2.	FOREIGN EXCHANGE MARKET CONCEPTS

Exchange rate: An exchange rate is the price of one currency (**base currency**) in terms of another currency (**price currency**) i.e. the number of units of price currency required to purchase one unit of base currency, quoted as P/B.

- For example, A/ B refers to the number of units of 'Currency A' that can be bought by one unit of 'Currency B'.
- Currency B is the *Base currency* and Currency A is the *Price currency*.
- Typically, exchange rates are quoted to four decimal places; except for yen, for which exchange rate is quoted to two decimal places.

Example:

Suppose, USD/ EUR exchange rate of 1.456 means that 1 euro will buy 1.456 U.S. dollars

- Euro is the base currency
- U.S. dollar is the price currency.

If this exchange rate decreases, then it would mean that fewer U.S. dollars will be needed to buy one euro. It implies that:

- U.S. dollar appreciates against the Euro or
- Euro depreciates against the U.S. dollar.

Spot Exchange-rate: The exchange rate used for **spot transactions** i.e. the exchange of currencies settled in two business days after the trade date, is referred to as "T+2 settlement".

Note: For Canadian dollar, spot settlement against the U.S. dollar is on a T + 1 basis.

Two-sided Price: Two-sided Price refers to the buying and selling price of a **base** currency quoted by a dealer.

- **Bid Price:** The price at which the dealer is willing to **buy the Base currency** i.e. number of units of **price currency** that the client will receive by selling 1 unit of base currency to a dealer.
- **Ask or Offer Price:** The price at which the dealer is willing to **sell the Base currency** i.e. number of units of **price currency** that the client must sell to the dealer to buy 1 unit of base currency.

Bid-offer Spread = Offer price – Bid price

- Bid-offer Spread is the compensation of the counterparty for providing foreign exchange to other market participants.
- The lower the buying rate (bid price) and the higher the selling rate (offer price) ➔ the wider the bid-ask spread, ➔ the higher the profit for a dealer.
- The size of the bid-offer spread (in pips) can vary

widely across exchange rates and over time.

Important Points:

1) Bid Price is **always lower** than Offer Price.
2) The counterparty in the transaction will have the *option (but not the obligation)* to deal at either the bid price (to sell the base currency) or offer price (to buy the base currency) quoted to them by the dealer.

- When counterparty deals at bid price, it is referred to as "hit the bid".
- When counterparty deals at offer price, it is referred to as "paid the offer".

Example:

Suppose, USD/SFr exchange rate = 0.3968/0.3978 ➔ Dealer is willing to pay USD 0.3968 to buy 1 SFr and that the dealer will sell 1 SFr for USD 0.3978.

Interbank Market: It is the market where the dealers (or professional market participants) engage in foreign exchange transactions among themselves. It involves dealing sizes of at least 1 million units of the base currency and trades are measured in terms of multiples of a million units of the base currency.

- The bid-offer spread that dealers receive from the interbank market is generally narrower than the bid-offer spread that they provide to their clients.
- The interbank market facilitates dealers to:
  A.   Adjust their inventories and risk positions;
  B. Distribute foreign exchange currencies to end users;
  C.   Transfer foreign exchange rate risk to market participants who are willing to assume that risk;
- When the dealer buys (sells) the base currency from (to) a client, the dealer typically enters into an offsetting transaction and sells (buys) the base currency in the interbank market.

Factors that affect the size of the bid/offer spread:

1) Interbank market liquidity of the underlying currency pair: The bid-offer spread in the interbank foreign exchange market depends on the liquidity in the interbank market i.e. the greater the liquidity, the narrower the bid-ask spread.

Liquidity in the interbank market depends on the following factors:

a) The currency pair involved: Some currency pairs e.g. USD/EUR, JPY/USD, or USD/GBP have greater liquidity due to greater market participation and as a result narrower bid-offer spreads.

b) The time day: Although FX markets are open 24 hours a day on business days, the interbank FX markets

have the greatest liquidity when the major FX trading centers are open. The liquidity in the interbank markets can be quite thin between the time New York closes and the time Asia opens.

c) **Market volatility:** The more volatile the market is → the more uncertain market participants are about the factors* that influence market pricing → the lower the liquidity and consequently, the wider the bid-offer spreads in both the interbank and broader markets.

*These factors include geopolitical events (e.g. war, civil strife), market crashes, and major data releases (e.g. U.S. nonfarm payrolls).

i.   **The size of the transaction:** Generally, the larger the size of the transaction, the more difficult it is for the dealer to lay off foreign exchange risk of the position in the interbank FX market, and as a result, the wider the bid-offer spread. In addition, retail transactions (i.e. dealing sizes of <1 million units of the base currency) tend to have relatively wider bid-offer spreads than that of interbank market.

ii. **The relationship between the dealer and the client:** The dealer may provide a tighter (smaller) bid-offer spot exchange rate quote

- In order to win the client's business for other services besides spot foreign exchange business e.g. transactions in bond and/or equity securities.
- In order to win repeat FX business.
- To a client with a good credit profile.

However, due to short settlement cycle for spot FX transactions, credit risk is not considered as an important factor in determining the client's bid-offer spread on spot exchange rates.

2.1	**Arbitrage Constraints on Spot Exchange Rate Quotes**

The two arbitrage constraints on spot exchange rate quotes are as follows:

1) *The bid quoted by a dealer in the interbank market <u>must be lower</u> than the current interbank offer; and the offer quoted by a dealer must be higher than the current interbank bid*; otherwise, arbitrage opportunities exit.

Example:

Suppose the current spot USD/EUR price in the interbank market is 1.3548/1.3550. But a dealer quoted a price of 1.3551/1.3553. Thus, other market participants would pay the offer in the interbank market i.e. buying EUR at a price of USD 1.3550 and then sell the EUR to the dealer by hitting the dealer's bid at USD 1.3551; hence, making a riskless profit = one pip.

2) *The cross-rate bids (offers) quoted by a dealer <u>must be lower (higher)</u> than the implied cross-rate offers (bids) quoted in the interbank market.*

Cross-Rate Calculations:

Suppose,

Exchange rate for CAD/USD = 1.0460
Exchange rate for USD/EUR = 1.2880

The exchange rate for CAD/EUR is determined as follows:

$$\frac{CAD}{USD} \times \frac{USD}{EUR} = \frac{CAD}{EUR}$$

$$1.0460 \times 1.2880 = 1.3472 \text{ CAD/EUR}$$

Now Suppose,

Exchange rate for CAD/USD = 1.0460
Exchange rate for JPY/USD = 85.50

The exchange rate for JPY/CAD is determined as follows:

$$\frac{CAD}{USD} \times \frac{JPY}{USD} = \frac{1}{\frac{CAD}{USD}} \times \frac{JPY}{USD} = \frac{USD}{CAD} \times \frac{JPY}{USD} = \frac{JPY}{CAD}$$

$$(1/ 1.0460) \times 85.50 = 81.74 \text{ JPY/CAD}$$

Triangular arbitrage:

The cross-rate quotes ***must be consistent*** with the components' underlying exchange rate quotes. If they are not consistent, then arbitrage opportunities exist.

Suppose, a misguided dealer quotes JPY / CAD rate of 82.00. Hence, profit can be earned by:

- Buying CAD1 at the lower price of JPY81.74.
- Selling CAD1 at JPY82.00.

A riskless arbitrage profit that can be earned by a trader = JPY0.26 per CAD1.

This arbitrage is known as triangular arbitrage because it involves three currencies.

NOTE:

Bid Rate (A per B) = 1 / Ask Rate (B per A)
E.g. Bid Rate (CAD per USD) = 1 / Ask Rate (USD per CAD)
Ask Rate (A per B) = 1 / Bid Rate (B per A)
E.g. Ask Rate (CAD per USD) = 1 / Bid Rate (USD per CAD)

Practice: Example 1, Volume 1, Reading 11.

2.2	**Forward Markets**

Currency forward contracts represent an obligation to buy or sell a certain amount of a specified currency at a *future date* at an exchange rate determined today. Unlike spot transactions, forward contracts involve

settlement period longer than the usual "T + 2" settlement for spot delivery.

- The exchange rate used for forwards transactions is called the **forward exchange rate**.

Example:

Suppose, today is 16 November.

- Spot settlement is for 18 November.
- Three-month forward settlement would be 18 February of the following year.

For details, refer to section 3.1.1 below

Points on a forward rate quote: Typically, forward exchange rates are quoted in terms of points (called pips).

Points on a forward rate quote = Forward exchange rate quote – Spot exchange rate quote

Note:

- In the bid-offer quote, the bid will always be smaller than the offer, even when the forward points are negative.
- **Positive Forward Points:** forward rate > spot rate, indicating that the base currency is trading at a forward premium and price currency is trading at a forward discount.
- **Negative Forward Points:** forward rate < spot rate, indicating that the base currency is trading at a forward discount and price currency is trading at a forward premium.
- The absolute number of forward points is positively related to the term of the forward contract i.e. *the longer the term, the greater the absolute number of forward points*.

Example:

Spot exchange rate USD/ EUR =1.2875
One year forward rate USD/ EUR = 1.28485
One year forward point = 1.28485 – 1.2875 = –0.00265

- It is scaled up by four decimal places by multiplying it by 10,000 i.e. -0.00265 × 10,000 = -26.5 points.

Converting forward points into forward quotes:

To convert the forward points into forward rate quote, forward points are scaled down to the fourth decimal place in the following manner:

$$Forward\ rate = Spot\ exchange\ rate + \frac{Fowrad\ points}{10,000}$$

$Forward\ premium/discount\ (in\ \%)$

$$= \frac{spot\ exchange\ rate - (forward\ points/10,000)}{spot\ exchange\ rate} - 1$$

- When a market participant is selling (buying) base currency ➜ he/she would use bid (offer) rates for both the spot and the forward points, implying that the market participant will hit the bid (pay the offer).
- It is important to note that quoted points are not annualized because they are already scaled to each maturity.

The spot rate can be converted into a forward quote when points are represented as % as follows:

Spot exchange rate × (1 + % premium)
Spot exchange rate × (1 - % discount)

NOTE:

When exchange rate is quoted to only two decimal places, forward points are divided by 100.

FX swap: FX swap is a combination of an offsetting spot transaction and a new forward contract in the same base currency i.e. the base currency is purchased (sold) spot and sold (purchased) forward. Generally, the mid-market spot exchange rate is used for the swap transaction.

Uses: FX swaps can be used:

- for funding purposes (called swap funding).
- to roll over a forward position into future either for hedging or speculation purposes.
- to eliminate foreign exchange risk.

Example:

Suppose a German based company needs to borrow EUR100 million for 90 days (starting 2 days from today). It can be done in two ways:

i. Borrow EUR100 million starting at T + 2.
ii. Borrow in U.S. dollars and exchange them for Euros in the spot FX market (both with T + 2 settlement) and then sell Euros 90 days forward against the U.S. dollar.

Factors that affect the bid-offer spread for Forward Points:

1. **Interbank market liquidity of the underlying currency pair:** The greater the liquidity, the narrower the bid-ask spread.

2. **Size of the transaction:** The larger the trade size, the lower the liquidity of a forward contract and thus, the wider the bid-ask spread.

3. **Relationship between the client and the dealer** (as explained above).

4. **Term of the forward contract:** The longer the term of the forward contract, the wider the bid-offer spread.

2.3	**Forward Markets**

Mark-to-market value of Forward Contracts:

The mark-to-market value of forward contracts represent the profit (or loss) that would be realized when the forward position is closed out at current market prices.

- At contract initiation, mark-to-market value of the contract is zero i.e. the forward rate is set such that no cash changes hands at initiation.
- Afterwards, the mark-to-market value of the forward contract changes as the spot exchange rate changes and as interest rates change in either of the two currencies.

Example:

Suppose, an investor originally bought GBP 10 million at an AUD/GBP rate of 1.600 and subsequently sold them at a rate of 1.6200. The 3-month discount rate is 4.80% (annualized).

- Long GBP 10 million at 1.6100 AUD/GBP≡ Short AUD 16,100,000 (10,000,000 × 1.6100) at the same forward rate.

At settlement date:

The net GBP amounts = 0 ➜ i.e. GBP 10 million both bought and sold.

- AUD cash flow = (1.6340 – 1.6100) × 10,000,000 = +AUD 240,000 ➜ cash inflow because the GBP subsequently appreciated (i.e. AUD/GBP rate increased).
- It is important to note that this cash flow will be paid at a settlement date. Thus, PV of the cash inflow is calculated as:

PV of future AUD cash flow = $\frac{AUD\ 240,000}{1+0.048\left[\frac{90}{360}\right]}$ = AUD 237,154

The longer the term of the forward contract, the

- lower the liquidity in the forward market.
- greater the exposure to counterparty credit risk.
- higher the price sensitivity to movements in interest rates i.e. the greater the interest rate risk of the forward contract.

Practice: Example 3, Volume 1, Reading 11.

3.	**A LONG-TERM FRAMEWORK FOR EXCHANGE RATES**

1) **Long run versus short run:** Long-term equilibrium values may act as an anchor for exchange rate movement. In the short run, no evident relationship exists between exchange rate movements and economic fundamentals.

- It is important to note that there is no simple formula, model, or approach that can be used to precisely forecast exchange rates.

2) **Expected versus unexpected changes:**

- In an efficient market, prices reflect both market participants' expectations and risk premium (i.e. compensation demanded by investors for exposures to unpredictable outcomes).
- Risk premia primarily depend on confidence and reputation and can change quickly in response to large, unexpected movements in a variable, leading to immediate, discrete price adjustments.
- In contrast, expectations of long-run equilibrium values tend to change slowly.

3) **Relative movements:** For determining exchange rates, the *differences* in key factors across countries are more important than the levels or variability of key factors in any particular country.

3.1	**International Parity Conditions**

Parity conditions show relationship between expected inflation differentials, interest rate differentials, forward exchange rates, current spot exchange rates, and expected future spot exchange rates. The key international parity conditions are as follows:

1) Covered interest rate parity
2) Uncovered interest rate parity
3) Forward rates parity
4) Purchasing power parity
5) The international Fisher effect

Assumptions of Parity Conditions:

- Perfect information is available to all market participants.
- Risk neutrality
- Freely adjustable market prices

Implication of Parity Conditions: If parity conditions are held at all times, it implies that no arbitrage opportunities exist i.e. investors cannot exploit profitable trading opportunities.

NOTE:

Parity Conditions are expected to hold in the long-run, but not always in the short term.

3.1.1) Covered Interest Rate Parity

According to covered interest rate parity,

The expected return earned on a *fully currency-hedged* foreign money market instrument investment should be **equal** to the return earned an otherwise identical domestic money market investment.

- Covered interest rate parity must always hold because it is enforced by arbitrage.

Assumptions:

- There are zero transaction costs.
- The underlying domestic and foreign money market instruments are identical in terms of liquidity, maturity, and default risk.
- Flow of capital is not restricted.

Explanation:

An investor has two alternatives available i.e.

a) Invest for one period at the domestic risk-free rate i.e. i_d;

- This amount will grow to $(1 + i_d)$ at the end of the investment horizon.

b) Convert 1 unit of domestic currency into foreign currency using the spot rate = $S_{f/d}$. (direct quote)

- Invest this amount for one period at foreign risk-free rate (i.e. i_f) e.g. in the bank deposits.
- The amount invested will grow to $S_{f/d} (1 + i_f)$ at the end of the investment horizon.
- Then, convert this amount to domestic currency using the forward rate i.e. for each unit of foreign currency, investor would obtain $1/F_{f/d}$ units of domestic currency.
- By converting the foreign currency at the forward rate, the investor has eliminated FX risk.

