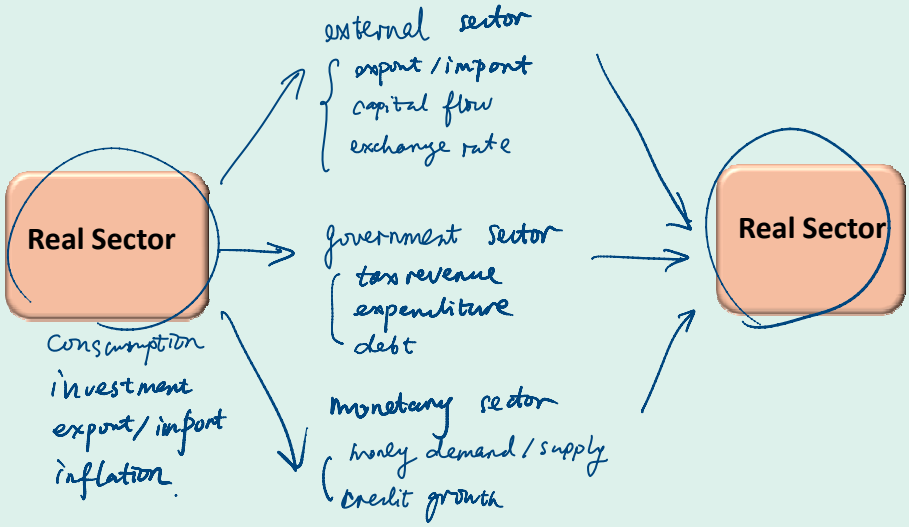
INTRODUCTION

Real sector refers to **real economic transactions** of an economy.

Main players:

- Households/Consumers
- Non-financial corporations
- Financial corporations
- General government
- Rest of the world

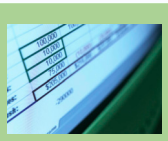
INTRODUCTION



OBJECTIVES

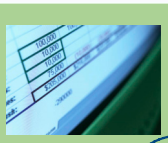
- Identify and explain the main items in the National Income and Product Accounts (NIPA)
- Understand and explain various ways to measure Gross Domestic Product (GDP)
- Understand how GDP is linked to other economic aggregates
- Understand how to measure inflation
- Analyze GDP growth
- Analyze private consumption and investment

OUTLINE



National Income Accounting

GDP
GNI
GNDI
C.
I

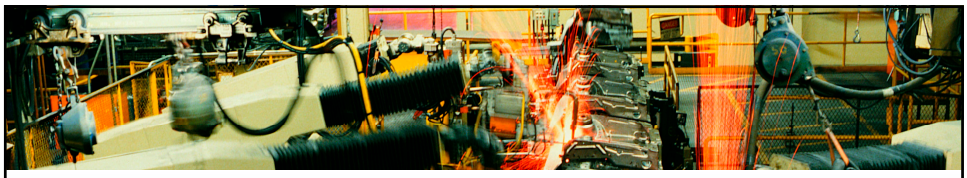


Nominal and Real Variables

Analysis of Growth

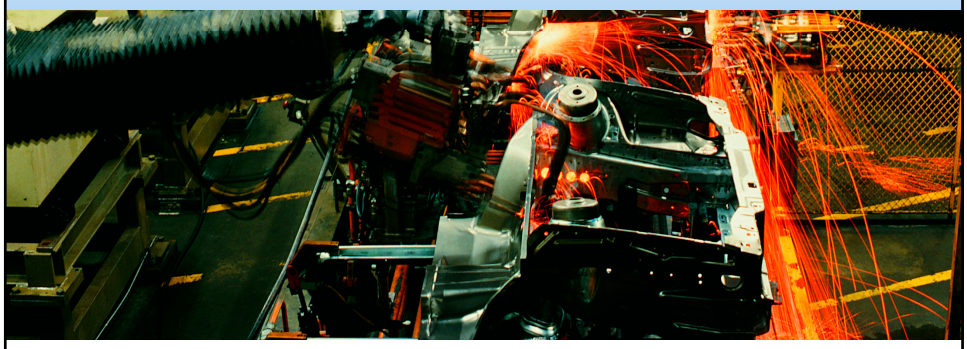
Analysis of Private Investment

Analysis of Private Consumption



Real Sector

1A. National Income and Product Accounts



INTERNATIONAL MONETARY FUND

NIPA

Real sector refers to
real economic transactions of an economy

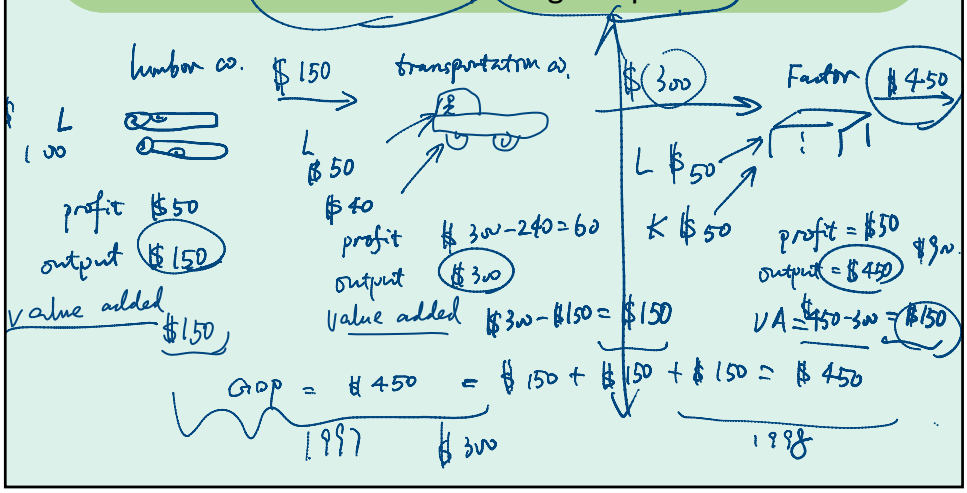
The quantification, description, and presentation of these transactions takes place within the framework of the National Income and Product Accounts (NIPA).

