wage earner earns 300 Baht a day, price of meal = 50 Baht a meal, he/she can buy meals.

- What does reflect “standard of living”?
- The focus is on “real variable”

1.4 Real GDP : Chain-weighted real GDP

1.4.1 Problems with a fixed base year

- If the base year changes, GDP figures also change — the NESDB has used four base years (1956 1962 1972 1988).
- Fixed base years do not reflect economic changes over time.
- Changes in the composition of output and relative prices.
- Improved quality of existing products. New goods come to markets; old goods die out.
- These problems mostly occurs in high-tech sectors. See <https://www.economist.com/news/briefing/2016/07/25/gross-domestic-product-gdp-increasingly-poor-measure-prosperity-it-not-even> .



1.4.2 Calculate : Chain-volume-measure GDP

- Growth rate of a variable = $\frac{Variable_t}{Variable_{t-1}} - 1$

- $\frac{Variable_t}{Variable_{t-1}} = \dots\dots\dots$

- $Variable_t =$

** If growth rate and $Variable_{t-1}$ are given, we can calculate the Variable at time t.

- Example :The profit of Company B, OZYS Ltd., has grown the over last three years by 2.5%, 3%, and 3.5%. Here we cannot use the arithmetic mean and say that the average growth was 3%. Why not?

Suppose that Company B, OZYS Ltd., started with a 100-million-dollar profit. Three years later it will have become:

= \$109,270,125.

- CVM GDP will calculate real GDP by using “**Real GDP growth rate**” based on previous year price.
- $RGDP_P^Q$ denotes Real GDP measured by using quantity in year Q and price level in year P.
- For example, Real GDP 2013 =
- “(1+ **Real GDP growth rate**)” based on previous year price is called “**Direct Index (DI)**”.
- To calculate Direct Index (DI).
 - GDP for Year 2 using prices in Year 1.
 - GDP for Year 1 using prices in Year 1.
 - Direct Index for Year 2 is the annual growth rate of Year 2 using Year 1 prices.
 - Do the same for Year 3, Year 4,
- Example. Let 2011 = Base year
 - 2011 = Base year
 - Real GDP 2011 = Nominal GDP 2011
 - 1+ growth rate = Direct Index

2011	2012	2013	2014	2015
$\underbrace{\quad}$	$\underbrace{\quad}$	$\underbrace{\quad}$	$\underbrace{\quad}$	
DI_{2012}	DI_{2013}	DI_{2014}	DI_{2015}	
rg_{2012}	rg_{2013}	rg_{2014}	rg_{2015}	

- Example : Chain-Volume-Measure GDP - CVM. Given the following information, calculate CVM GDP in 2012, 2013, 2014 and 2015. The base year is 2012. Show how to calculate.

t	GDP (2012's Price) $\sum_i P_{i,2012} Q_{i,t}$ unit: \$	GDP (2013's Price) $\sum_i P_{i,2013} Q_{i,t}$ unit: \$	GDP (2014's Price) $\sum_i P_{i,2014} Q_{i,t}$ unit: \$	GDP (2015's Price) $\sum_i P_{i,2015} Q_{i,t}$ unit: \$
2012	100	108	115	125
2013	105	110	120	130
2014	110	121	125	140
2015	120	130	150	160

*Note : The numbers in the table may not be very realistic. The main idea is just to understand the CVM method.

real GDP 2012 = ?

real GDP 2013 = ?

real GDP 2014 = ?

real GDP 2015 = ?