NOTE:

- Both of these alternatives are risk-free and have same risk characteristics.
- The arbitrage relationship holds for any investment horizon.

Covered interest rate parity is stated as follows:

$$(1 + i_d) = S_{f/d}(1 + i_f)\left(\frac{1}{F_{f/d}}\right)$$

$$F_{f/d} = S_{f/d}\left(\frac{1 + i_f}{(1 + i_d)}\right)$$

Forward rate as a % of spot rate can be stated as follows:

$$\frac{F_{f/d}}{S_{f/d}} = \left(\frac{1 + i_f}{(1 + i_d)}\right)$$

Using day count convention:

$$\left(1 + i_d\left[\frac{Actual}{360}\right]\right) = S_{f/d}\left(1 + i_f\left[\frac{Actual}{360}\right]\right)\left(\frac{1}{F_{f/d}}\right)$$

$$F_{f/d} = S_{f/d}\left(\frac{1 + i_f\left[\frac{Actual}{360}\right]}{1 + i_d\left[\frac{Actual}{360}\right]}\right)$$

- The above equation implies that covered (currency-hedged) interest rate differential between the two markets is zero.
- Thus, covered interest rate parity implies that the forward exchange rate **must be** the rate at which the holding period returns on these two alternative investment strategies will be exactly the same. Otherwise, investors can sell short lower return investment and invest in higher return investment.

For example,

a) If $(1 + i_d) > [S_{f/d}(1 + i_f)(1/F_{f/d})]$

1) Borrow in Foreign currency
2) Buy domestic currency in spot market with foreign currency
3) Lend the domestic currency i.e. invest it at i_d.
4) Sell the domestic currency forward (buy currency of original loan forward i.e. foreign currency)

- The demand for domestic currency-denominated securities causes domestic interest rates to fall, while the higher level of borrowing in foreign currency causes foreign interest rates to rise.

b) If $(1 + i_d) < [S_{f/d}(1 + i_f)(1/F_{f/d})]$

1) Borrow in domestic currency
2) Buy foreign currency in spot market with domestic currency
3) Lend the foreign currency i.e. invest it at i_f.
4) Sell the foreign currency forward (buy currency of original loan forward i.e. domestic currency).

Implications of Covered Interest Rate Parity: The forward premium should be approximately equal to the difference in interest rates, implying that any interest rate differential between countries should be offset exactly by the forward premium or discount on its exchange rate.

- When covered interest rate parity holds, the forward exchange rate will be an unbiased forecast of the future spot exchange rate.

**Practice: Example 2,
Volume 1, Reading 11.**

3.1.2) Uncovered Interest Rate Parity

According to the uncovered interest rate parity condition,

The expected return on an <u>uncovered (i.e. unhedged)</u> foreign currency investment should be **equal** to the return on a comparable domestic currency investment.

For a domestic investor, the return on a risk-free domestic money market instrument is known with certainty; however, the domestic investor is exposed to FX risk with regard to an unhedged foreign currency investment.

Uncovered interest rate parity is stated as follows:

$$i_f - \%\Delta S^e_{f/d} = i_d$$

$$\%\Delta S^e_{f/d} = i_f - i_d$$

where,

- $\%\Delta S^e_{f/d}$ **=** Expected change in the foreign currency price of the domestic currency over the investment horizon.
- An increase in $S^e_{f/d}$ indicates that the foreign currency is expected to depreciate ➔ resulting in reduction in return for an investor.
- According to uncovered interest rate parity, when return on both unhedged foreign currency investment and domestic investment is equal, investors will be indifferent between both the alternatives, reflecting that investors are **risk neutral**.
- According to this equation, the change in spot rate over the investment horizon should be, on average, equal to the differential in interest rates between the two countries.
  - E.g. if $i_f - i_d$ = 5%, it indicates that domestic currency is expected to appreciate against the foreign currency by 5% ➔ $\%\Delta S^e_{f/d}$ = 5%.
- This implies that on average, the expected appreciation/depreciation of the exchange rate is an unbiased predictor of the future spot rate.

When uncovered interest rate parity holds:

- The currency of a country with the higher (lower) interest rate or money market yield is expected to depreciate (appreciate) such that the higher return offered by the high-yield currency is exactly offset by the depreciation of the high-yield currency.
- The forward exchange rate will be an unbiased forecast of the future spot exchange rate.
- The current exchange rate will NOT be the best predictor unless the interest rate differential is equal to zero.

NOTE:

- Uncovered interest rate parity tends to hold over

very long term periods. It does not hold over short and medium term periods. Thus, over short and medium term periods, interest rate differentials are poor predictor of future exchange rate changes.
- Unlike covered interest rate parity, uncovered interest rate parity is NOT enforced by arbitrage.

Example:

Suppose, i_f = 10%, i_d = 5%. Consider three cases:

i. The $S_{f/d}$ rate is expected to remain unchanged:

Return on foreign-currency-denominated money market investment = 10% – 0%
= 10%

- Since it is > i_d, investor would prefer the foreign-currency-denominated money market investment.

ii. The domestic currency is expected to appreciate by 10%.

Return on foreign-currency-denominated money market investment = 10% – 10%
= 0%

- Since it is < i_d, investor would prefer the domestic investment.

iii. The domestic currency is expected to appreciate by 5%.

Return on foreign-currency-denominated money market investment = 10% – 5%
= 5%

- Since it is = i_d, the uncovered interest rate parity holds.

3.1.3) Forward Rates Parity

According to forward rate parity, forward rates are unbiased predictor of future exchange rates. Forward rates may not be a perfect forecast therefore, they may overestimate or underestimate the future spot rates but on average they are equal to the future spot rates. Two other parity conditions important for building forward rate parity are:
1.   Covered interest rate parity
2.   Uncovered interest rate parity

The **forward premium or discount** is calculated as follows:

<u>For one year horizon,</u>

$$F_{f/d} - S_{f/d} = S_{f/d}\left(\frac{i_f - i_d}{1 + i_d}\right) \cong S_{f/d}(i_f - i_d)$$

<u>Using day count convention:</u>

$$F_{f/d} - S_{f/d} = S_{f/d} \left(\frac{\left[\dfrac{Actual}{360} \right]}{1 + i_d \left[\dfrac{Actual}{360} \right]} \right) (i_f - i_d)$$

where,

f = foreign or price currency
d = domestic or base currency

- The domestic currency will trade at a forward premium (i.e. $F_{f/d} > S_{f/d}$), if and only if, the foreign risk-free interest rate > domestic risk-free interest rate (i.e. $i_f > i_d$). In other words,
  - *Currency with the higher interest rate will always trade at a discount in the forward market.*
  - *Currency with the lower interest rate will always trade at a premium in the forward market.*
- The forward premium or discount is **proportional** to the spot exchange rate ($S_{f/d}$), interest rate differential ($i_f - i_d$) between the markets, and *approximately proportional* to the time to maturity (actual/360).

Forward discount or premium as % of spot rate:

$$\frac{F_{f/d} - S_{f/d}}{S_{f/d}} \cong (i_f - i_d)$$

If uncovered interest rate parity holds,
Forward premium or discount

$$= \frac{F_{f/d} - S_{f/d}}{S_{f/d}} = \%\Delta S^e_{f/d} \cong (i_f - i_d)$$

- It follows that the forward exchange rate = Expected future spot exchange rate ➔ $F_{f/d} = S^e_{f/d}$
- *Thus, when **both covered and uncovered interest rate parity hold**, the forward exchange rate will be an unbiased forecast of the future spot exchange rate.*

If the forward rate > (<) speculator's expected future spot rate ➔ risk-neutral speculators will buy the domestic currency in the spot (forward) market and simultaneously sell it in the forward (spot) market ➔ generating a profit if expectations are correct.

- Unfortunately, despite being unbiased, forward exchange rates are **poor predictors** of future spot exchange rate due to the high volatility in exchange rate movements.
- When it is assumed that exchange rate movements follow a random walk (i.e. $E_t [S_{t+1}] = S_t$), then the current spot exchange rate will be the best predictor of future spot rates.

Under Uncovered interest rate parity:

- When $i_d < i_f$ ➔ domestic (foreign) currency must trade at a forward premium (discount) ➔ expected appreciation of the home/domestic currency.
- When $i_d > i_f$ ➔ domestic (foreign) currency must trade

at a forward discount (premium) ➔ expected depreciation of the home/domestic currency.

Under Covered interest rate parity:

- When $i_d < i_f$ ➔ domestic (foreign) currency must trade at a forward premium (discount).
- When $i_d > i_f$ ➔ domestic (foreign) currency must trade at a forward discount (premium).

Practice: Example 4, Volume 1, Reading 11.

3.1.4) Purchasing Power parity (PPP)

PPP is based on **law of one price,** which states that in competitive markets (free of transportation costs and official barriers to trade), identical goods sold in different countries **must** sell for the same price when their prices are measured in the same currency.

Hence, according to PPP, the nominal exchange rates would adjust for inflation so that identical goods (or baskets of goods) will have the identical price in different markets i.e. foreign price of a good X should be equal to the exchange rate-adjusted price of the identical good in the domestic country.

$$P^x_f = S_{f/d} \times P^x_d$$

Absolute version of PPP: According to absolute version of PPP, foreign price of a basket of goods and services should be equal to the exchange rate-adjusted price of the identical basket of goods and services in the domestic country.

$$P_f = S_{f/d} \times P_d$$

Nominal exchange rate = Foreign broad price index / Domestic broad price index i.e.

$$S_{f/d} = P_f / P_d$$

Assumptions of Absolute version of PPP:

- All domestic and foreign goods are freely tradable internationally i.e. transaction costs are zero.
- Identical bundle of goods and services are consumed with equal proportions (same weights) across different countries.

When the above assumptions do not hold, absolute PPP probably doesn't hold precisely in the real world. However, if assumptions do not hold, but transaction costs and other trade impediments are assumed to be **constant** over time, then _changes_ in exchange rates may be equal to the _changes_ in national price levels.
Relative version of PPP: It focuses on **actual** changes in exchange rates caused by **actual** differences in national

inflation rates in a given time period. According to relative version of PPP,

% change in the spot exchange rate = Foreign inflation rate – Domestic inflation rate

$\%\Delta S_{f/d} = \pi_f - \pi_d$

- The relative version of PPP implies that the currency of the high-inflation country should depreciate relative to the currency of the low-inflation country.
- If domestic price level rises by 10%, then domestic currency will fall by 10%.

Example:

Suppose, foreign inflation rate is 10% while the domestic inflation rate is 5%, then the $S_{f/d}$ exchange rate must rise by 5% in order to maintain the relative competitiveness of the two regions.

Ex ante version of PPP: The ex-ante version of PPP focuses on *expected* changes in the spot exchange rate caused entirely by *expected* differences in national inflation rates. According to ex-ante PPP, *currency of a country that is expected to have persistently high (low) inflation rates tends to depreciate (appreciate) over time.* Ex ante PPP can be expressed as:

$$\%\Delta S^e_{f/d} = \pi^e_f - \pi^e_d$$

where,

$\%\Delta S^e_{f/d}$ = Expected % change in the spot exchange rate
π^e_f = Foreign inflation rates expected to prevail over the same period
π^e_d = Domestic inflation rates expected to prevail over the same period

PPP does not hold when:

- There are different baskets of goods for price indexes.
- Goods and services are non-tradable.
- There are barriers to trade.
- There are transportation costs.
- Adjustment involves longer time.

Important to Note:

- If the currency is overvalued on a PPP basis ➔ it should depreciate.
- If the currency is undervalued on a PPP basis ➔ it should appreciate.

- Over longer time horizons, nominal exchange rates tend to move towards their long-run PPP equilibrium values. Thus, PPP can be used as a long-run benchmark exchange rate and to make meaningful international comparisons of economic data.

3.1.5) The Fisher Effect and Real Interest Rate Parity

When the Fisher effect holds, Nominal interest rate in a country = Real interest rate + Expected Inflation rate i.e.
$i_d = r_d + \pi^e_d$
$i_f = r_f + \pi^e_f$

Foreign-domestic nominal yield spread= Foreign-domestic real yield spread + Foreign-domestic expected inflation differential

$i_f - i_d = (r_f - r_d) + (\pi^e_f - \pi^e_d)$
$(r_f - r_d) = (i_f - i_d) - (\pi^e_f - \pi^e_d)$

Important to Note:

- If uncovered interest rate parity holds, then the nominal interest rate spread = expected change in the exchange rate.
- If ex-ante PPP holds, then the difference in expected inflation rates = expected change in the exchange rate.

When both uncovered interest rate parity and ex-ante PPP hold, real yield spread between the domestic and foreign countries will be zero regardless of expected changes in the spot exchange rate i.e.

$$(r_f - r_d) = \%\Delta S^e_{f/d} - \%\Delta S^e_{f/d} = 0$$

Reflecting that,

Nominal interest rate differential between two countries = Difference between the expected inflation rates

$$i_f - i_d = \pi^e_f - \pi^e_d$$

- This relationship is referred to as ***International Fisher effect***. It is based on both real interest rate parity* and ex ante PPP.

***Real Interest rate parity:** According to real interest rate parity, the level of real interest rates in the domestic country will converge to the level of real interest rates in the foreign country.

According to International Fisher effect, the exchange rate of a country with a higher (lower) interest rate than its trading partner should depreciate (appreciate) by the amount of the interest rate difference to maintain equality of real rates of return.

IMPORTANT:

If all the key international parity conditions are held at all times, then the expected % change in the spot exchange rate would be equal to

- The forward premium or discount (in %)
- The nominal yield spread between countries
- The difference in expected national inflation rates

Implying that when all the key international parity conditions hold, no profitable arbitrage opportunities on exchange rate movements would exist for a global investor.

3.1.6) International Parity Conditions: Typing All the Pieces Together

International parity conditions provides support to long-term exchange rate movements as in the long-run, there is as unclear interaction among nominal interest rates, exchange rates and inflation rates

To summarize, following are six international parity conditions

1. According to **Covered interest rate parity:** Arbitrage ensures that Nominal interest rate spreads = % forward premium or discount
2. According to **Uncovered interest rate parity:** Nominal interest rate spread should reflect the expected % Δ of the spot exchange rate.
3. Forward exchange rate will be unbiased predictor of future spot exchange rate when **covered and**

uncovered interest rate parity hold i.e. nominal yield spread = forward premium or discount = expected % Δ in spot exchange rate
4. According to **ex ante PPP** expected Δ in the spot exchange rate = expected difference b/w domestic & foreign inflation rate.
5. According to **International Fisher effect**, assuming fisher effect and interest rate parity holds*, then nominal yield spread b/w domestic & foreign markets = domestic-foreign expected inflation difference.
   *i) Nominal interest rate = real interest rate + expected inflation & ii) real interest rates are same across all markets]
6. If **ex ante PPP and Fisher Effect hold** then expected inflation differentials = expected Δ in exchange rate = nominal interest rate differentials..

> **Practice: Example 5 & 6, Volume 1, Reading 11.**

4.	THE CARRY TRADE

Foreign Exchange (FX) Carry trade Strategy: This strategy involves going **long** a basket of **high-yielding** currencies and simultaneously going **short** a basket of **low-yielding** currencies (also called funding currencies).