Key to the real sector is the concept of

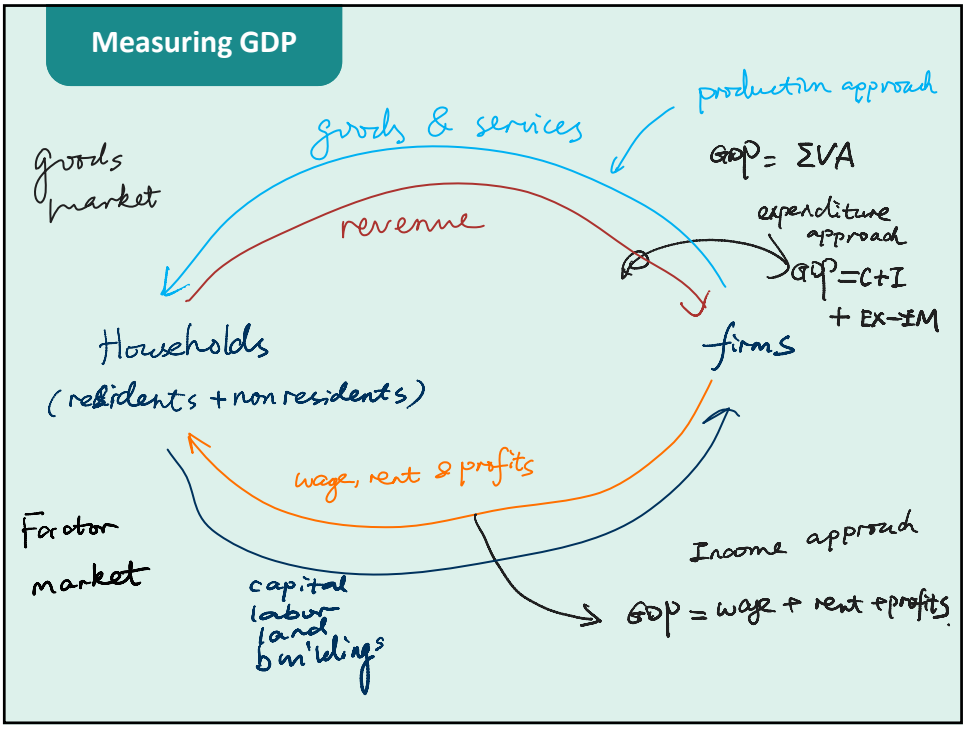
Gross Domestic Product (GDP):
the market value of all final goods and services produced within a country in a given period

Production Approach

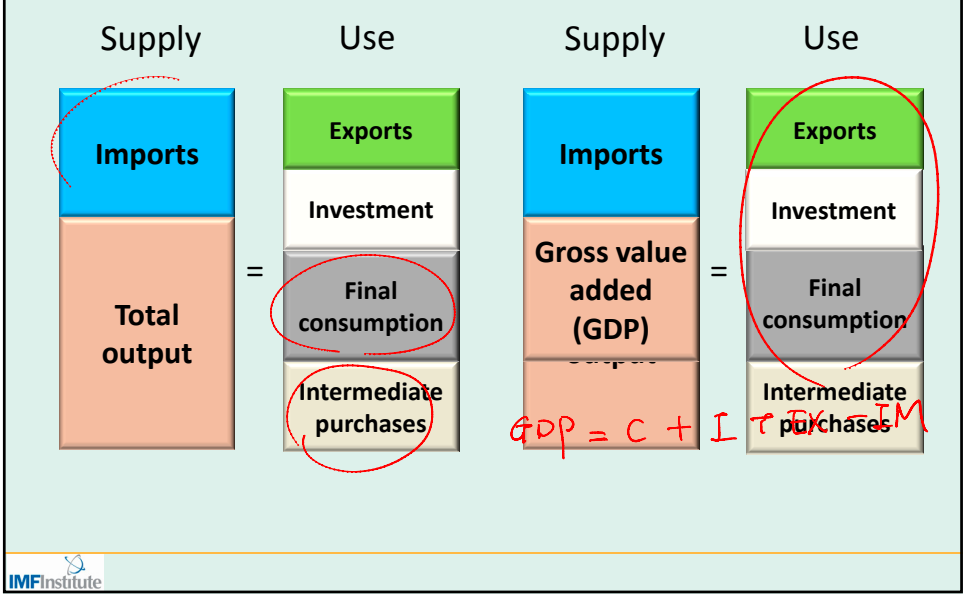
Gross Domestic Product (GDP):
the market value of all final goods and services produced within a country in a given period