Chain-volume-measure GDP

- **Step 1:** calculate Direct Index (DI).
 - GDP for Year 2 using prices in Year 1.
 - GDP for Year 1 using prices in Year 1.
- Direct Index for Year 2 is the annual growth rate of Year 2 using Year 1 prices.
 - Do the same for Year 3, Year 4, ...
 - Each year has its own DI based on the previous year's prices.

$$\begin{aligned}GDP^t &= \sum_i P^{t-1} \times Q^t \\GDP^{t-1} &= \sum_i P^{t-1} \times Q^{t-1}\end{aligned}$$

$$DI^t = \frac{GDP^t}{GDP^{t-1}} = \frac{\sum_i P^{t-1} \times Q^t}{\sum_i P^{t-1} \times Q^{t-1}}$$

- Chain index: Base year =2011

$$DI^{2015} = \frac{\sum_i P^{2014} \times Q^{2015}}{\sum_i P^{2014} \times Q^{2014}}$$

$$DI^{2014} = \frac{\sum_i P^{2013} \times Q^{2014}}{\sum_i P^{2013} \times Q^{2013}}$$

$$DI^{2013} = \frac{\sum_i P^{2012} \times Q^{2013}}{\sum_i P^{2012} \times Q^{2012}}$$

$$DI^{2012} = \frac{\sum_i P^{2011} \times Q^{2012}}{\sum_i P^{2011} \times Q^{2011}}$$

- **Step 2:** create the Chain Index (CI).

- Link the series of DI's into CI for each year.
- CI for each year is the geometric mean of growth rates from the base year (2011).
- CI = cumulative growth rate from 2011.

$$C_{2011}^{2015} = CI^{2015} = DI^{2015} \times DI^{2014} \times DI^{2013} \times DI^{2012}$$

$$C_{2011}^{2014} = CI^{2014} = DI^{2014} \times DI^{2013} \times DI^{2012}$$

$$C_{2011}^{2013} = CI^{2013} = DI^{2013} \times DI^{2012}$$

$$C_{2011}^{2012} = CI^{2012} = DI^{2012}$$

- **Step 3:** calculate chain-volume-measure GDP value using CI and the base-year value.
- Use the value of nominal GDP 2009 as reference.

$$CVMGDP_{2011}^{2012} = GDP^{2011} \times CI^{2012}$$

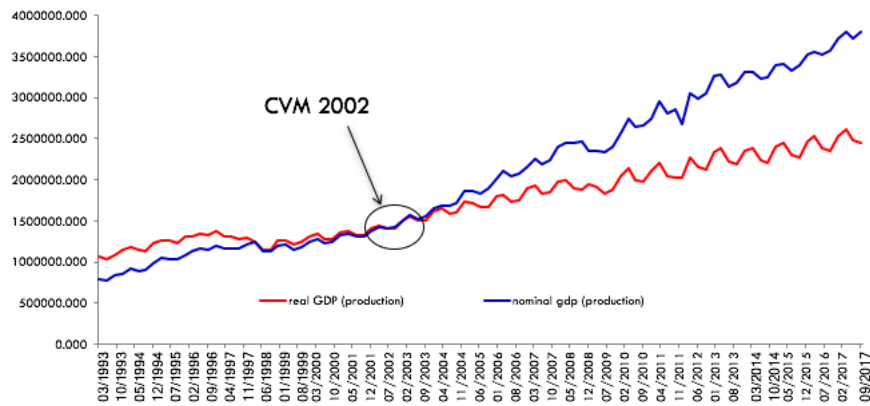
$$CVMGP_{2011}^{2013} = GDP^{2011} \times CI^{2013}$$

$$CVMGDP_{2011}^{2014} = GDP^{2011} \times CI^{2014}$$

$$CVMGDP_{2011}^{2015} = GDP^{2011} \times CI^{2015}$$

1.4.3 Notes on CVM GDP

- The calculated growth rates are closer to reality.
- Growth rates from DI, CI and CVM are identical.
- CVM series are non-additive.
- For the base year, GDP subcategories sum up to total GDP.
- For other years, subcategories do not sum up.
- In terms of accounting, this is technically adjusted by “residual terms”.



2 Price index and inflation

2.1 Implicit GDP price deflator

- The ratio of the nominal GDP to the real GDP of a given year.
- The most comprehensive price index.
- includes prices of all final goods and services.

$$\text{Implicit GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

2.2 Price Index and Inflation

- Price index is a weighted average of the prices of a basket of the goods and services produced over a period of time.
 - Consumer price index (CPI).
 - Producer price index (PPI).