- During periods of low volatility, carry trades tend to generate positive excess returns.
- However, during periods of high volatility, carry trades are exposed to significant losses as during such times:

The risk of an adverse exchange rate movement rises sharply relative to the gradual flow of income.	High-yield currencies face selling pressures and investors start preferring low interest rate currencies which are viewed as safe assets during times of uncertainty.	As a result, the realized returns on long high-yield currency positions will tend to decline significantly, while the realized returns on low-yield currencies will tend to rise.

- If uncovered interest rate parity holds at all times, then using carry trade strategy is not profitable.

Argument for persistence of the Carry Trade: It is argued that high-yield currencies represent a risk premium paid for more risky markets and unstable economy; whereas low-yield currencies represent less risky markets.

Reason behind risk of large losses: A Carry trade is a leveraged trade i.e. it involves borrowing in the funding currency and investing in the high-yield currency. Like all leverage, it increases the volatility in the investor's return on equity.

Properties of Carry trade returns:

1) The distribution of carry trade returns is _more peaked_ than a normal distribution i.e. tends to generate a larger number of trades with small gains/losses.
2) The distribution of carry trade returns tends to have _fatter tails_ and is _negatively skewed_ i.e. tends to generate more frequent and larger losses.

> **Practice: Example 7, Volume 1, Reading 11.**

5.	THE IMPACT OF BALANCE OF PAYMENTS FLOWS

A country's BOP can have a significant impact on the level of its exchange rate and vice versa.

Balance of Payment (BOP): The balance of payments represents the record of the **flow** of all of the payments between the residents of a country and the rest of the world in a given year.

BOP = current account + capital account + official reserve account = 0

The three components of BOP are:

Current Account: represents part of economy engaged in actual production of goods and services.

Capital Account: reflects financial flows

Decisions of trade flows (current accounts) and financial flows (capital accounts) are made by different entities and changes in exchange rates aligned these decisions.

Current Account Surplus: Countries with +ve current account balance where Exports>Imports.

Current Account Deficits: Countries with –ve current account balance where Imports>Exports (must attract funds from abroad to keep balance).

Note:
In the long run, countries with persistent current account: surpluses (deficits) often exhibit currency appreciation (depreciation).

At least in the short-to-intermediate term, exchange rate movements are primarily determined by investment/financing decisions (i.e. capital account balance) because:

1) Prices of real goods and services tend to adjust quite slowly than exchange rates and other asset prices.
2) Production of real goods and services takes place over time and demand decisions suffer from substantial inertia. In contrast, in liquid financial markets, financial flows are instantly redirected.
3) Current spending/production decisions only reflect purchase/sales of current production; whereas the investment/financing decisions reflect both the financing of current expenditures and reallocation of existing portfolios.
4) The actual exchange rate is very sensitive to perceived currency values because the expected exchange rate movements can lead to large short-term capital flows.

5.1	**Current Account Imbalance and the Determination of Exchange Rates**

Trends in current account balance affect the exchange rates through following three channels:

✓   The flow of supply/demand channel
✓   The Portfolio Balance Channel
✓   The Debt Sustainability Channel

5.1.1) The flow supply/demand channel: It is based on the fact that supply of domestic currency is driven by the country's demand for foreign goods and services while the demand for domestic currency is driven by foreign demand for a country's goods and services.

- Current account surplus (deficit) implies ➔ higher (lower) demand for domestic currency ➔appreciation (depreciation) of the domestic currency against foreign currencies.
- However, when the domestic currency reaches some particular level, appreciation (depreciation) of the currency leads to deterioration (improvement) in the trade balance of the surplus (deficit) country.

The change in exchange rates that is needed to restore current account balance depends on the following factors:

1) **The initial gap between imports and exports:** When the initial gap between imports and exports is relatively wide for a ***deficit*** nation, then relatively higher growth in exports than growth in imports is needed to narrow the current account deficit.
2) **The sensitivity of import and export prices to changes in the exchange rate:** Typically, depreciation of the deficit country's currency should result in:

- An increase in import prices in domestic currency terms.
- A decrease in export prices in foreign currency terms.

However, it has been experienced that changes in exchange rates have very limited pass-through affect on prices of traded goods and services. Thus,

- The limited (greater) the pass-through of exchange rate changes into traded goods/services prices, the more (less) substantial changes in exchange rates are required to narrow a trade imbalance.

3) **The sensitivity of import and export demand to the changes in import and export prices:** For a deficit nation, when import demand is more price elastic than export demand, then its currency needs to be depreciated by a substantial amount to restore the current account balance.

5.1.2) The portfolio balance channel: According to this channel, current account imbalances shift wealth from deficit nations to surplus nations that can lead to shifts in global asset preferences.

- For example, countries running large current account surpluses against a deficit country may seek to reduce their holdings of deficit country's currency to a desired level; as a result, the value of deficit country's currency is negatively affected.

5.1.3) The debt sustainability channel: According to this channel, running a large and persistent current account deficit ultimately leads to a continuous rise in external debt as a % of GDP. Thus, to narrow the current account deficit and to stabilize the external debt at some sustainable level, a deficit country's currency needs to be depreciated by a substantial amount; and consequently, the currency's real long-run equilibrium value declines.

- For surplus countries, opposite occurs.

Practice: Example below 5.1.3, Volume 1, Reading 11.

5.2 Capital Flows and the Determination of Exchange Rates

The importance of global financial flows in determining exchange rates, interest rates and broad asset price trends has increased with an increase in financial integration of the world's capital markets and free flow of capital.

Excessive Capital inflows in Emerging Markets (EM) fuel boom-like conditions (before crises), such as:
•   EM currencies appreciation
•   Overinvestment in risky projects
•   Asset bubble
•   Consumption binge & huge domestic credit
•   Huge external indebtedness
•   Huge credit/credit account deficit

When Crises Occurs (boom-like conditions suddenly reverse)
•   Major economic downturn
•   Soverign Default
•   Serious Banking Crises
•   Significant Currency Depreciation

EM Governments take preventive actions such as:
•   Using capita controls to resist huge capital inflows
•   Selling domestic currency in the FX market

5.2.1) Equity Market Trends and Exchange Rates

In the long-run, the correlation between exchange rates and equity markets is fairly close to zero.

In the short-to medium term periods, the correlation between exchange rates and equity markets is **unstable** i.e. it tends to fluctuate from being highly positive to being highly negative based on the market conditions. Hence, it is difficult to forecast expected exchange rate movements based solely on expected equity market performance.

• When investors' appetite for risk is high (i.e. investors are less risk reverse) ➔ the market is said to be in "risk-on" model; as a result,
  • Investors' demand for risky assets (e.g. equities) tends to increase ➔ which increases the prices of those assets.
  • Investors' demand for safe haven assets (e.g. dollar) tends to decline, which decreases the price of those assets.
• When investors' appetite for risk is low (i.e. investors are more risk reverse) ➔ the market is said to be in "risk-off" model; as a result,
  • Investors' demand for risky assets (e.g. equities) tends to decline ➔ which lowers the prices of those assets.
  • Investors' demand for safe haven assets (e.g. dollar) tends to increase, which increases the price of those assets.

Practice: Example 8, Volume 1, Reading 11.

6. MONETARY AND FISCAL POLICIES

6.1 The Mundell-Fleming Model

According to the Mundell-Fleming model, changes in monetary and fiscal policy affect exchange rates through their impact on interest rates and economic activity (output) within a country.

• The model is based on aggregate demand only as it assumes that economy is undercapitalized such that supply can be adjusted without any significant changes in price level or inflation rate.
• In other words, in a Mundell-Fleming model, changes in the price level and/or the inflation rate do not play any role

Easy or expansionary _monetary_ policy: Expansionary monetary policy involves reducing interest rates, increasing investment & consumption.
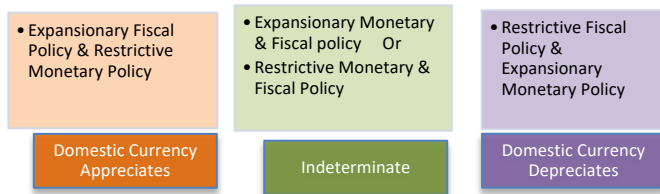
Expansionary monetary policy (lowering interest rates) with flexible exchange rates, induce capital outflows to higher-yielding markets and cause currency depreciation.

Easy or expansionary _Fiscal_ policy: Expansionary fiscal policy involves reducing taxes and/or increasing government spending exerts upward pressures on interest rates.
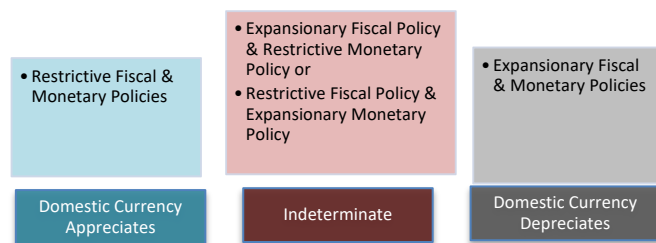
Expansionary fiscal policy with Flexible Exchange Rates leads to:

• An upward pressure on interest rates to finance larger budget deficits.
• Increase in capital inflows from lower-yielding markets and the consequent appreciation of the currency.
• If capital flows are immobile or insensitive to interest rate differentials, the increase in demand increase imports and worsen the trade balance and downward pressure on currency.

Under high capital mobility, what happens to exchange rates for the following Monetary-Fiscal Policy Mix

• Expansionary Fiscal Policy & Restrictive Monetary Policy	• Expansionary Monetary & Fiscal policy Or • Restrictive Monetary & Fiscal Policy	• Restrictive Fiscal Policy & Expansionary Monetary Policy
Domestic Currency Appreciates	Indeterminate	Domestic Currency Depreciates

2) Under low capital mobility, what happens to exchange rates for the following Monetary-Fiscal Policy Mix

• Restrictive Fiscal & Monetary Policies	• Expansionary Fiscal Policy & Restrictive Monetary Policy or • Restrictive Fiscal Policy & Expansionary Monetary Policy	• Expansionary Fiscal & Monetary Policies
Domestic Currency Appreciates	Indeterminate	Domestic Currency Depreciates

When capital mobility is high: Changes in monetary and fiscal policies affect exchange rates mainly through *capital flows* rather than trade flows.
- *The combination of* expansionary *fiscal policy and a* restrictive *monetary policy is extremely bullish for a currency.*
- *The combination of a* restrictive *fiscal policy and* expansionary *monetary policy is extremely bearish for a currency.*
- *The effect of combination of* expansionary *fiscal policy and* expansionary *monetary policy on currency is ambiguous.*
- *The effect of combination of* restrictive *fiscal policy and* restrictive *monetary policy on currency is ambiguous.*

When capital mobility is low: Changes in monetary and fiscal policies affect exchange rates mainly through *trade flows* rather than capital flows.
- *The combination of* restrictive *fiscal policy and* restrictive *monetary policy is bullish for a currency because it tends to improve trade balance.*
- *The combination of* expansionary *fiscal policy and* expansionary *monetary policy is bearish for a currency because it tends to deteriorate trade balance.*
- *The combination of* expansionary *fiscal policy and a* restrictive *monetary policy has an ambiguous effect on AD and trade balance and hence on currency.*
- *The combination of a* restrictive *fiscal policy and* expansionary *monetary policy has an ambiguous effect on AD and trade balance and hence on currency.*

6.2	**Monetary Models of Exchange Rate Determination**

Unlike Mundell-Fleming model, under the Monetary models of exchange rate determination,

- Output is fixed.
- The monetary policy affects exchange rates through its impact on the price level and the inflation rate.

The Monetary Approach states that:

- Changes in domestic price levels are primarily determined by changes in domestic money supply i.e. an X% increase (decrease) in the domestic money supply will lead to an X% increase (decrease) in the domestic price level.
- A money supply-induced increase (decrease) in domestic prices relative to foreign prices will lead to a proportional decline (increase) in domestic prices relative to currency's value.

In summary:
- A **relative increase** in a domestic's money supply causes its currency to **depreciate.**
- A **relative decrease** in a domestic's money supply causes its currency to **appreciate.**

Limitation of Pure monetary approach: Since the model assumes that PPP holds at all the times (i.e. both the short and long run), it does not provide a realistic explanation of the impact of monetary factors on the exchange rates.

The Dornbusch Overshooting Model

The Dornbusch Overshooting Model is a **modified** monetary model of the exchange rate. This model is free from the limitation of **pure** monetary approach model.

Assumptions of the model:

- In the short-run, prices are fixed or have limited flexibility.
- In the long-run, prices are fully flexible, implying that any increase in the domestic money supply will give rise to a proportional increase in domestic prices and will depreciate the domestic currency.

According to the model,

In the short-run when domestic price level is **inflexible** and capital is highly mobile, any increase in the nominal money supply leads to decrease in domestic interest rate➔increase in capital outflow to higher-yielding countries ➔as a result, the nominal exchange rate **over-depreciates** (overshoot its long-run PPP level)➔ giving a signal that the domestic currency is so undervalued that it is expected to appreciate in the future.

Practice: Example 9, Volume 1, Reading 11.

6.3	Portfolio Balance Approach

Mundell-Fleming model determines exchange rates in short-term but fails to capture the long-term effects of budgetary imbalances. Portfolio Balance approach resolve this limitation.
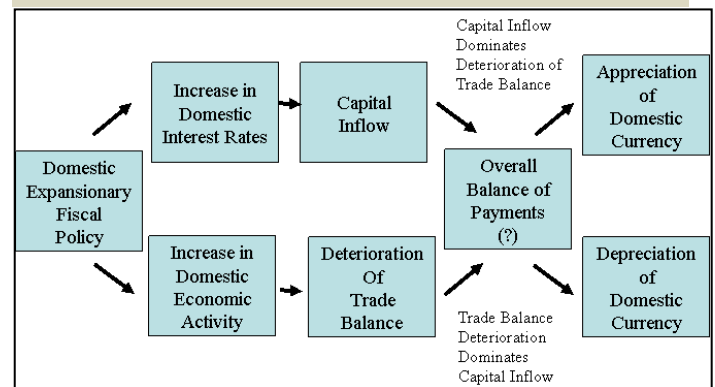
Portfolio Balance Approach:

According to this approach, exchange rate is a function of relative supplies of domestic and foreign bonds; so, the exchange rate is determined by equilibrium in global asset market.

- Global investors prefer to hold a **diversified** portfolio of domestic and foreign assets, including bonds and the desired allocation of each investor depends on expected return and risk.
- A persistent increase in government budget deficit leads to a steady increase in the supply of domestic bonds outstanding
- Investors will held these bonds if they are compensated for returns such as:
  o Higher interest rates and/or higher risk premium
  o Depreciation of the currency to a level sufficient to generate expected profit from subsequent appreciation of the currency.
  o Some combination of the two.

Important to Note:

In the long run, currencies of countries that run large budget deficits on a persistent basis eventually depreciate.

The combination of Mundell-Fleming and portfolio balance models:

When capital is highly mobile:

- In the short-run, expansionary fiscal policy leads to an increase in domestic real interest rates relative to other countries → which leads to appreciation of the domestic currency.
- In the long-run, expansionary fiscal policy may cause the amount of debt to increase to an unsustainable level; thus, either

  the central bank is forced to **monetize the debt** i.e. print additional money to buy the government's debt. Consequently, the domestic currency depreciates; or

  fiscal stance will become restrictive i.e. seeks to reduce the public deficit and debt levels by issuing fewer government bonds. As the supply of bonds fall → bonds yields decrease and consequently, the domestic currency depreciates.

Practice: Example 10, Volume 1, Reading 11.