Measuring GDP



Expenditure Approach



Income Approach

The Income Approach adds up the value of all income generated by a country's residents:

+ Compensation of employees (W) → workers

+ Gross operating surplus of business (OS) – includes profits, rent, interest, and so on → firms

+ Taxes on goods and services less subsidies (TSP) → government

Measuring GDP

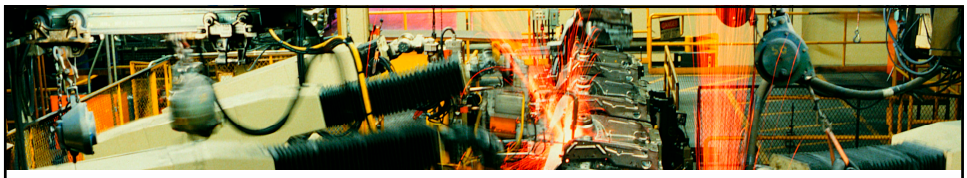
GDP=

total expenditure = total Production = total income

Expenditure Approach (buyer's payment)	Product Approach (seller's receipts)	Income Approach (income generated)
Consumption (C) + Investment (I) + Exports (X) – Imports (M)	sum of value added across sectors (or firms) of economy	Compensation of employees + Gross operating surplus + taxes- subsidies

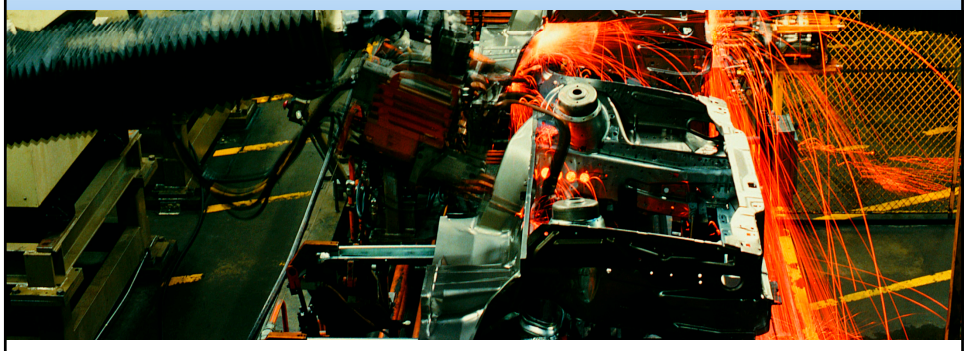
Problems Measuring GDP

1. Some types of output are ***inaccurately measured***, because they are not traded (e.g. public education)
2. ***Black market*** economy
3. National accounts do not take ***externalities*** into account (e.g. pollution)
4. Some economic activities represent use of resources to offset impact of ***undesirable activities*** (e.g. prisons)
5. Improvements in ***quality of goods*** are not adequately reflected in national accounts (e.g. computer goods)



Real Sector

1B. Linking GDP to Other Aggregates

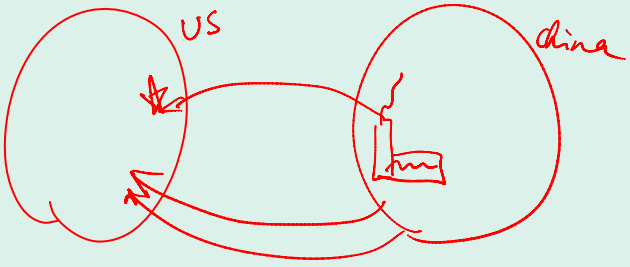


INTERNATIONAL MONETARY FUND

GNI

- Gross National Income (GNI) measures production or income that is earned using a country's ***resources***:

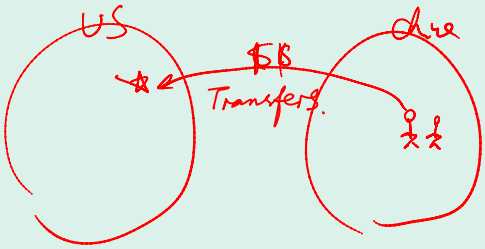
GNI = GDP + Factor payments from nonresidents
- Factor payments to nonresidents