- How much money would it be needed if one needs to secure a fixed consumption bundle?
- This is constructed for measuring cost of living (CPI: consumer price index) or cost of production (PPI: Producer price index) CPI measures COL and hence welfare changes.
- Inflation is the rate of change in the price index.

2.2.1 Calculations of Consumer Price Index

- The consumer price index (CPI) uses the current-year prices and the base-year quantities of the goods.
- Base year = 2007; $CPI_{2007} = 100$

$$CPI^{2015} = \frac{\sum(Q^{2007}P^{2015})}{\sum(Q^{2007}P^{2007})} \times 100$$

2.2.3 Calculation of inflation

- Inflation can be calculated by using either the implicit GDP price deflator or CPI.

$$\text{CPI Inflation} = \left[\frac{CPI^{2015}}{CPI^{2014}} - 1 \right] \times 100\%$$

$$\text{GDP Deflator Inflation} = \left[\frac{\text{GDP Deflator}^{2015}}{\text{GDP Deflator}^{2014}} - 1 \right] \times 100\%$$

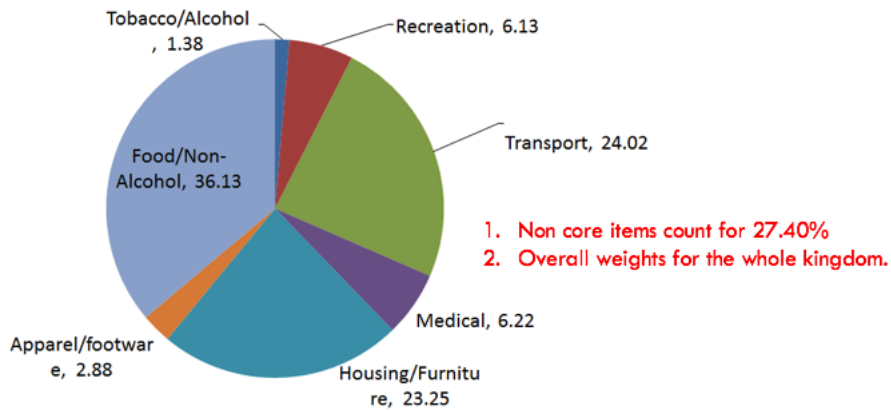
2.2.4 Problems with price indices

- Changes in the relative prices over time.
 - Assuming no change in consumers' choice despite changes in relative prices.
 - The items with rising prices will be over-weighted.
- Changes in the quality of the goods over time.
- Emergence of new goods.
- Miscalculation matters a lot public policy.
 - In many countries, social security payment (retirement income) is tied to the CPI inflation; the goal is to maintain the same standard of living.
 - Upward biased calculation in inflation hence results in higher budget than that would have been necessary if the calculation had been made correct.

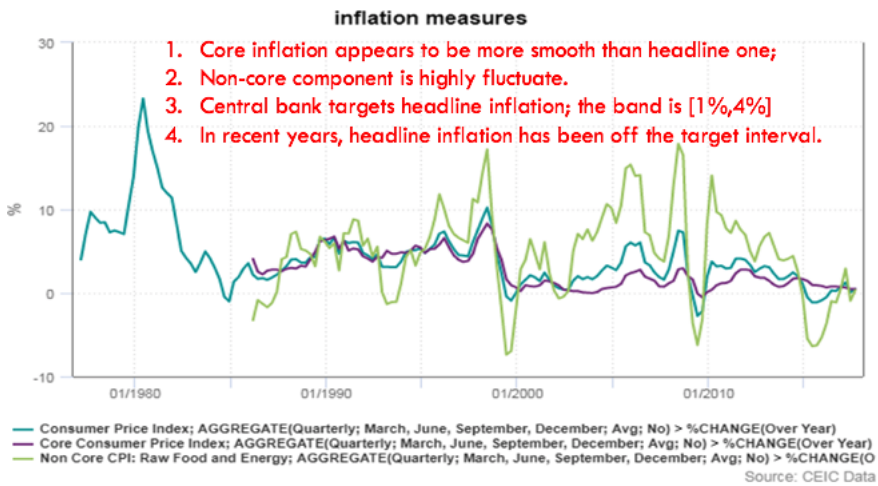
2.2.5 Thailand's Inflation Figures

- The series are calculated monthly by the Bureau of Trade and Economic Indices, Internal Trade Department Ministry of Commerce.
- Data is collected, based on the survey.
 - **Headline** (General) CPI: prices of 7 groups (373 items) of goods and services.
 - **Core** CPI: prices of 266 items, excluding fresh food and energy group (107 items).