7.	EXCHANGE RATE MANAGEMENT: INTERVENTION AND CONTROLS

Capital inflows can affect an economy positively or negatively. An increase in capital inflows can increase a country's economic growth and asset values. As a result currency appreciates and foreign investors earn healthier returns.

On the other hand, capital inflows can worsen a country's asset price bubble or overvaluation of its currency. When short-term capital inflow eventually reverse, foreign investors suddenly draw their capital back, economy suffers significant drop in asset prices and huge currency depreciation.

Increase in capital inflows are caused by a combination of 'pull' and 'push' factors.

Pull Factors, may stem from both public or private sectors, represent positive developments in an economy that attract overseas capital into that economy. For example,

- Expected decline in inflation and inflation volatility
- More-flexible exchange rate regimes
- Improved fiscal positions
- Privatization of state-owned entities
- Liberalization of financial markets
- Removal of foreign exchange regulations and controls

As a result, growth in private sector attracts foreign investment, healthy export sector improves current account balance and strong FX reserves support against future speculative attacks.

Push Factors: They represent a set of developments in _other economies_ that causes overseas capital to flow to a particular economy. For example,

- The low interest rate policies in other economies (specially industrial countries) may encourage

investors to shift capital to high-yielding economies.

- Changes in asset allocation over time, which eventually increase the share of funds allocated to a particular economy e.g. high allocation in emerging market (EM) countries.
- Studies have shown that EM countries better handled the global financial crises of 2008, as a result, capital flows to EM countries rose.
- Ultra low interest rates in economies such as U.S., Euro area and Japan have encouraged investors to invest in high-yielding EM economies.

Governments directly intervene to resist excessive inflows and currency bubbles. Some forms of capital control may include:

- Preventing banks from selling local currency in a FC transaction.
- Limiting FC transaction by imposing higher tax rates.
- Requiring that a portion of investment must be deployed in a term bank deposit.
- Limiting foreign ownership of local institutions.
- Preventing foreign investors from repatriating funds from the sale of financial assets.
- Making local currency available at exchange rates linked to the usage of foreign currency.

Many participants believe that capital control distort global trade and finance, deflect capita flows from economies and complicate monetary and exchange rate policies in those economies. Despite these concerns IMF asserts that the resultant benefits of capital control may exceed the related costs as capital controls prevent countries from future financial deterioration, asset bubble formation and overshooting of exchange rates.

NOTE:

The higher the ratio of **central bank FX reserves holding to average daily FX turnover in the domestic currency**, the greater their firepower, and thus, the greater the ability to affect the level and path of exchange rates. The ratio is negligible in developed countries but is quite sizeable in EM economies. Therefore, the effectiveness of intervention is
- limited in developed markets
- more mixed in EM economies as it lowers the exchange rate volatility.

8.	Warning Signs of CURRENCY CRISES

When capital inflows unexpectedly stop, the economy contracts, asset value fall, the currency sharply depreciates and it may result in financial crises.

- As selling pressure begins, repositioning of portfolios & liquidation of vulnerable positions by investors and borrowers, to avoid excessive capital losses, intensify the currency crises.
- The major issue with such currency crises is that they are difficult to anticipate adequately because their underlying causes differ greatly.
- Developing early warning signs are challenging because views on primary causes of crises varies.

Two School of thoughts with regard to Currency crisis anticipation:

o According to the first school of thought, the major cause of the currency crises is the deteriorating and weak economic fundamentals, implying that if an economy is facing weak and deteriorating fundamentals, it gives a warning sign that in the near future its currency may be vulnerable to speculative attacks.
o According to the second school of thought, there is no particular factor that may precipitate currency crisis i.e. it can occur out of the blue. Under this school of thought, an economy with sound and strong economic fundamentals may suffer from speculative attacks on its currency because of

- an abrupt adverse shift in market sentiment, completely unrelated to economic fundamentals or
- contagion or spillover effects arising from crises developments in other markets.

Features of an Ideal Early Warning System: An ideal warning system should

i. Have a strong record both with regard to predicting actual crises and preventing the frequent issuance of false signals.
ii. Be based on macroeconomic indicators with readily available data without any long time lags.
iii. Provide an early warning signal *well in advance* of actual currency crises to provide market participants sufficient time to adjust or hedge their portfolios.
iv. Be broad-based i.e. covers a wide range of indicators of currency crises.

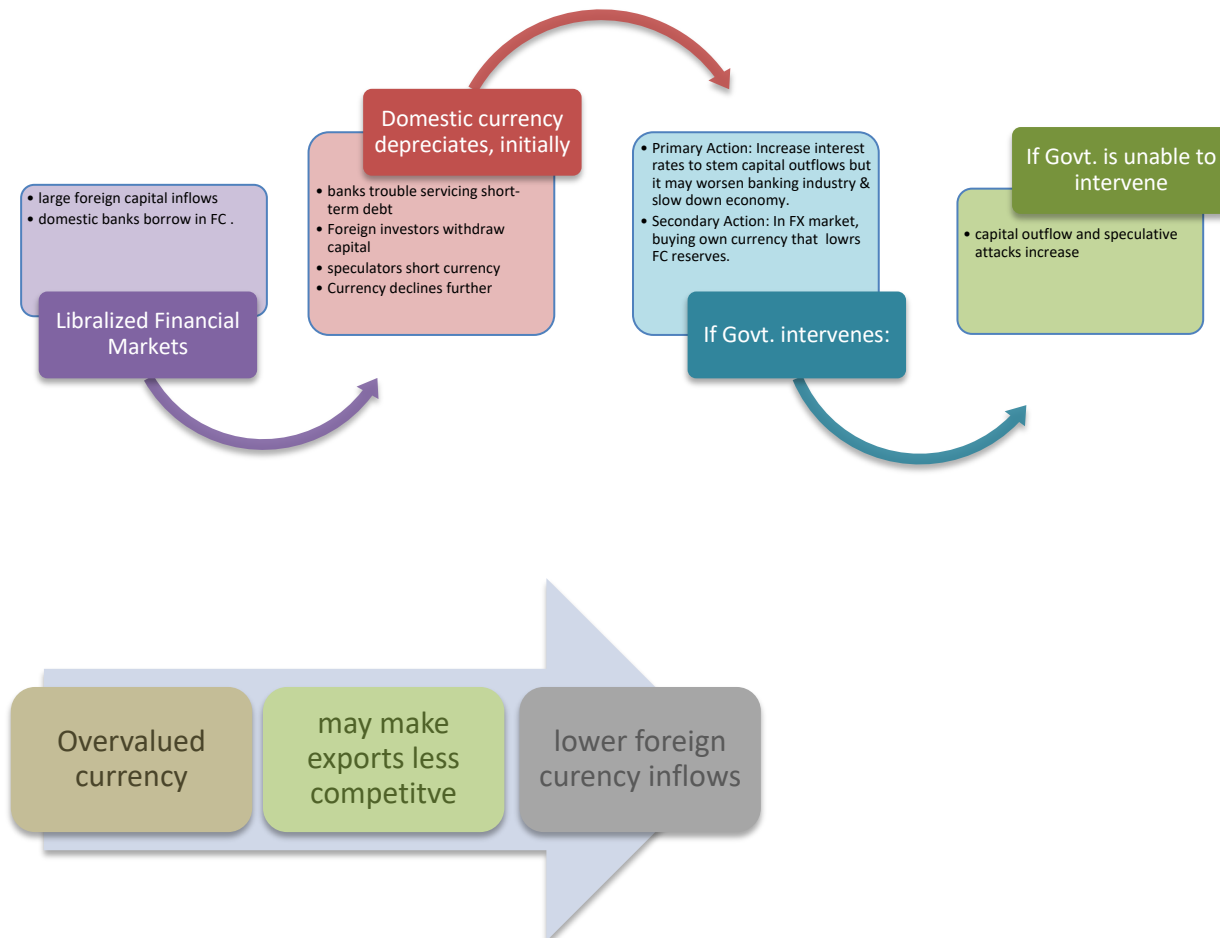**Number of variables used to anticipate currency crises:** Although variables or methodologies differ from one study to the next, following are some conditions identified in one or more studies.
1. Liberalized capital markets i.e. free flow of capital prior to a currency crisis.
2. Pre crises period exhibits large foreign capital inflows (relative to GDP). Foreign currency denominated short-term funding is particularly problematic.
3. A currency crisis often leads to banking crises.

4. Countries with fixed or partially fixed exchange rates are more prone to currency crises than countries with floating exchange rates.
5. As crises approaches, foreign exchange reserves decline sharply.
6. Pre-crises period exhibits excessive appreciation of the currency as compared to its historical mean.
7. Prior to crises, the term of the trade $(ratio\ of\ \frac{Exports}{Imports})$ deteriorates.

8. Prior to crises, broad money growth and the ratio of 'M2 money supply to bank reserves' rise.
9. Excessive rise in inflation has been observed in pre crises period compared with tranquil period.

These factors are highly interrelated and often one factor leads to another. The two diagrams below show how the above mentioned factors are interrelated.

- large foreign capital inflows
- domestic banks borrow in FC .

Libralized Financial Markets

Domestic currency depreciates, initially
- banks trouble servicing short-term debt
- Foreign investors withdraw capital
- speculators short currency
- Currency declines further

- Primary Action: Increase interest rates to stem capital outflows but it may worsen banking industry & slow down economy.
- Secondary Action: In FX market, buying own currency that lowrs FC reserves.

If Govt. intervenes:

If Govt. is unable to intervene
- capital outflow and speculative attacks increase

Overvalued currency   **may make exports less competitve**   **lower foreign curency inflows**

Though unable to accurately predict upcoming currency crisis, models –combined with other analytical judgment and analysis, can help in preparing for and assessing exposures.

Practice: Example 11, Volume 1, Reading 11.

Practice: End of Chapter Practice Problems for Reading 11.

1.	INTRODUCTION

Actual growth rate of GDP v/s Potential GDP growth rate: In the long-run, the actual growth rate of GDP should be equal to the growth rate of potential GDP.

- The growth rate of potential GDP acts as an upper limit to growth i.e. it is the maximum amount of output that an economy can sustainably produce without creating any upward pressures on the inflation rate.

As the growth rate of potential GDP increases:

- The level of income rises: Due to compounding effect, even small changes in the growth rate lead to large changes in the level of income over time.
- The level of profits rises.
- The living standard of the population increases.

2.	GROWTH IN THE GLOBAL ECONOMY: DEVELOPED VS. DEVELOPING COUNTRIES

A country's standard of living and level of economic development can be measured by estimating GDP and per capita GDP.

Economic growth = Annual % change in real GDP or in real per capita GDP

Real GDP: Growth in real GDP reflects the expansion in total economy over time.

Real per capita GDP: Growth in real per capita GDP reflects the increase in the average standard of living in each country. It indicates that growth in real GDP is greater than that of population. Countries with high (low) per capita GDP are said to be developed (developing) countries.

Converting GDP in currency terms: The GDP data can be converted into currency (e.g. in dollars) in two ways i.e.

1) Using current market exchange rates:

Country's GDP measured in its own currency × Current market exchange rates

Limitations: This method is inappropriate for two reasons i.e.

i.   Market exchange rates are highly volatile and thus, even small changes in the exchange rate can translate into large changes in estimated value of GDP even if there is little or no growth in the country's economy.
ii. Since market exchange rates are determined by trade and financial flows, they do not incorporate differences in prices of non-tradable goods and services across countries. As a result, the standard of living of consumers in developing countries is understated.

2) Using exchange rates implied by PPP:

Country's GDP measured in its own currency × Exchange rates implied by PPP

- This method is more appropriate to compare living standards across time and/or across countries because at PPP implied exchange rates, the cost of a typical basket of goods and services is the same across all countries.

2.1	Savings and Investment

Capital can be accumulated through private and public sector investment.

- The higher the level of disposable income → the higher the savings → the greater the capital accumulation → the higher the per capita GDP.

Vicious Cycle of Poverty:
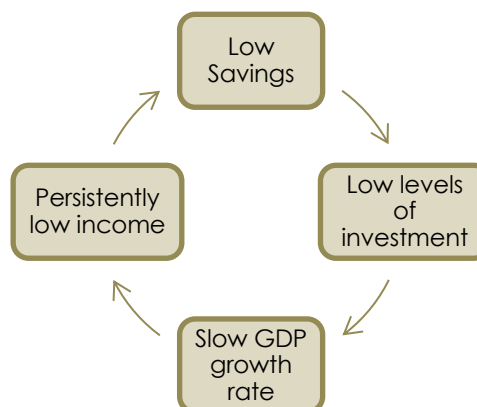
- The vicious cycle of low savings can be broken by attracting greater foreign investment.
- Besides level of savings, an economy's growth also depends on how efficiently saving is allocated within the economy.

2.2 Financial Markets and Intermediaries

Financial markets act as an intermediary between savers and borrowers. Better-functioning financial markets facilitate countries to grow at a faster rate. Financial markets and intermediaries (i.e. banks) can promote growth in at least three ways:

1. The financial markets and intermediaries channel financial capital (savings) from savers to those investment projects that are expected to generate the highest risk-adjusted returns.
2. By creating attractive investment instruments that facilitate risk transfer and diversification, the financial markets and intermediaries encourage savers to invest and assume risk.
3. The existence of well-developed and better-functioning financial markets and intermediaries facilitate corporations to finance their capital investments.

However, financial sector intermediation that results in declining credit standards and/or increasing leverage will increase risk.

2.3 Political Stability, Rule of Law, and Property Rights

Key ingredients for economic growth are:

- Stable and effective government;
- Well-developed legal and regulatory system that establishes, protects and enforces property rights;
- Enforcement and respect for property rights that govern the protection of private property, intellectual property;

All the above mentioned factors encourage domestic households and companies to invest and save.

Factors that increase investment risk, discourage foreign investment, and weaken growth:

- Wars
- Military coups
- Corruption
- Political instability

2.4 Education and Health Care Systems

Adequate education at all levels is a key component of a sustainable growth for all the economies.

- Physical and human capital are often complementary; thus, the productivity of existing physical capital can be enhanced by increasing human capital via improving education through both formal schooling and on-the-job training.
- The economic growth also depends on the efficiency of allocation of education spending among different types and levels i.e. primary,

secondary and post-secondary.

The impact of education spending varies among developing and developed countries i.e.

a) Developed countries are on the **leading edge of technology**; thus, they need to invest in **post-secondary education** to promote innovation and growth. In such countries, incremental spending on post-secondary education will have a greater impact on growth.

b) Developing countries mostly apply and imitate technology developed elsewhere; thus, they need to invest in primary and secondary education. In such countries, incremental spending on primary and secondary education will have a greater impact on growth as it improves a country's ability to absorb new technologies and to perform tasks more efficiently.

2.5 Tax and Regulatory Systems

Tax and regulatory policies play an important role in the growth and productivity of an economy, particularly at the company level.

- The limited regulations promote entrepreneurial activity → attract new companies → increase productivity levels.
- In addition, the lower the administrative start-up costs, the greater the entrepreneurial activity.

2.6 Free Trade and Unrestricted Capital Flows

Opening an economy to capital and trade flows has a significant impact on economic growth.

Benefits of an open Economy: In an open economy,

- Domestic investment can be financed using world savings.
- World savings can facilitate an economy to break the vicious cycle of property (explained above).
- An economy can attract foreign investment, which helps an economy to break the vicious cycle of poverty, by increasing savings, physical capital stock, productivity, employment and wages.