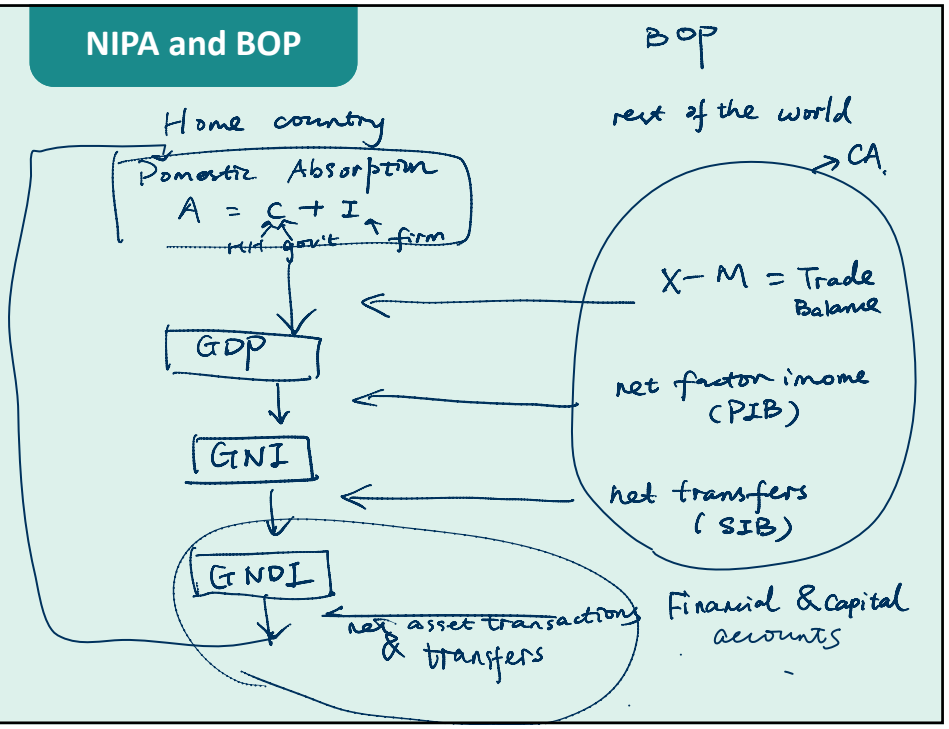
GNDI

- Gross National Disposable Income (GNDI) is the total income available to residents for either final consumption or saving

GNDI = GNI + Current transfers from nonresidents
- Current transfers to nonresidents



NIPA and BOP



Summary

GDP = A+ (X-M)

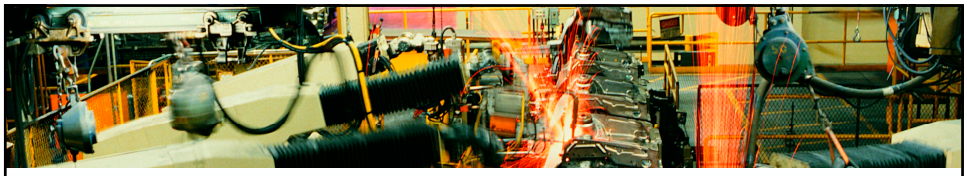
= C+ I + (X-M)

GNI = GDP + PIB

GNDI = GNI + SIB = C + I + (X-M) + PIB + SIB

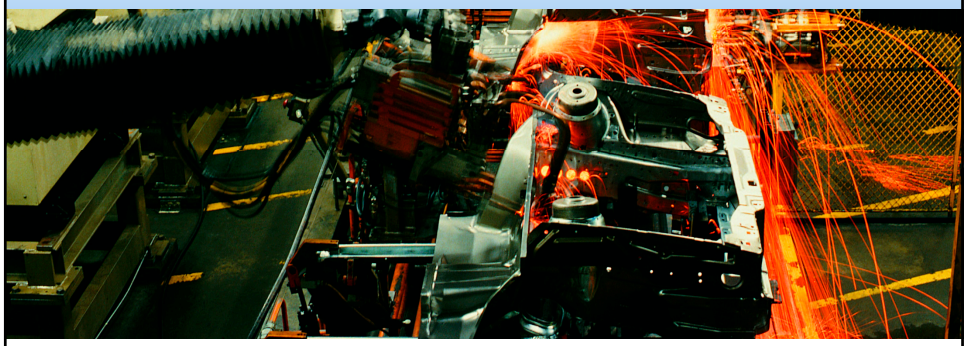
Therefore,

GNDI – C – I = (X-M)+ PIB + SIB= CAB



Real Sector

1c. Saving, Investment and Current Account



INTERNATIONAL MONETARY FUND

Recap

net factor income ↓ net transfers ↓

$$GNDI = GDP + PIB + SIB$$

$$= \underbrace{(C + I)}_{A} + \underbrace{(X - M) + PIB + SIB}_{CAB}$$

$$\Rightarrow GNDI \uparrow - A \downarrow = CAB \uparrow$$

$CAB < 0 \iff GNDI < A$

$GNDI - C - I = CAB$

National Saving

Gross National Saving (S) is defined as:

$$S = GNDI - C = GNDI - C_p - C_g$$

S = current income − spending for current needs

- Saving can be further decomposed into private and public saving:

$S_p = YD_p - C_p$.