Weight in the calculation of CPI



Headline and Core inflation



3 Labor market measurement

- Real GDP provides us several key information on how strong economy is performing.
- CPI Inflation measures the rise of cost of living, and hence reflects welfare.
- Another counterpart measurement for the slackness/tightness economics activities is the labor market indicators such as unemployment rate.

How do we Measure labor market activities?

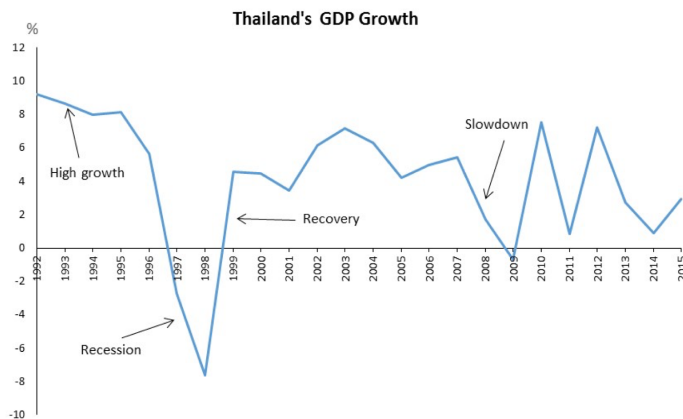
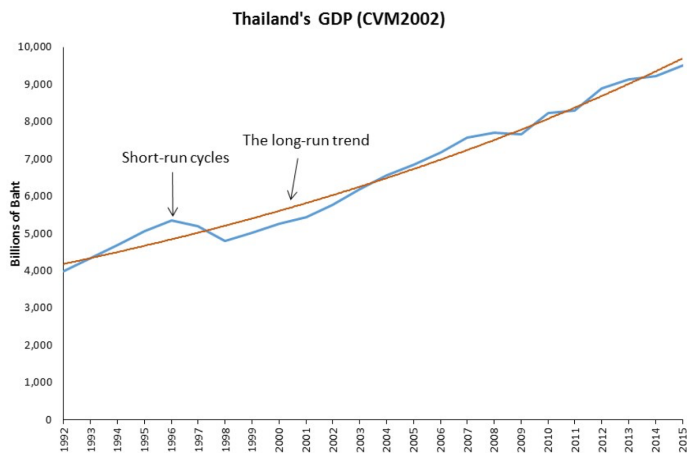
- Labor market indicators are reported by survey.
- Working-age population: labor force plus not in labor force.
- Labor force = the employed + unemployment.
- Unemployment = those who look for the job, but not currently being employed
- Unemployment rate = the unemployed/labor force.
- Labor-force participation rate = total labor force / working-age population
- Discouraged workers: those who wish to work but have stopped searching for jobs and thus are dropped out of the labor force.
- Two sources: NESDB (and also NSO.)
- Labor force: persons with the age of 15-59.
- Underemployment: work less than 35 hours and available for more.

	2017/Q1
1.Population	67,555.03
1.1 Below 15 years	11,726.48
1.2 Above 15 years	55,828.55
2. Labor force (2.1 + 2.2 + 2.3) 3/	38,216.14
2.1 Employed	37,443.2
Underemployed	335.65
2.1.1.Agri	11,002.54
2.1.2.Manu	8,837.86
2.1.3 Service	14,689.65
2.2 Unemployment	463.38
2.3.seasonal unemployed	309.56
3.Not in the labor force with 15 years of age above	17,612.41
3.1 housework	5,169.94
3.2 study	4,444.33
3.3 Young / old / in capacitate to work	6,196.75
3.4 others	1,801.4
Labor force participation rate (2 divided by 1.2)	68.45%
unemployment rate (2.2 divided by 2)	1.21%

Part II

Economic Growth and Business Cycles

- The time series of GDP can be separated into trend and business cycle components.
- Two periods of analysis are as follows.
 1. Long-run growth: long-term trends.
 2. Short-run fluctuations: business cycles.