Types of Foreign investment:

1) **Foreign direct investment (FDI):** It refers to the direct investment by foreign companies in a domestic country in the form of building or buying property, plant, and equipment. FDI facilitates developing countries to have an access to technology developed and used in developed countries.

2) **Foreign indirect investment:** It refers to an indirect investment by foreign companies and individuals in a domestic economy in the form of purchase of

securities (equity & fixed income) issued by domestic companies.

Benefits of Free Trade:

- Reducing tariffs on foreign imports (capital goods, in particular) and removing restrictions on foreign direct and indirect investments tend to lead to higher economic growth.
- By reducing tariffs and restrictions on trade, domestic residents can have access to a variety of goods at relatively lower costs.
- Free trade promotes competition among domestic companies by decreasing their pricing power and provides them an access to larger markets.

2.7	Summary of Factors Limiting Growth in Developing Countries

Factors that negatively impact growth:

- Low rates of saving and investment
- Poorly developed financial markets
- Weak and/or corrupt legal systems
- Lack of enforcement of laws
- Lack of property rights
- Unstable political system
- Inadequate and poor public education and health services
- Tax and regulatory policies discouraging entrepreneurial activity
- Restrictions on international trade and flows of capital

Pre-conditions for Economic Growth:

1) Well-functioning and well-developed markets
2) Clearly defined property rights and rule of law
3) No restrictions on international trade and flows of capital
4) Adequate public education and health services
5) Tax and regulatory policies that encourage entrepreneurial activity
6) Adequate investment in infrastructure that increases stock of physical capital, labor productivity and growth.

It is important to understand that *an economy needs to have a **sustained** (not one time) increase in growth rates to become a high-income country and to improve its standard of living*.

Obstacles to growth in the developing countries:

- Inadequate education level
- **"Brain drain"** problem i.e. departure of most highly educated individuals in developing country to the developed countries.
- Lack of appropriate institutions;
- Poor legal and political environment
- Lack of physical, human, and public capital
- Little or no innovation
- Poor health
- Lower life expectancy rates

Practice: Example 1, Volume 1, Reading 12.

3.	WHY POTENTIAL GROWTH MATTERS TO INVESTORS

The potential risk and return associated with long-term investments in the securities of companies located or operating in that country can be evaluated based on an economy's long-term economic growth.

Relationship between economic growth and stock prices:

- Equity values reflect anticipated growth in aggregate earnings, which in turn depend on expectations of future economic growth.
- Generally, earnings growth rate of companies operating in an economy is lower than the earnings growth rate for the overall economy.
- However, when the ratio of corporate profits to GDP increases over time ➔ company's earnings will grow at a rate greater than the of GDP growth rate.
- It must be stressed that earnings growth rate cannot exceed GDP growth rate on a persistent basis, implying that *in the long-run, real earnings growth cannot exceed the growth rate of potential GDP.*
- The economic growth and the long-run growth of aggregate earnings depend on same factors.

The performance of stock market depends on an economy's performance, measured by its GDP.

$$P = GDP \left(\frac{E}{GDP}\right)\left(\frac{P}{E}\right)$$

where,

P = Aggregate value (price) of equities
E = Aggregate corporate earnings
GDP = can be real or nominal with a corresponding real or nominal interpretation of the other variables.

Expressing in terms of logarithmic rates:

(1/T) % ΔP = (1/T) % ΔGDP + (1/T) %Δ (E / GDP) + (1/T) % Δ(P / E)

% change in stock market value = % change in GDP + % change in the share of earnings (profit) in GDP + % change in the price-to-earnings multiple

where,

T = time horizon

- **Over short to immediate horizons**, the stock market value is affected by all of the three factors.
- **In the long run**, the stock market value **majorly** depends on the growth rate of GDP.
  - The ratio of earnings to GDP can neither rise nor decline forever, implying that in the long-run, % change in the share of earnings (profit) in GDP must be approximately zero.
  - Similarly, the P/E ratio can neither rise nor decline forever, implying that in the long-run, % change in the price-to-earnings multiple must be approximately zero.
- Hence, in the long-run, changes in the earnings-to-GDP and P/E ratios largely affect the volatility of the market, not its return.
- A country's GDP growth rate is not constant; rather, it can and does change (i.e. increase or decrease) over time.
- Factors and policies that affect potential growth rate of an economy by a small amount lead to large changes in the standards of living and the future level of economic activity due to effect of compounding.
- A **persistent** increase in the rate of labor productivity growth increases the sustainable economic growth rate, resulting in increase in the earnings growth and potential return on equities.

Relationship between Fixed income returns and Economy's potential growth rate:

Fixed income returns are mainly based on the relationship between actual and potential growth.

- When an actual GDP > (<) potential GDP → inflation increases (decreases) → nominal interest rates increase (decrease) and consequently, bond prices fall (rise).
  - However, it does not imply that there is a long-run trade-off between growth and inflation.
- The level of real interest rates and real asset returns also depend on the growth rate of potential GDP of an economy.
- The real return that consumers/savers demand for forgoing present consumption is the real interest rate. Thus,
  - The higher the potential GDP growth rate → the higher the real interest rate → the more consumers save and the higher the expected real asset returns, in general.
  - In addition, when the rate of potential GDP growth increases → the general credit quality of fixed income securities improves because such securities are mostly backed by a flow of income.
- Monetary policy decisions also depend on output gap (i.e. difference between an economy's estimated potential output **level** and its actual operating level) and difference between **growth rate** of actual GDP and potential GDP.
  - When forecasted actual GDP growth < (>) growth in potential GDP → output gap widens (narrows) → an economy slows down (heats up) → downward (upward) pressure on inflation → inflationary expectations reduce (increase).

- To close this output gap → the central bank may need to pursue an easy (tight) monetary policy by lowering (raising) short-term interest rates; as a result, bond prices rise (fall).
- The growth rate of potential GDP is also used by credit rating agencies to evaluate the credit risk of sovereign or government-issued debt i.e. the higher the estimated potential GDP growth rate, the lower the perceived risk of such bonds, all else equal.
- Fiscal policy decisions also depend on output gap and difference between growth rate of actual GDP and potential GDP i.e. typically,
  - During recessions (i.e. when output gap widens) → a government may need to pursue an easy fiscal policy, leading to increase in budget deficits.
  - During expansions (i.e. when output gap narrows) → a government may need to pursue a tight fiscal policy, leading to decrease in budget deficits.

Volatility of Equity market v/s Long-term real GDP growth:

- Due to high volatility associated with equity market, it is very difficult to predict equity returns using historical equity returns. In contrast, since long-term real GDP growth rate depends on slowly evolving fundamental economic factors, it tends to exhibit relatively low volatility, particularly in developed countries.
- Similarly, countries with prudent monetary policies tend to have less volatile inflation rates compared to stock prices.

Practice: Example 2, Volume 1, Reading 12.

4.1	Production Function

Inputs to economic growth:

1. Labor
2. Physical
3. Human capital
4. Technology
5. Natural resources
6. Public infrastructure

A two-factor aggregate production function:

$$Y = AF(K, L)$$

where,

Y = Level of aggregate output in the economy
L = Quantity of labor or number of workers or hours in the economy
K = Stock of capital used to produce goods and services
A = Total Factor Productivity (TFP)

NOTE:

Capital and labor can be employed in various combinations to produce output.

Total Factor Productivity (TFP): It reflects the general level of productivity, innovation or technology in the economy.

- Increase in TFP implies a proportionate increase in output for any combination of inputs.
- Increase in TFP does not imply a **change** in the relative productivity of the inputs.
- Changes in TFP are estimated using a growth accounting method, explained below.

Cobb-Douglas Production Function: It is stated as follows:

$$F(K, L) = K^\alpha L^{1-\alpha}$$

where,

α =   Share of output or GDP paid by companies to suppliers of capital*

$1 - \alpha$ =   Share of output or GDP paid by companies to suppliers of labor

NOTE:

The value of α lies between 0 and 1.

*Under the Cobb-Douglas production function, MPK is stated as:

$$\textbf{MPK} = \alpha \, AK^{\alpha-1} L^{1-\alpha} = \alpha \, Y/K$$

Since in a competitive economy, profit is maximized when Marginal product of capital (MPK) = Rental price of capital (r) and Marginal product of labor = Real wage rate,

$\alpha \, Y/K = r \rightarrow \alpha = r(K) / Y = $ Capital income / Output or GDP

Output per worker or Average labor productivity (Y/L or y): It refers to the average amount of goods that can be produced by a unit of labor. It is estimated as follows.

GDP/Labor input = TFP × capital-to-labor ratio × share of capital in GDP

Or

$$y = Y/L = Ak^\alpha$$

Capital-to-labor ratio (k):

It reflects the amount of capital available for each worker.

- Due to lack of human and physical capital, developing countries have relatively *higher labor productivity growth* and relatively small impact of diminishing marginal returns than developed countries but *low levels* of productivity compared to developed countries.

Two important Properties of Cobb-Douglas Production Function:

1) The Cobb-Douglas production function exhibits **constant returns to scale** i.e. if all the inputs into the production process are increased by the X %, then output will also increase by X %.

- Constant returns to scale implies that $\alpha + (1-\alpha)$ must always = 1.
- This indicates that if both inputs are increased proportionately, then there are no diminishing marginal returns.

2) The Cobb-Douglas production function exhibits **diminishing marginal productivity** with respect to each individual input i.e. the marginal (incremental) output produced by employing each additional unit of *variable* input, keeping the other inputs unchanged, will decline.

- The diminishing marginal productivity implies that adding more and more capital to a fixed number of workers increases per capita output *but at a decreasing rate*.

Significance of diminishing marginal returns to capital depends on the importance of capital in production i.e. value of "α":

- <u>When the value of "α" is close to 0</u>, reflecting that capital is relatively unimportant, diminishing marginal returns to capital will be **very significant (rapid)** and any addition to capital will NOT have a considerable impact on growth. In other words, as capital increases, each additional unit of capital will result in progressively smaller increase in output.
- <u>When the value of "α" is close to 1</u>, reflecting that capital is very important, diminishing marginal returns to capital will be **small (slow)** and any addition to capital will have a considerable impact on growth. In other words, the marginal output produced by employing next unit of capital will nearly the same as that of previous unit of capital.

4.2	Capital Deepening vs. Technological Progress

There are two sources of Growth in per capita output:

1) Capital deepening: It refers to an increase in the economy's stock of capital (i.e. plant and equipment) relative to its workforce. It is reflected by increase in the capital-to-labor ratio.

As Savings increase → the amount of income available for investment increases → gross investment increases → net investment increases → eventually stock of capital increases.

Similarly,

When restrictions are removed →foreign investment increases → stock of capital increases

- The increase in capital deepening is represented by the **_movement along_** the production function i.e. from A to B in exhibit 4.
- As long as the growth rate of capital (net investment) > growth rate of labor, ➔ the capital-to-labor ratio increases.
- However, capital deepening cannot result in a sustained growth in per capita income i.e.
  o As the capital-to-labor ratio reaches a maximum value (i.e. at point B), diminishing marginal returns to capital triggers i.e. MPK declines as more capital is added to the labor input. It is represented by a movement to point D (exhibit 4).
- The point where MPK = MC, profit is maximized and no further capital is added by producers i.e. capital-to-labor ratio will stop increasing.

Contribution of Capital Deepening = Labor productivity growth rate – Total Factor Productivity

- The larger the difference between the productivity growth measures, the greater the contribution of capital deepening to the economic growth.

2) Improvement in technology or technological progress: It refers to the economy's ability to produce more output without using any more inputs i.e. capital or labor.

- An improvement in TFP is represented by an **_upward shift_** in the entire production function i.e. from point B to C (exhibit 4, page 593).
- Improvement in TFP also increases the marginal product of capital relative to its marginal cost and results in a *permanent (sustained)* increase in per capital output growth rate even in the steady state.

In other words, *in the absence of technological progress, a country cannot permanently increase per capital GDP growth simply by indefinitely increasing its capital stock.*

Contribution of Improvement in technology = Labor productivity growth rate – Capital Deepening

In developing countries, potential GDP growth rate can be increased through both capital deepening and technological progress; while in developed countries, the improvements in potential GDP growth rate largely depend on technological progress.

See: Exhibit 4, Volume 1, Reading 12

Practice: Example 3, **Volume 1, Reading 12.**

4.3	Growth Accounting

Three sources of growth:

1) Growth in Labor
2) Growth in Capital
3) Technological Progress (TFP)

Growth Accounting Equation based on Solow Approach:

Growth rate of output = Rate of technological change + (α × Growth rate of capital) + (1- α) × Growth rate of labor

$$\Delta Y / Y = \Delta A / A + \alpha \Delta K/K + (1 - \alpha) \Delta L/L$$

where,

α   = Elasticity of output with respect to capital i.e. 1% increase in capital leads to α% increase in output. It also represents relative shares of capital in national income.

(1 − α) = Elasticity of output with respect to labor. It also represents relative shares of labor in national income.

A   = Growth in TFP i.e. entrepreneurial ability, education, roads, technology, natural resources etc.

- It measures the amount of output that cannot be explained by growth in capital or labor.
- It is not directly measured; rather, it must be estimated as a **_residual_** in the above equation e.g. using a time-series, econometric model.

TFP = Growth in output – Growth in the factor inputs or weighted growth rates of these inputs

- TFP estimates highly depend on the measurement of the labor and capital inputs.

Uses of Growth Accounting Equation: It can be used to

- Estimate the contribution of technological progress to economic growth
- Analyze and decompose the sources of growth in an economy.
- Quantify the contribution of each factor to long-term growth in an economy i.e. contribution of capital and labor, impact of TFP etc.
- Estimate potential output.

Labor productivity growth accounting equation: It is an alternative method of measuring potential GDP.

Growth rate in potential GDP = Long-term growth rate of labor force + Long-term growth rate in labor productivity

Advantages:

- It is a simple method relative to Solow approach.
- It does not require estimating the capital input and TFP.

Disadvantage: Under this method, it is difficult to directly analyze and predict impacts of capital deepening and TFP progress.

4.4	**Extending the Production Function**

An Extended Production Function includes the following inputs:

1. Raw materials and natural resources i.e. oil, lumber and available land (N).
2. Quantity of labor i.e. the number of workers in the country (L).
3. Human capital i.e. education and skill level of the workers (H).
4. Information, computer, and telecommunications (ICT) capital i.e. computer hardware, software, and communication equipment (K_{IT}).
5. Non-ICT capital i.e. transport equipment, metal products and plant machinery other than computer hardware and communications equipment, and non-residential buildings and other structures (K_{NT}).
6. Public capital i.e. infrastructure owned and provided by the government (K_P).
7. Technological knowledge i.e. the production methods used to convert inputs into final products, reflected by TFP (i.e. A).

$$Y = AF (N, L, H, K_{IT}, K_{NT}, K_P)$$

4.5	**Natural Resources**

There are two categories of natural resources:

1. **Renewable resources:** These resources are the resources that can be continuously replaced by nature i.e. forest, trees.

2. **Non-renewable resources:** These resources are finite resources i.e. once they are used up, they cannot be replaced by nature e.g. oil and coal.

- Although access to natural resources is important, *ownership and production of natural resources does not necessarily imply a higher economic growth*.
- Indeed, sometimes, access to natural resources may even impede growth, resulting in a "**resource curse**" i.e. when countries rich in natural resources lack the economic institutions necessary for growth.
- Sometimes, countries rich in resources may suffer the **Dutch disease** i.e. strong export demand for resources leads to currency appreciation which makes other segments of the economy (particularly manufacturing), globally uncompetitive.
- Due to the shifts towards a services-based economy, the relative share of natural resources in national income has decreased in many countries.