$= GNDI + TR + INT - T - C_p$

$S_g = T - TR - INT - C_g$

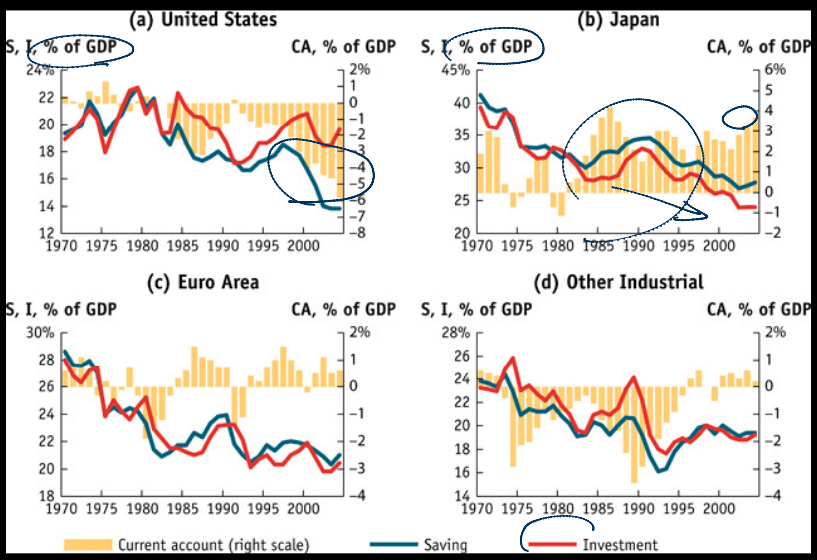
$S = S_p + S_g = GNDI - C_p - C_g$

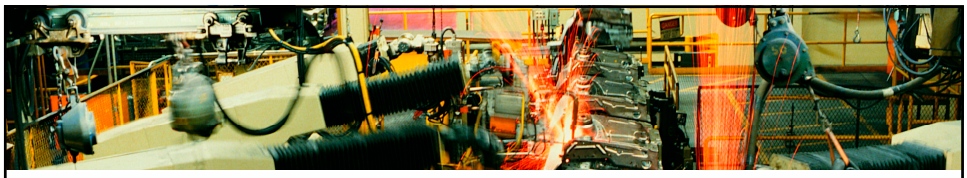
Saving-Investment

$$CAB = S - I = (S_p - I_p) + (S_g - I_g)$$

- $I > S \Leftrightarrow CAB < 0$. net borrowing from abroad
- $S > I \Leftrightarrow CAB > 0$, net lending abroad.
- twin deficits, $CAB < 0 \Leftrightarrow S < I$
  $S_g < I_g$

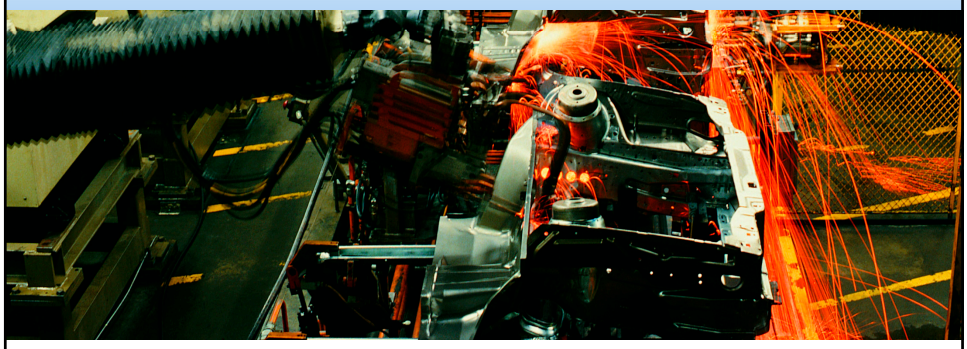
Example: Saving, Investment and CAB





Real Sector

1D. Nominal and Real Variables



INTERNATIONAL MONETARY FUND

Nominal versus Real

Nominal GDP (GDP) measures the total value of production at current prices

Real GDP (RGDP) attempts to isolate those changes in GDP that reflect changes in quantities (rather than in prices)

"GDP at constant prices"
fixed base year

Example: Nominal vs. Real Output

Data

Product	**Year 1**	**Year 2**	**Percentage change**
Quantity			
Computers	10	15	50%
Shoes	400	500	25%
Price			
Computers	1000	800	-20%
Shoes	50	65	30%
Value			
Computers	10,000	12,000	20%
Shoes	20,000	32,500	63%
Total	30,000	44,500	48%

$\left(\frac{44500}{30000} - 1\right) \times 100 = 48\%$

Example: Nominal vs. Real Output

base year

Data					
Product	**Year 1**	**Year 2**	**Percentage change**	**Year 2**	**Percentage change**
Quantity					
Computers	10	15	50%	15	50%
Shoes	400	500	25%	500	25%
Price					
Computers	1000	800	-20%	1000	0%
Shoes	50	65	30%	50	0%
Value					
Computers	10,000	12,000	20%	15,000	50%
Shoes	20,000	32,500	63%	25,000	25%
Total	30,000	44,500	48%	40,000	33%

$\Delta RGDP = \left(\frac{40000}{30,000} - 1\right) \times 100 = 33\%$

GDP deflator

The GDP deflator (PGDP) is an index that measures the average price of goods and services produced relative to a base year

$$GDP = RGDP \times PGDP$$

$$PGDP = \frac{GDP}{RGDP}$$

$$= \frac{\sum_{i=1}^{N} P_t^i q_t^i}{\sum_{i=1}^{N} P_0^i q_t^i} \times 100$$

Illustration

Data base year

	Year 1	Year 2	Perc. Change	Year 2	Perc. Change
Product (quantity)					
Computers	10	15	50%	15	50%
Shoes	400	500	25%	500	25%
Price					
Computers	1000	800	-20%	1000	0%
Shoes	50	65	30%	50	0%
Value					
Computers	10,000	12,000	20%	15,000	50%
Shoes	20,000	32,500	63%	25,000	25%
Total	30,000	44,500	**48%**	40,000	**33%**