4 Economic Growth

GDP (millions of US dollars)

Country	1990	1996	2006	2013	2016
Thailand	85,343	183,035	221,758	420,529	407,026
Hong Kong	76,928	159,717	193,536	275,697	320,914
China	360,858	863,747	2,752,132	9,607,224	11,199,145
Malaysia	44,024	100,855	162,691	323,277	296,536

GDP Per Capita in U.S. Dollars

Country	1990	1996	2006	2013	2016
Thailand	1,508	3,043	3,369	6,171	5,910
Hong Kong	13,486	24,818	28,224	38,358	43,681
China	318	709	2,099	7,078	8,123
Malaysia	2,441	4,797	6,223	10,882	9,508

source: www.worldbank.org

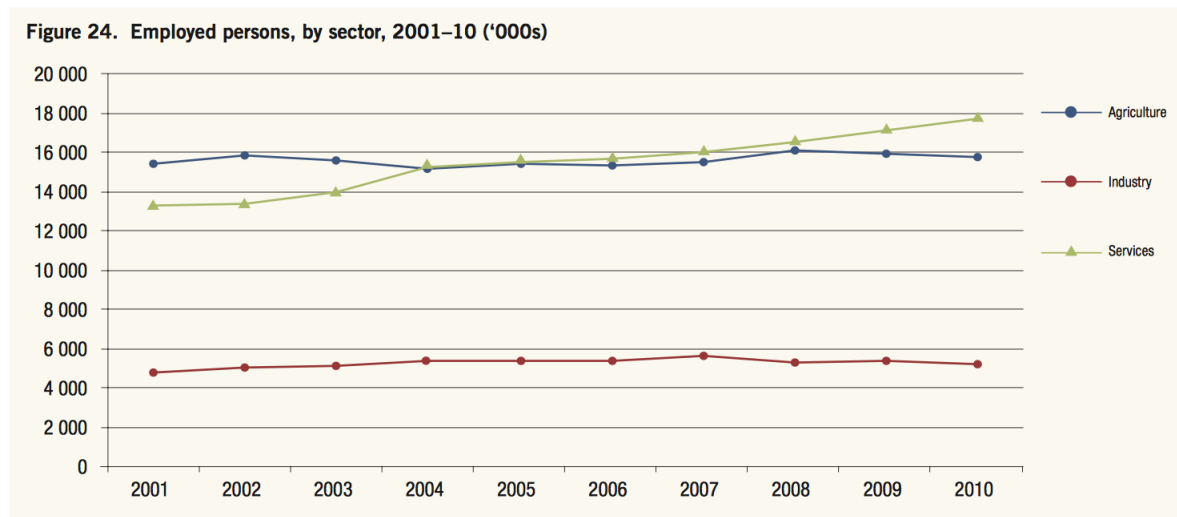
- standard of living $\leftarrow$ GDP per capita
- Factors which determine long-run growth.
 - Growth theories.
 - Solow growth model.
 - Endogenous growth models.

5 Business cycles

- Deviations of GDP growth from long-term trends.
- Factors which cause GDP to deviate from trends.
 - Business cycle theories.
 - Real business cycle theory;
 - Market segmentation theory;
 - Keynesian sticky-wage IS-LM, AD-AS model.

“Motivating questions” (Page 22. Williamson)

- What causes sustained economic growth?
- Could economic growth continue indefinitely, or is there some limit to growth?
- Is there anything that governments can or should do to alter the rate of Economic growth?
- What causes business cycles?
- Could the dramatic decreases and increases in economic growth repeated?
- Should government act to smooth business cycles?



Source: NSO, Labour Force Surveys, 2001–10.