4.6	**Labor Supply (section 4.6.1- 4.6.4)**

Growth in the number of people available for work (i.e. quantity of workforce) is an important source of economic growth. Growth in labor input depends on four factors:

1. **Population growth:** Long-term anticipated growth in labor supply majorly depends on the growth of the working age population.

- Working age population growth depends on fertility rates and mortality rates. Developing countries have higher population growth rates compared to developed countries.
- It must be stressed that *population growth may result in increase in the growth rate of the overall economy but it does not affect the rate of increase in per capita GDP*.

Besides population growth rate, economic growth also depends on the age mix of the population i.e.

- Countries face a **demographic burden** when the share of non-working elders (i.e. over 65) in the population exhibits an increasing trend.
- Countries receive a **demographic boost** when the share of population below the age of 16 exhibits a declining trend.

2. **Labor force participation:** Labor force participation rate refers to the percentage of the *working age population* in the labor force.

- Labor force participation rate can be increased with an increase in the female labor force participation rates.
- In the short run due to changes in the labor force participation rate, the growth rate of the labor force may <u>not</u> be equal to the population growth.
- Unlike increase in population, an increase in the labor force participation rate may result in an increase in the growth of per capita GDP.
- It is important to understand that increase (or decrease) in labor force participation rate (e.g. by reducing unemployment rate) simply indicates a temporary change in the level of participation; it does not imply a truly permanent rate of change.

3. **Net migration:** A significant increase in immigration may offset the slow domestic labor force growth rate in an economy.

4. **Average hours worked:** Potential size of the labor input is measured by the total number of hours available for work.

Total number of hours available for work = Labor force × Average hours worked per worker

Labor force = Working age population (ages 16 to 64) that is either employed or available for work but not working (i.e. unemployment)

- The average hours worked per worker is highly sensitive to the business cycle and varies significantly across countries i.e. the average number of hours worked tends to reduce during recession.
- In most developed countries, the average number of hours worked per year has been declining, leading to shorter workweek as workers prefer leisure time to labor income due to following factors:
  - Legislation
  - Collective bargaining agreements
  - Growth of part-time and temporary work, particularly due to increase in female labor force participation rates
  - Wealth effect
  - High tax rates on labor income

NOTE:

Typically, Growth rate of labor input should be = Population growth rate + Net change in population due to immigration.

Practice: Example 5 & 6, Volume 1, Reading 12.

| 4.7 | Labor Quality: Human Capital |

Human capital: It refers to improvement in labor quality via accumulated knowledge and skills acquired from education, on-the-job training or life experience and investment in human beings. It is considered as an important source of growth for an economy.

- Generally, the better educated and more skilled workers →the higher the productivity of the workers, the more adaptable workers to changes in technology or changes in market demand and supply → the higher the economic growth.
- Human capital can be increased by investing in education and on-the-job training and also by improving health of the population.

Benefits of Education:

- Education improves the quality of labor and increases the stock of human capital.
- Although investment in education is costly but it generates high return e.g. the higher the education, the higher the wages.
- In addition, investment in education produces a spillover or externality effect i.e. increasing the educational level of one person increases the

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- output for the whole economy.
- Education can cause a sustained increase in the growth of an economy by promoting innovation and technological progress.

| 4.8 | Capital: ICT and Non-ICT |

Net investment in physical capital stock = Gross investment – Depreciation

- As long as the net investment in physical capital stock is positive, the physical capital stock increases over time.
- Although an economy cannot achieve a long-term sustainable growth simply by capital deepening due to diminishing marginal productivity, however, there is a high positive correlation between investment spending and economic growth i.e.
  - The higher the rate of net investment → the higher the investment to GDP ratio → the higher the growth rates of physical capital stock and → the higher the GDP growth rate.
  - However, if population is increasing, then impact of growth of per capita GDP will be small.

Rationale behind positive correlation between Investment spending and Economic Growth:

i. Despite diminishing marginal productivity of capital, investment-driven economic growth may last for a considerable period of time in capital-poor countries.

ii. The positive impact of investment spending on economic growth depends on the existing physical capital stock which varies significantly across countries i.e.

- The smaller the amount of existing physical capital per worker, the greater the positive impact of changes in physical capital stock on growth.
- For countries with a large physical capital stock, the changes in physical capital stock will have a major impact on growth only when there will be a sustained high level of investment over many years.

iii. Economic growth and productivity also depend on the composition of investment spending and the stock of physical capital.

Categories of Investment Spending:

1) ICT Capital: ICT capital refers to information, computer, and telecommunications capital e.g. computer hardware, software, and communication equipment.

- ICT capital spending measures the impact of information technology sector on economic growth.
- Use of IT equipment in various industries has also generated network externalities i.e. internet and

email by interconnecting people have facilitated them to work more productivity.

2) Non-ICT Capital: Non-ICT capital includes transport equipment, metal products and plant machinery and non-residential buildings and other structures.

- Non-ICT capital spending measures the impact of capital deepening on economic growth.
- Non-ICT capital spending tends to have relatively less impact on potential GDP growth than ICT capital spending.

4.9	Technology

Technology is considered the most important source of growth for an economy.

Technological progress refers to the ability to produce more and/or higher-quality and new variety of goods and services with the same resources or inputs. Technological progress results in an upward shift in the production function.

- Changes in technology are represented by human capital (knowledge, organization, information, and experience base) and/or in new machinery, equipment, and software.
- Technology progress requires countries to innovate through expenditures, both public and private on research and development (R&D).
  - Typically, developed countries tend to have high ratio of R&D spending to GDP.
  - In contrast, since developing countries imitate or rely on technology developed in advanced

countries, they tend to have lower ratio of R&D spending to GDP.
- It is important to note that although high R&D spending increases output and productivity in the long-run; in the short-run, it may cause a cyclical slow down in growth as new technologies and processes substitute old companies and workers.

Practice: Example 7, Volume 1, Reading 12.

4.10	Public Infrastructure

Public infrastructure investment is an important source of economic growth and productivity. It includes investment in roads, bridges, municipal water, dams, and electric grids etc.

- Public capital tends to have few substitutes.
- Like technology, public infrastructure investment generates an externality effect in the economy because it acts as a complement to the production of private sector goods and services.

Practice: Example 8 & 9, Volume 1, Reading 12.

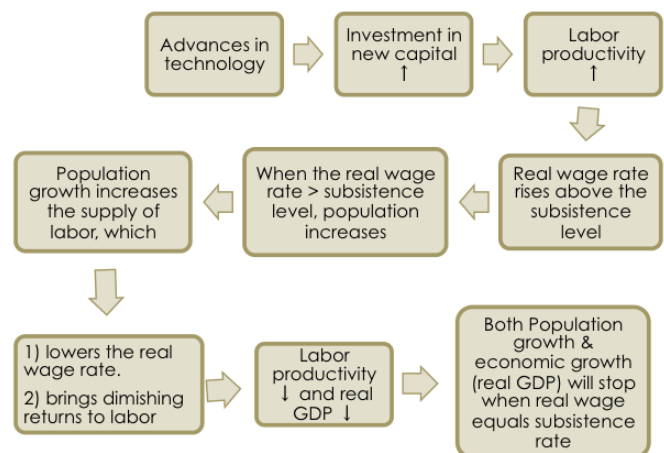| 5.	THEORIES OF GROWTH (Section 5.1-5.3)

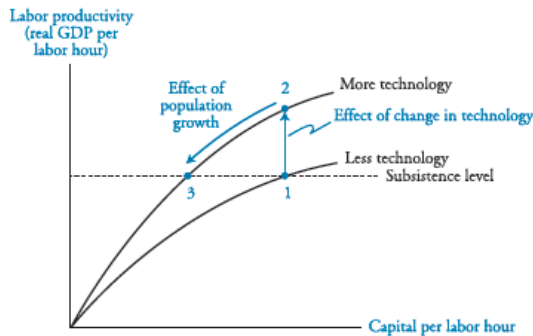Three theories of Economic Growth:

1) The Classical Model: It is commonly known as the Malthusian theory. According to this theory, growth rate in real GDP per capita is temporary because an exploding population with limited resources brings an economic growth to an end.

Inputs to Production Function:

i. Land as a fixed factor
ii. Labor as a variable factor

The Basic Idea:

Advances in technology → Investment in new capital ↑ → Labor productivity ↑ → Real wage rate rises above the subsistence level → When the real wage rate > subsistence level, population increases → Population growth increases the supply of labor, which → 1) lowers the real wage rate. 2) brings dimishing returns to labor → Labor productivity ↓ and real GDP ↓ → Both Population growth & economic growth (real GDP) will stop when real wage equals subsistence rate

Implication:

- Under the classical model, in the long run, changes in technology result in a larger NOT richer population.
- Even with technological progress, an economy's standard of living is constant over time and per capita output cannot grow.

Criticism of Classical Theory: It has been observed that:

- Population growth rate is not strongly associated with increase in income per person.
- Population growth does not push income to revert back to subsistence level.
- Per capita income can grow with technological progress, which can offset the impact of diminishing marginal returns.

2) Neoclassical Model: Under Neoclassical growth theory (also known as **Solow growth** model), the economic growth and growth in real GDP per person depends solely on exogenous technological progress i.e. as long as technology keeps advancing, real GDP per person will persistently increase.

Inputs to Production Function (based on Cobb-Douglas production function):

i.   Capital as variable factor subject to diminishing marginal productivity
ii. Labor as variable factor subject to diminishing marginal productivity

Assumptions:

- Economic growth rate depends on the rate of technological change.
- Technological change is exogenous and results from chance.

The Basic Idea:

- The population growth rate is independent of real GDP and the real GDP growth rate.

**Population growth rate =** Birth rate – Death rate

- The birth rate is determined by the opportunity cost

of a woman's time i.e. as women's wage rates ↑, the opportunity cost of having children ↑ and the birth rate ↓.
- The death rate is determined by the quality and availability of health care services i.e. as the quality and availability of health care improves, the death rate ↓.
- The decrease in both the birth rate and the death rate offset each other and thus make the population growth rate independent of the level of income.
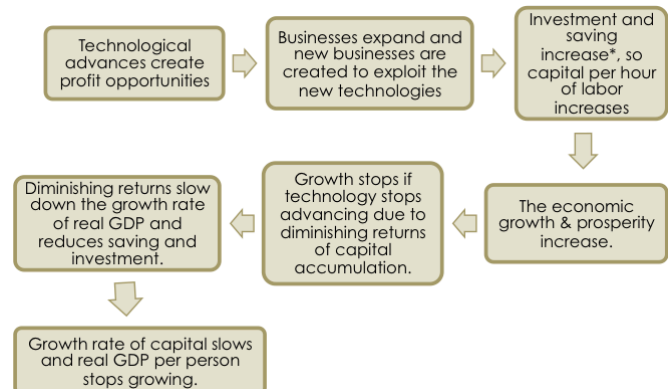
*As long as rate of return (real interest rate) > target return → people have an incentive to save. When rate of return < target return, savings decrease → resulting in decrease in investment.
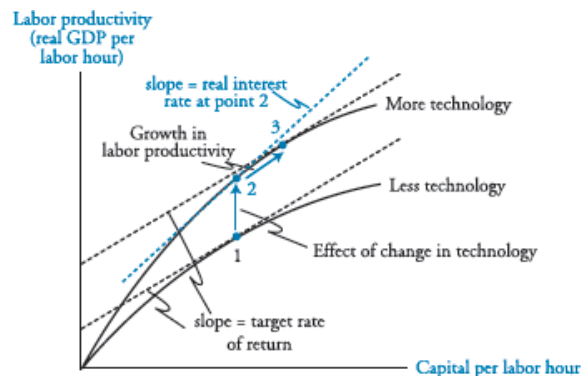
5.2.1) Balanced or Steady State Rate of Growth in Neoclassical Growth Theory

In a closed economy: There is no international trade or capital flows; thus,

Domestic investment = Domestic savings

And

Growth in physical capital stock = $\Delta K = sY - \delta K$

where,

s   = Fraction of income that is saved
sY = Gross investment → Increases in gross investment results in increase in physical capital stock.
δ = A constant rate at which the physical capital stock depreciates → Depreciation results in decrease in physical capital stock.

According to the neoclassical growth theory, an economy moves to an equilibrium position over time i.e. it reaches the balanced or steady state rate of growth.

In the steady state:

- The growth rate of capital per worker = growth rate of output per worker i.e.
  $$\Delta k / k = \Delta y / y = \Delta A / A + \alpha \, \Delta k / k$$
- The output-to-capital ratio is constant.
- Capital-to-labor ratio (k) and output per worker (y) grow at the same rate i.e.
  Growth rate of capital per worker = Growth rate of output per worker = $\frac{TFP}{1-\alpha}$ ➔ Steady state growth rate of labor productivity
- The marginal product of capital is also constant and is equal to $\alpha \,(Y/K)$, which in turn is equal to real interest rate in the economy.
- The increase in the capital-to-labor ratio (i.e. by capital deepening) does not affect the marginal product of capital and growth rate of the economy; rather, the potential growth rate of the economy is affected by only changes in growth rates of TFP and in the labor share of output.

Growth rate of Total output = $\Delta Y / Y$
$$= \text{Growth rate of TFP scaled by labor force share +}$$
Growth rate in the labor force $= \frac{\theta}{1-\alpha} + n$

Steady state Output-to-capital ratio = $\frac{Y}{K}$
$$= \left(\frac{1}{s}\right)\left[\left(\frac{\theta}{1-\alpha}\right) + \delta + n\right] = \Psi$$

Gross investment = $\left[\left(\frac{\theta}{1-\alpha}\right) + \delta + n\right] k$

Refer to: Exhibit 13, Volume 1, Reading 12

- The **Straight line** represents the amount of investment required to maintain the physical capital stock at the required rate.
  Slope of straight line = $[\delta + n + \theta / (1-\alpha)]$
- The **curved line** represents the amount of actual investment per worker. The curve reflects diminishing marginal returns to capital.
- Steady state equilibrium occurs where the straight line intersects the curved line.
- Over time when capital-to-labor ratio rises, TFP increases, the actual investment curve shifts upward, the equilibrium moves upward and to the right along the straight line.

During the transition to the steady state growth path, the exogenous factors i.e. labor supply and TFP are fixed and

Growth rates of output per capita = $\Delta y / y$
$$= \left[\left(\frac{\theta}{1-\alpha}\right) + as\left(\frac{Y}{K} - \Psi\right)\right] = \left(\frac{\theta}{1-\alpha}\right) + as\,(y/k - \Psi)$$

Capital-to-labor ratio = $\Delta k / k$
$$= \left[\left(\frac{\theta}{1-\alpha}\right) + s\left(\frac{Y}{K} - \Psi\right)\right] = \left(\frac{\theta}{1-\alpha}\right) + s\,(y/k - \Psi)$$

When the actual saving/investment > required investment (e.g. due to low capital-to-labor ratio or high TFP).

- Output-to-capital ratio > equilibrium level
- Growth rates of output per capita and the capital-to-labor ratio will be above the steady state rate.
- Since $\alpha < 1$, it indicates that growth in capital > output growth rate and the output-to-capital ratio is falling.
- However, with passage of time, the growth rates of both output per capita and the capital-to-labor ratio decline to the steady state rate.

When the actual saving/investment < required investment (e.g. due to high and unsustainable capital-to-labor ratio or low TFP).