	Year 1	Year 2
Price deflator	100	111.25

$$PGDP = \frac{GDP}{RGDP} \times 100$$

$$= \frac{44\,500}{40\,000} \times 100$$

$$= 111.25$$

CPI

The consumer price index (CPI) measures the cost of a basket of goods and services purchased by a typical household for consumption in some base period.

$$CPI_t = \frac{\sum_{i=1}^{N} p_t^i q_0^i}{\sum_{i=1}^{N} p_0^i q_0^i} \times 100$$

CPI-U

GDP deflator and CPI

Differences:

- They cover different sets of goods and services:
  - The CPI: the prices of a representative basket of goods and services purchased by consumers.
  - The GDP deflator: the price of all newly and domestically produced final goods and services
- They are constructed differently
  - The CPI uses a fixed basket of goods and services
  - The basket changes for the GDP deflator

Inflation

Inflation is a sustained increase in the general level of prices of goods and services in an economy.

- CPI inflation is the most widely used measure

$$\Delta CPI_t = \left(\frac{CPI_t}{CPI_{t-1}} - 1 \right) \times 100$$

- Other measures include *changes* in:
  - The GDP deflator (PGDP)
  - Wholesale Price Index (WPI) or Producer Price Index (PPI)

Role of Inflation

- To calculate real variables
  - Real return (e.g. real interest rate) ⇒ Consumption / Saving / investment

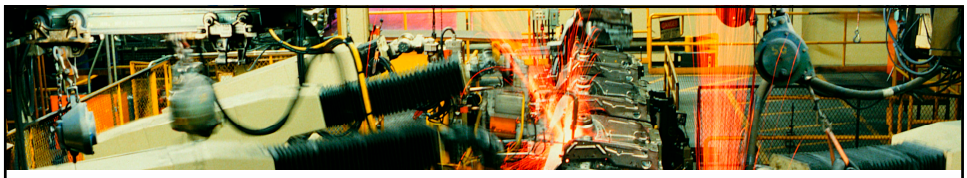
t+1 : \$100 / \$100 ∴ 1 ; t : \$105 / \$110 < 1

$i = \left(\frac{105}{100} - 1\right) = 5\%$

$r = \frac{(1+i)}{(1+\pi)} - 1 \approx -5\%$

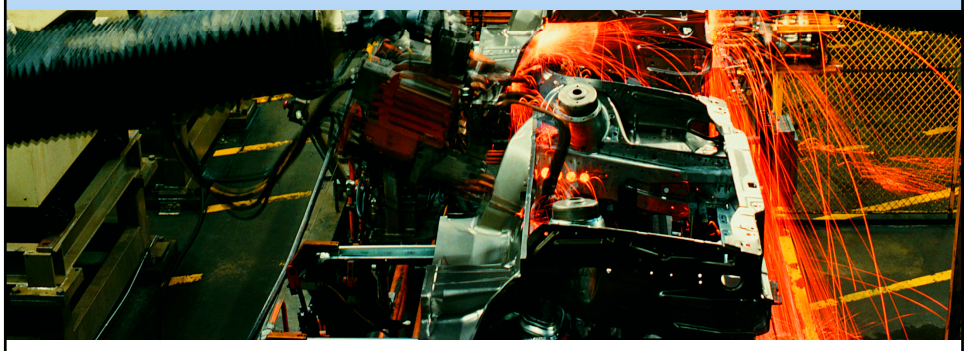
$r \approx i - \pi^e$

  - Real exchange rate ⇒ Trade and capital flow
  - Real wage
- Proxy for uncertainty



Real Sector

2A. Analysis of Growth



INTERNATIONAL MONETARY FUND

Potential Output

Potential Output is the level of output that can be produced if all of the factors of production are employed at its "natural rate".

Output gap
= (Actual GDP– Potential GDP)/ Potential GDP * 100

output gap > 0 ⇒ inflation ↑
output gap < 0 ⇒ inflation ↓
non inflation accelerating output

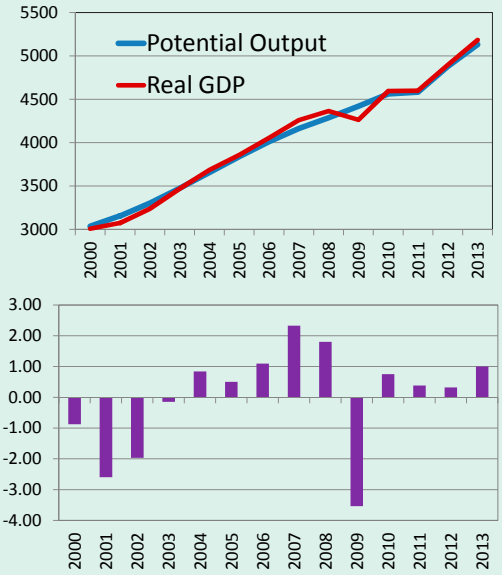
Potential Output

How to estimate potential output?

- The production function approach $Y = Af(K, L)$
- Time Series techniques
  - Linear regression
  - Univariate filters e.g. Hodrik-Prescott, band-pass filter
- Survey responses

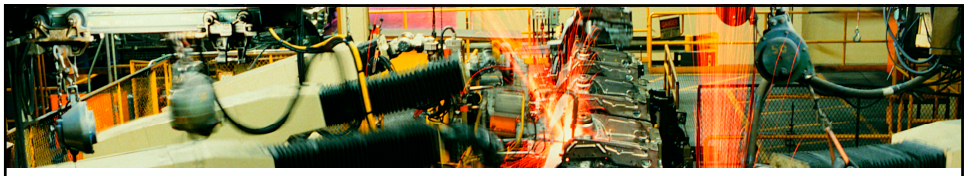
Example: Thailand, 2000-13

Year	Real Output	Potential Output	Output Gap
2000	3008	3035	-0.87
2001	3074	3156	-2.60
2002	3237	3302	-1.97
2003	3468	3473	-0.15
2004	3687	3656	0.84
2005	3858	3839	0.50
2006	4055	4011	1.09
2007	4259	4162	2.33
2008	4365	4288	1.80
2009	4263	4420	-3.54
2010	4596	4562	0.75
2011	4600	4582	0.38
2012	4896	4880	0.32
2013	5184	5132	1.00



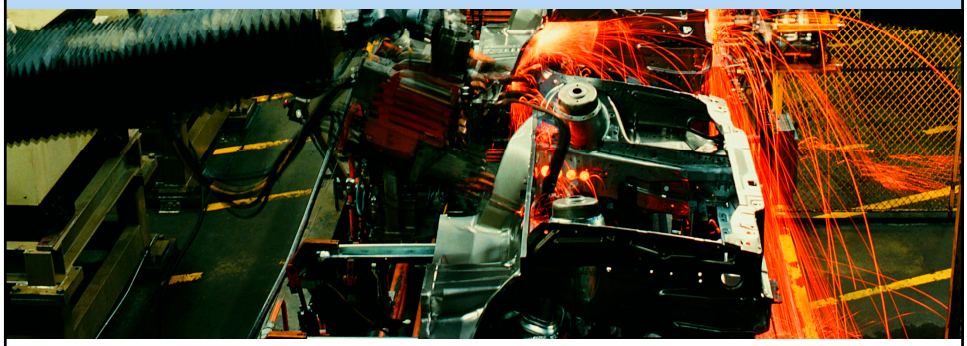
Contribution to Growth

	1992	1993	1994	1995	Est. 1996
			(1988 Prices=100)		
Consumption	1,470	1,591	1,717	1,844	1,954
Private	1,276	1,387	1,505	1,630	1,730
Government	194	204	212	214	223
Investment	929	1,016	1,144	1,300	1,397
Private fixed	731	820	917	1,031	1,095
Public sector	183	191	219	257	299
Change in stocks	14	4	8	13	4
Domestic demand	2,398	2,607	2,861	3,144	3,351
Exports of goods and services	918	1,031	1,182	1,356	1,389
Imports of goods and services	977	1,106	1,297	1,516	1,558
Net export	-59	-75	-115	-160	-170
Statistical discrepancy	-57	-62	-56	-61	-63
Gross domestic product	2,282	2,471	2,690	2,923	3,118
			(Contributions to Growth)		
GDP		8.3	8.9	8.7	6.7
Domestic demand		9.1	10.3	10.5	7.1
Net exports		-0.7	-1.6	-1.6	-0.3
Private Consumption		4.9	4.8	4.6	3.4
Private Investment		3.9	3.9	4.2	2.2
Government		0.8	1.4	1.5	1.8



Real Sector

2B. Determinants of Private Consumption



INTERNATIONAL MONETARY FUND

Introduction

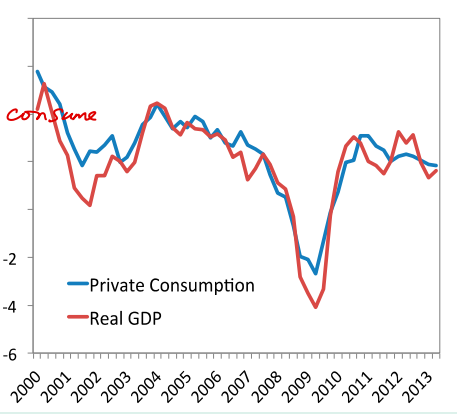
- C_p is normally the largest component of aggregate demand

- The simplest version of Keynesian economic theory: marginal propensity to consume