- Output-to-capital ratio < equilibrium level
- Growth rates of output per capita and the capital-to-labor ratio will be below the steady state rate.
- Output falls.
- However, with the passage of time, output grows faster than capital and both output per capita and the capital-to-labor ratio rise to the steady state rate.

*See: Exhibit 16 Volume 1, Reading 12.*

Practice: Example 10, Volume 1, Reading 12.

Impact of parameters:

A. Saving rate (s): When saving rate ↑➔ saving/investment at every level of output ↑, ➔ capital-to-labor ratio and output per worker ↑➔ saving/investment curve shifts **upward** to a new equilibrium level at higher capital-to-labor ratio and output per worker. *See exhibit 14.*

- The saving rate only changes the level of output per worker; it does not permanently change the growth rate of output per worker i.e. the steady state growth rates of output per capita or output remain unchanged.
- However, the higher the saving rates ➔ the higher the level of per capita output and capital-to-labor ratio, and the higher the level of labor productivity.
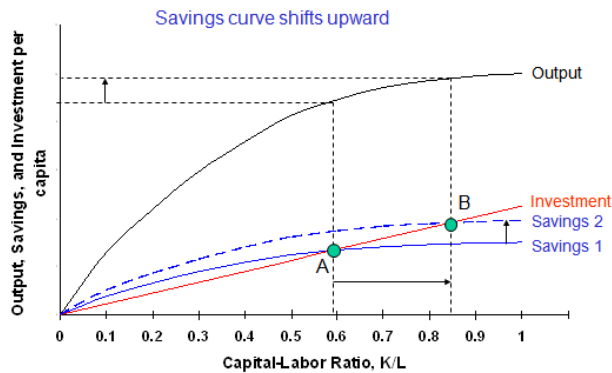
B. Labor force growth (n): When labor force growth rate ↑, slope of the required investment line increases → the straight line intersects the supply of saving/ investment curve at new equilibrium point with *lower* capital-to-labor and output per worker ratios.

- The labor force growth rate only changes the level of output per worker; it does not permanently change the growth rate of output per worker.

C. Depreciation rate (δ): When depreciation rate ↑, → net capital accumulation falls at a given rate of gross saving, → slope of the required investment line increases → and it intersects the supply of saving/ investment curve at new equilibrium point with *lower* capital-to-labor and output per worker ratios.

- The depreciation rate only changes the level of output per worker; it does not permanently change the growth rate of output per worker.

D. Growth in TFP (θ): When growth rate of TFP ↑, → in the future, output per worker will grow faster BUT at present with a given supply of labor and a given level of TFP, output per worker will fall, → slope of the required investment line increases → and it intersects the supply of saving/ investment curve at new equilibrium point with *lower* capital-to-labor and output per worker ratios. *See exhibit 15.*

- Due to changes in TFP, the capital-to-labor ratio and output per capita are not constant even in steady state, implying that *changes in the growth rate of TFP can permanently change the growth rate of output per worker.*

Important to Note:

- When the capital-to-labor ratio increases but the output-to-capital ratio declines, a greater fraction of savings is required to maintain the capital-to-labor ratio; as a result, a smaller fraction is left for capital deepening.
- Proportional impact of the change in parameter on the capital-to-labor ratio and per capita income over time is estimated as follows:

$$\frac{k_{new}}{k_{old}} = \left[\frac{\left(\frac{Y}{K} \right)_{new}}{\left(\frac{Y}{K} \right)_{old}} \right]^{\frac{1}{\alpha - 1}}$$

$$\frac{y_{new}}{y_{old}} = \left[\frac{k_{new}}{k_{old}} \right]^{\alpha}$$

Implications of the Neoclassical Model:

1) Higher rates of investment (capital accumulation) cannot **permanently** increase the rate of per capita growth in an economy i.e. per capita growth in the economy will stop increasing at some point, reaching the steady state of growth.

2) Capital deepening can raise per capita growth only when

- Economy is operating below the steady state; and
- MPK> Marginal cost of capital (MC).

3) When the rate of growth of capital stock > growth rate of labor productivity, the return to investment in an economy should decline over time.

4) Changes in saving and investment only have a transitory impact on growth i.e. steady state rate of economic growth is unrelated to the rate of saving and investment.

5) Because of diminishing marginal returns to capital, potential GDP per capita can sustainably grow only through technological change or growth in TFP.

6) Due to lack of physical capital and hence high marginal productivity of capital and potentially higher saving rates in developing countries, growth rates & income levels per person of developing countries should converge to the developed countries.

Criticism of Neoclassical Growth Theory:

1. In the neoclassical theory, the technology is treated as exogenous factor; thus, the theory does not explicitly explain the determinants of technological progress or changes in TFP over time.

2. The historical evidence shows that convergence among countries is slow and the poor countries are not catching up.

3. It has also been observed that in developed countries, with rate of growth of capital stock > growth rate of labor productivity, the return to investment has not declined over time.

Practice: Example 11, Volume 1, Reading 12.

Augmented Solow Approach (section 5.2.3):

This approach is an extension of the neoclassical model. Under this approach:

> - The portion of growth associated with the technological progress (TFP) is relatively small compared to neoclassical model.
> - Besides physical capital, investment includes human capital, research and development, and public infrastructure.
> - In addition to level of capital spending, the economic growth also depends on the **composition** of capital spending i.e. the higher the capital spending on high-technology goods relative to physical capital, the higher the productivity and the higher the growth.
> - However, even a broadly defined capital investment is subject to diminishing marginal returns; implying that in the long-run, an economy will ultimately revert towards a steady state growth rate.

3) Endogenous Growth Model:

The Basic Idea: According to new growth theory, the growth rate depends on ability of people to innovate. This implies that as long as incentives and motives of rising profit exist in an economy, growth can be sustained indefinitely i.e.
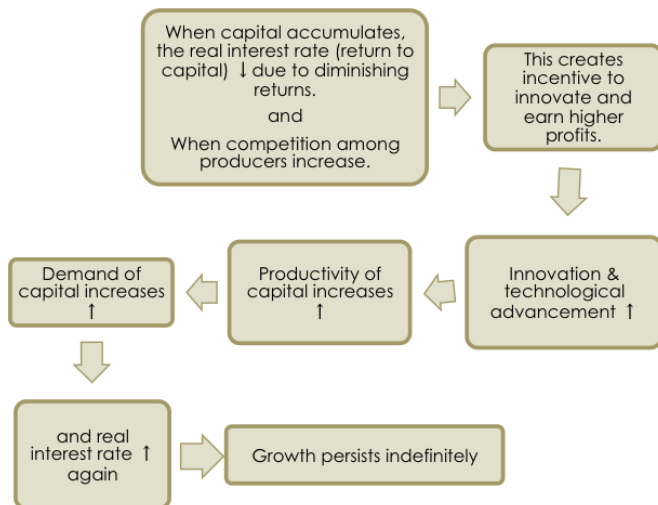
Important to Note:

Technological progress is an endogenous factor i.e. it depends on ability and willingness of people to innovate.

Inputs to the production function:

> - Capital
> - Labor
> - Knowledge or human capital
> - R&D spending

These factors of production are financed through savings.

Production function in the endogenous growth model:

$$y_e = f(k_e) = ck_e$$

where,

ye = output per worker
ke = stock of capital per worker
c = constant marginal product of capital in the aggregate economy
e = endogenous growth model

> - Unlike neoclassical production function, endogenous growth production function represents a straight line.
> - The output-to-capital ratio is fixed; as a result, growth rate of output per worker will always be equal to the growth rate of capital per worker.

Growth rate of output per capita = $\Delta y_e / y_e$
$$= \Delta k_e / k_e = sc - \delta - n$$

> - This implies that *permanently higher growth rate in an economy can be achieved through a higher saving rate.*

Following Two factors play a key role in endogenous growth theory:

1. Discoveries are a public capital good.
2. R&D expenditures and human capital (i.e. knowledge) are not subject to diminishing returns i.e. increasing knowledge increase the productivity of both labor and capital; rather, they may have increasing returns to scale due to large positive externalities or spillover effects because spending by companies on R&D and knowledge capital generates benefits to the economy as a whole.

Implication of the Endogenous Growth Model:

1) Higher rates of investment (through higher savings) in capital stock (i.e. pure capital deepening), knowledge and in new, innovative products and processes can result in a permanently higher growth rates.
2) The incomes of developed and developing countries do not necessarily converge over time because developed economies with constant or even increasing returns to knowledge capital can continue to grow as fast as, or faster than, the developing countries.

According to endogenous growth theory, the increase in growth is a perpetual process.
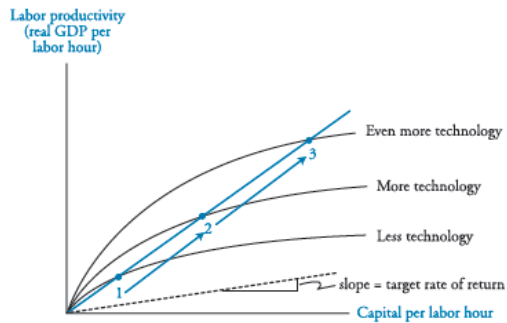
Practice: Example 12, Volume 1, Reading 12.

Differences between theories:

- According to **classical theory**, increase in population negatively affects economic growth.
- According to **endogenous growth theory**, increase in population positively affects economic growth because TFP progress depends on ability and willingness of people to innovate.
- According to **classical theory**, population explosion results in decrease in real GDP.
- According to **neo-classical theory**, diminishing returns to capital results in decrease in real GDP.
- Both **classical and neo-classical** theories consider technology as an exogenous factor that occurs by chance.
- Under an **Endogenous growth theory**, technology is viewed as an endogenous factor that depends on the ability and capacity of human resources to innovate.

| 5.4	Convergence Debate

According to the Convergence hypothesis, over time, countries with low per capita incomes (i.e. developing countries) should grow at a faster rate than countries with high per capita incomes (i.e. developed countries); so that the per capita income in developing countries will converge toward the same level of per capita income.

Convergence between the developed and developing countries can occur in two ways:

1) Through capital accumulation and capital deepening.
2) By imitating or adopting technology developed in the advanced countries. In addition, the higher the capital spending on technological progress, the narrower the income gap between developed and developing countries.

However, the evidence on convergence is mixed.

Important to Note: If the convergence hypothesis is correct, it implies that the growth rate in per capita GDP is inversely related to the initial level of per capita real GDP.
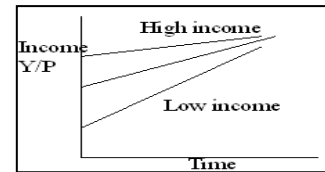
Types of Convergence under the Neoclassical growth theory:

1) **Absolute Convergence:** According to absolute convergence, regardless of their particular characteristics, per capita incomes in poor countries will **grow** at the same rate as that of rich economies such that all economies will eventually converge to a **common steady state.**

- However, it does not imply that the **level** of per capita income will be the same in all countries regardless of underlying characteristics.

2) **Conditional Convergence:** According to conditional convergence, countries with low per capita incomes will catch up the countries with high per capita incomes *ONLY* if they have similar socio-economic characteristics e.g. population growth rate, savings per capita, depreciation and capital stock. Such that

- Only **homogenous** economies will converge to the same level of per capita output as well as the same steady state growth rate;
- While **heterogeneous** economies will converge to different level of per capita output and steady state growth rate, depending on their human capital endowment and other socio-economic characteristics.

Club convergence: According to club convergence, only *rich and middle-income* countries that are member of the club should converge to the income level of richest countries in the world. Under club convergence,

- The lowest per capita income countries in the club should grow at the fastest rate.
- Per capita income of Non-member countries should continue to decline.
- Poor countries can become members of the convergence club by making appropriate institutional changes e.g. appropriate legal, political, and economic institutions, labor market reforms and trade policy*.

Implication of convergence and/or Club convergence on Equity investment: If convergence and particularly club convergence does occur, then in the long-run,

- Corporate profits, earnings and stock prices in *lower*

per capita incomes countries that are members of the convergence club should grow at a faster rate (note that risk will also be higher).
- This implies that in the long-run, investors can earn higher rate of return by investing in lower per capita incomes countries that are members of the club than investing in higher-income countries.

*NOTE:

Import substitution policies may initially improve growth but if maintained for a long period, they may negatively affect growth.

6.	GROWTH IN AN OPEN ECONOMY

Effects of Opening up the economy to trade and financial flows on Economic growth rate: In an open economy,

1) A country can fund its domestic investment by borrowing funds in global markets instead of just relying on domestic savings.
2) Countries can increase their overall productivity by reallocating resources into industries in which they have a comparative advantage away from industries in which they have a comparative disadvantage.
3) Companies have access to a larger, global market for their products so that they can better exploit any economies of scale and have incentives to innovate.
4) Countries can increase their rate of TFP progress by importing technology from other countries.
5) A country can increase its physical capital stock through capital inflows (i.e. by borrowing funds globally), which results in higher productivity growth rate and higher per capita incomes despite low domestic savings.

- Since capital flows must be matched by equal and offsetting trade flows, this implies that *capital-poor countries tend to run a trade deficit.*

6) As global trade increases, competition in the domestic market increases, leading to better quality and low priced products.

According to the neoclassical model, convergence should occur *more quickly* when:

- Economies are open;
- There is no trade or capital flow restrictions;
- International borrowing and lending is allowed;

Implication of *Capital-to-labor ratios* on rate of return on investment:

- The lower (higher) the capital-to-labor ratio → the higher (lower) the marginal product of capital → the higher (lower) the rate of return on investments.
  o This implies that investors should invest in capital-poor countries to earn higher returns on investments.
- However, as physical capital stock in the capital-poor country increases over time → the return on investments reduces → the rate of investment declines → the size of the country's trade deficit

declines → the growth rate will slow down and will revert toward the steady state rate of growth.
  o →Consequently, investment < level of domestic savings → country's trade deficit will convert into a trade surplus and will become a capital-exporting country.

Neoclassical model v/s Endogenous growth model with respect to an open economy:

- In the Solow or neoclassical model, opening up an economy to trade and financial flows will not cause any increase in the rate of growth in an economy i.e. countries will always grow at the steady state rate of growth.
- In contrast, in the Endogenous growth model, opening up an economy to trade and financial flows can permanently increase the rate of economic growth.

Under Endogenous Growth Model, increase in global trade positively affects global output in following three ways:

a) **Selection Effect:** When due to increased competition from foreign companies, less efficient domestic companies exit the market whereas more efficient domestic companies innovate and discover new technologies to lower their costs and increase profits, the efficiency of the overall national economy tends to increase. This is referred to as selection effect.

b) **Scale Effect:** When opening up an economy provides companies an access to a larger, global market for their products, they are better able to fully exploit economies of scale and have incentives to innovate, such that spending on R&D and human capital increases and causes the efficiency of the overall national economy to increase. This is referred to as scale effect.

- Typically, scale effect tends to benefit smaller countries.

c) **Backwardness Effect:** When opening up an economy facilitates less advanced countries or sectors of an economy to import or imitate technology developed in more advanced countries or sectors, it generates knowledge spillover effects and is referred to as backwardness effect.

- Typically, backwardness effect tends to benefit poorer, less developed countries.

NOTE:

However, trade may also hurt growth of countries (particularly small countries) that lack TFP progress.

Practice: Example 13,
Volume 1, Reading 12.

Two contrasting strategies for economic development:

1) Inward-oriented policies: Policies that restrict imports to develop and/or support domestic industries and put limits on investment from abroad are referred to as inward-oriented policies. These policies promote production of domestic substitutes despite their higher production costs. These policies are also known as *import substitution policies*.