  $C_p = a + b \times$ disposable income

- Life-cycle hypothesis

- Permanent income hypothesis



Introduction

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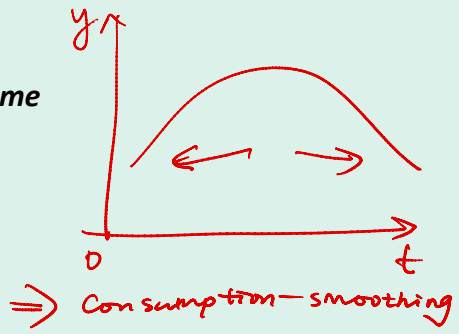
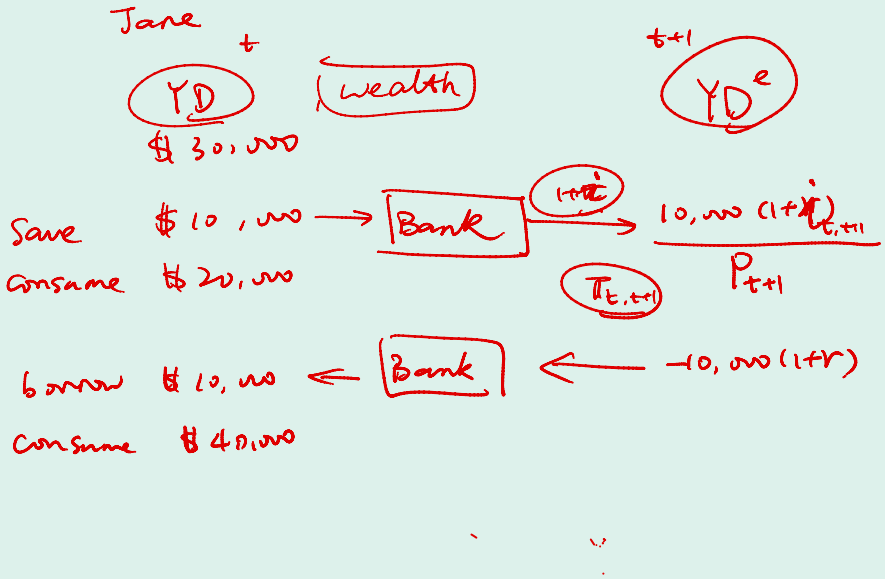


Determinants of Private Consumption



Determinants of Private Consumption

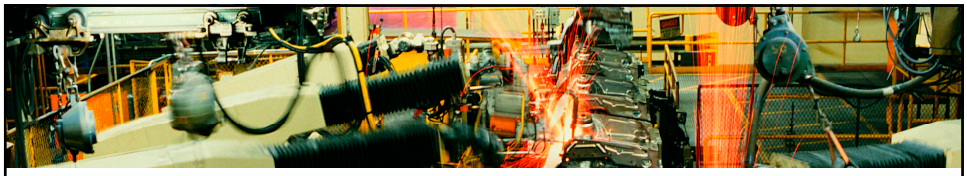
$C_P = f$ (YD, YD^e, wealth, real interest rate, uncertainty, credit, financial market conditions, …)

- Current disposable income, YD
- Expectations, YD^e
- Wealth
- Uncertainty
- Availability of credit
- After-tax real rate of interest
  - Substitution effect
  - Income effect

Other Considerations

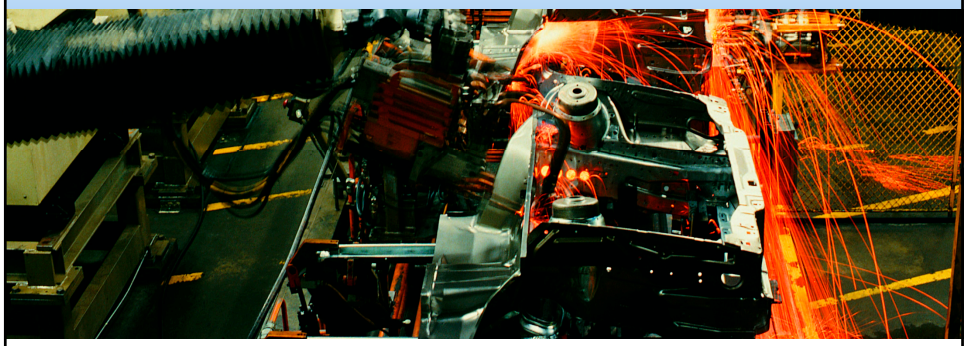
- Income distribution
  - Income is not equally distributed across households and may affect national consumption and saving rates
- Demographics
  - Saving rates differ across age groups
- Government Borrowing

  The effects depends on
  - What is the borrowing used for?
  - Which generation is bearing the burden?
  - Does borrowing aid or impede financial market development?



Real Sector

2C. Determinants of Private Investment



INTERNATIONAL MONETARY FUND

Introduction

Investment: the purchase or construction of capital goods, including residential and nonresidential buildings, machines and equipment, and additions to inventory stocks.

- Investment fluctuates more than the other components of aggregate demand → economic fluctuations
- Investment plays a crucial role in determining the long-run productive capacity of the economy
- What determines the amount of investment?

Determinants of non-residential investment

Firm's profit-optimizing decision

Marginal product of capital = Marginal cost of capital

- Current and expected profits
- Factor productivity
- Competitiveness (due to a real exchange rate change)
- .....

- Cost of finance (real interest rates; taxes)
- Cost of other inputs of production (wage, energy cost, intermediate inputs)
- .....

$I_P = f$ (**GDP, ΔGDP, sales, real interest rate, exchange rate, wage, oil price, capacity utilization, ER/inflation volatility, political volatility…)**

Inventories and residential investment

- What about **inventory investment** (unsold goods, unfinished goods, or raw materials)?
  - Apply the same approach
- What about the **construction of residential buildings**?
  - Apply the same approach
  - Government and credit policies (esp. the amount of credit allocated to construction, interest rates, regulations or taxes, household income and housing deficit)

Investment in Developing Countries

- Previously:
marginal product of capital = marginal cost of capital
- The standard optimizing investment models are weakened by
  - Under-developed financial market
  - Large role of government in capital formation ("crowding out" effect)
  - Distortions created by foreign exchange constraints
- Consider other factors:
  - Bank credit
  - Foreign capital inflows
  - Retained profits