2) Outward-oriented policies: Policies that focus on promoting integration with the world economy by promoting exports, eliminating trade restrictions and attracting foreign investments are referred to as outward-oriented policies. These policies are basically trade-oriented policies and often referred to as *export-led growth strategies*. It has been evidenced that countries that pursue outward-oriented policies tend to:

- Have high rates of GDP growth and convergence with developed countries compared to countries that pursue inward-oriented policies.
- Enjoy positive effects of foreign direct investment.

Practice: Example 14 & 15,
Volume 1, Reading 12.

Practice: End of Chapter Practice
Problems for Reading 12.

<table>
<tr><td>1.</td><td>INTRODUCTION</td></tr>
</table>

1. INTRODUCTION

Knowledge of the basic types of laws that affect economies, financial systems, industries, and businesses is useful to an analyst.

Regulations may develop both pro-actively and reactively.

- Pro-active regulations are those that are developed to address expected consequences of future changes in the environment.
- Reactive regulations are those that are developed in response to the consequences of changes in the environment that have occurred in the past e.g. regulations developed in response to financial crisis.

Examples:

- Regulations associated with dealing with systematic risk;
- Labor regulation;
- Environmental regulation;
- Electronic privacy regulation etc.

Regulatory Framework: A regulatory frameworks refers to a *set of rules or standards of conduct* e.g.

- Restrictions on and/or mandate how businesses interact with others (i.e. other businesses, consumers, workers, and society); or
- Constraints on and/or mandate with regard to internal operations of businesses.

Importance of Regulations: Knowledge of regulation is crucial for analysts and investors because

- Regulation has potentially extensive and significant effects on the economy and on individual companies and securities.
- Changes in regulatory structure and regulatory uncertainty may have considerable effects on business decisions.
- Regulatory structure has substantial impact on business operations and business environment.
- Regulation plays an important role in helping markets function effectively.

2. OVERVIEW REGULATION

2.1 Classification of Regulations and Regulators

Classification of Regulators:

A. Legislative bodies: They have the authority to enact laws (called statutes) at a broad level. However, it is the responsibility of regulatory bodies to implement those set of rules and laws.

B. Regulatory bodies: They have the legal authority to enact and enforce rules and regulations within the parameters of the mandate given to them. These include:

a) Government agencies e.g. U.S. Securities and Exchange Commission (SEC). SEC regulates the securities markets in the U.S.

b) Independent regulators: They are recognized by a government body or agency but are not government agencies. Unlike government agencies,

- They do not depend on government funding.
- They are protected from political influence and pressure, to some extent.
- They may represent self-regulating organizations, private, non-governmental organizations.

C. Courts: In regulatory context, they perform following roles:

- They help to interpret regulations and laws;
- They define permitted and not permitted regulatory practices;
- They impose sanctions for regulatory violations.

NOTE:

However, classification of a regulator is not always clear.

Classification of Regulations:

A. Statutes: Laws enacted by legislative bodies e.g. Dodd-Frank Ac, enacted by the U.S. Congress.
B. Administrative regulations or administrative law: Regulations enacted by government agencies or other regulators.
C. Judicial law: Interpretations of regulations and laws by courts.

Accounting standard setting bodies: Typically, they are private sector, non-profit, self-regulated organizations e.g. IASB and FASB.

- They provide a set of rules and requirements to prepare financial reports in accordance with specified accounting standards.
- Those set of rules and standards are recognized and enforced by the regulatory authorities.

Credit ratings agencies: Typically, they are private sector, profit-oriented entities. They provide credit ratings for the entities.

- Ratings have an important impact on the pricing of bonds and structuring of portfolios.
- Any regulation associated with credit reporting agencies are recognized and enforced by the regulatory authorities.

Benefits of Credit-rating agency Model:

- The rating agencies tend to provide **objective** guidance for financial instruments for regulatory purposes.
- The rating agencies tend to have economies of scale in information production, which generates large private incentives to outsource the required information.

Limitations of Credit-rating agency Model: Rating agencies may have conflicts of interest with rating seeking entities, resulting in a mismatch between ratings of securities and the degree of risk and quality of securities.

- Such entities may engage in regulatory arbitrage (discussed below) to obtain higher rating.
- Unfortunately, transferring credit rating authority to other organizations does not imply any useful fundamental changes.

Self-regulatory organizations (SROs): SRO is a self-regulating, private, non-governmental organization and an independent regulator that is recognized by a government agency or body. SROs can be exchanges, industry associations, or some form of peer group e.g. Financial Industry Regulatory Authority (FINRA), the International Organization of Securities Commissions (IOSCO) that regulates a significant portion of the world's capital markets.

- They are granted the legal authority and enforcement power by a government agency or body. However, the authority that is received from their members rather than government bodies does not have the force of law.
- SRO **sets and issues** standards and guidance for market participants; whereas, regulatory authorities **recognize and enforce** the standards and guidance.
- SROs do not depend on government funding; rather, they are funded independently.
- SROs both represent and regulate their members who mutually agree to comply with the rules and standards set by SRO.
- SROs may face pressures from their members.
- It is important to note that all self-regulating organizations *are not necessarily independent regulators*. E.g. the Public Company Accounting Oversight Board (PCAOB), a non-profit corporation that oversees the audits of public companies, is an independent regulator; but it is not an SRO.

Role of SROs: The role of SROs varies among countries.

- In some countries, SROs have specific regulatory authority and enforcement powers.
- In some countries, SROs are not recognized as independent regulators.
- The role of SROs is limited in countries where civil law systems prevail and the market primarily depends on government supervision.
- The SROs have extensive and substantial role in countries where common law systems prevail and the market primarily depends on self-regulation.

It is important to understand that the regulatory authorities have the responsibility to oversee and supervise corporate governance of SROs to ensure that they act in a manner consistent with a fair and efficient market.

Statutory boards: They represent non-government entities, but they are subject to specific legislations that govern their operations.

- Mostly, they are funded independently and generate revenues by charging fees on some or all of their services.
- Nevertheless, when revenues are insufficient to meet their operating expenses, they may receive funding from government.

NOTE:

Unions based regulatory bodies: For example, European Commission (EC).

Objectives of Regulations: Regulation plays an important role in following aspects:

- Safety of food, products;
- Privacy of financial information;
- Protection of intellectual property by setting standards and processes that define and govern patents, trademarks and copyrights;
- Protection of environment e.g. by mitigating pollution;
- Labor or employment regulations e.g. workers' rights, employment practices;
- Commerce or trade regulations e.g. consumers' rights and protection, investors' protection anti-trust;
- Financial system regulations e.g. prudential supervision of institutions, capital requirements, insider trading;
- Setting technical standards for technology and electronic tools and resources;

Important to Note: It is important for an analyst to consider the type of regulation that affects the industry/business being analyzed e.g.

- Oil, gas, and mining companies are sensitive to regulatory changes with respect to environmental issues.

- Labor-intensive industries may be sensitive to regulatory changes with respect to labor conditions and rights.
- Pharmaceutical and technology companies may be sensitive to regulatory changes with respect to intellectual property rights.

Classification of laws and regulation based on difference between development and enforcement of regulation:
Regulators are responsible with regard to both substantive and procedural laws.

A. **Substantive Law:** It defines the legal relationship between the citizen and the state and among citizens themselves by defining their legal rights and responsibilities.
B. **Procedural law:** It develops the methods of protection and enforcement of the substantive laws (i.e. legal rights).

2.2	Economic Rationale for Regulation

When there are no frictions (e.g. costs for or restraints on trading and asymmetrical information) and externalities, the market solution is considered as economically efficient or *Pareto optimal* and no regulatory intervention is needed. Market failure occurs when freely functioning markets fail to efficiently or optimally allocate resources, leading to loss of economic efficiency.

Main causes of Market Failure:

a) *Externalities* that result in divergence between private and social costs and/or benefits.

- Negative externality causes market to produce a larger quantity than is socially desirable e.g. pollution.
- Positive externality causes market to produce a smaller quantity than is socially desirable e.g. roads, parks.

b) *Public goods and common resources*: Market failure occurs in public goods because their consumption provides shared benefits to market participants and generates spillover effects; as a result, markets would not produce the optimal amount of these goods e.g. national defense and standard setting.

c) *Monopolies and lack of competition*

d) *Imperfect Asymmetry*: It includes

- Adverse selection: It refers to a problem when (before entering into an agreement/contract) one party has better information than other party.
- Moral hazards: It refers to conflicts of interest that arise as a result of delegation of decision making to agents or post-contractual behavior that adversely affects the interest of other (ignorant) party.

Rationale for Regulations:

- Markets do not always work effectively, and as a result regulation plays a crucial role in helping markets function effectively.
- Regulations provide important protection e.g. regulations that protect the health and safety of workers, food products, environment etc.
- Regulation also plays an important role in protecting consumers.

ECONOMIC RATIONALE FOR GOVERNMENT REGULATIONS
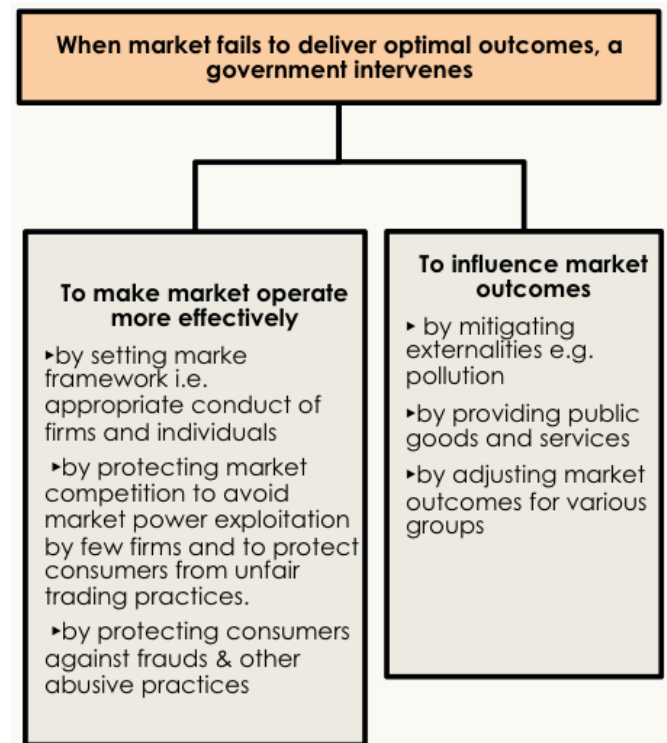
2.2.1) Regulatory Interdependencies

The outcomes of regulations vary among different:

- Orientations of the regulators;
- Objectives;
- Jurisdictions with different perspectives or different trade-offs;

Regulatory capture theory: According to this theory, regulatory agency will be captured (controlled) by the industry/companies being regulated i.e. regulators develop regulations that are in the best interest of the regulated industry.

Regulatory competition: It refers to a situation where various regulators compete among themselves to attract certain entities by providing a favorable regulatory environment. It may adversely affect the effectiveness of enhanced regulation in particular countries.

Regulatory arbitrage: It refers to a situation when entities take advantage of loopholes in regulatory systems to avoid certain types of regulation e.g. by conducting business, creating products and services in certain locations with reduced regulatory costs and/or oversight.

Regulatory cooperation and coordination is needed to deal with global issues i.e. systematic risk, moral hazard, global warming, and nuclear power regulation etc. For example, the *BASEL Accords* are developed to establish and promote internationally consistent capital requirements and risk management practices for larger international banks.

Objectives of BASEL Committee/Bank Supervisor:

- To regulate and monitor the safety and soundness of financial institutions;
- To promote financial stability;
- To reduce system-wide risks;
- To protect customers of financial institutions;

Important to Note: Bank supervisors (unlike securities commissions) tend to avoid disclosing the results of the bank's tests of financial institutions in order to promote financial stability and avoid systematic risk arising from loss of confidence.

Objectives of securities commissions, per IOSCO:

- To protect investors;
- To ensure that markets function in a fair, efficient, and transparent manner;
- To reduce systematic risk;

2.3	Regulatory Tools

Features of ideal and effective regulations: It must be stressed that the regulatory and government policies should be

- Predictable;
- Clear;
- Consistent over time;
- Potentially able to impose sanctions on violators of the regulations i.e. regulators should have comprehensive enforcement powers.
  - Sanctions can be in the form of monetary fines/fees/settlement;
  - In accounting frauds, sanctions may involve redistribution of funds from current stockholders to the stockholders who were the specific victims.
- Efficient and effective in achieving their objectives (i.e. achieving goals at minimum costs);

Impediments to imposing sanctions on violators of the regulations:

It is difficult to:
- detect violations;
- identify exactly the culprits;
- impose sanctions on individuals (i.e. companies' executives) who are able to fight using corporate resources due to indemnification provisions in their employment contracts.

Regulatory tools:

a) Price mechanisms: They are used to create the appropriate marginal incentives and to efficiently allocate resources.

These include:

1) **Taxes:** Taxes can be used to reduce environmental pollution.
2) **Subsidies:** Subsidies can be used to provide financial support to high growth small businesses or domestic businesses.

Limitation: Use of price mechanisms to regulate markets may create barriers to entry in a market, resulting in decrease in competition and increase in market power of few firms.

b) Regulatory mandates and restrictions on behaviors i.e.

1) Setting rights and responsibilities
2) Restricting some activities e.g. insider trading, short selling.
3) Mandating some activities e.g. capital requirements for banks, registration with a securities commission for certain activities.
4) Provision of public goods and services e.g. defense, transportation infrastructure. It depends on the political philosophy of the country/government, structure of the government, and the country's GDP.
5) Providing funds to finance private projects e.g. loans to individuals or companies for specified activities. It depends on the political philosophy of the country/government, structure of the government, and the country's GDP.

Coase Theorem: According to the coase theorem, when an externality can be traded and there are no transaction costs, the socially efficient outcome will occur regardless of the initial allocation of property rights.

Impediments to developing effective regulations to mitigate systematic risk: It is quite difficult to assess the degree of effectiveness of regulations and regulatory changes with respect to dealing with systematic risk because:

- The amount of data on systematic crises is very limited.
- The types and sources of systematic risk in future are likely to be different from past.

- The effectiveness of a regulation is hard to assess on ex-ante and ex-post basis.
- Some regulations may have unintended effects i.e. they may increase another source of risk in an attempt to reduce one source of risk.

Regulatory Responses: Examples of regulatory responses include:

Conflict of interest policies: It refers to a situation where a potential employee of a regulator has conflict of interest with the regulated entity e.g. spousal employment, a marketable position in an investment portfolio etc. In such cases, potential regulatory responses include:

a) Ban on involvement in the company e.g. employment etc.
b) Resolution of the conflict of interest;
c) Disclosure of the conflict of interest;

Trading restrictions on insiders: In refers to a situation when a person/entity has some inside non-public information. In such cases, potential regulatory responses include:

a) Ban from trading on non-public information;
b) Disclosure of insider trades;
c) Requirement on a company to impose a *blackout period* during which insiders are not allowed to trade on the company's stocks;

NOTE:

The amount of acceptable total pollution generated by a firm can be determined using two approaches i.e.

1) **Historical usage** (i.e. the amount of pollution produced in the past). However, amount of pollution allocated based on historical usage may change the marginal incentives.

2) **Allocation based on some political negotiations:** However, amount of pollution allocated through political process is subject to considerable lobbying.

Negative Externalities: These include systematic risk and financial contagion (i.e. when financial shocks spread to and infect other healthier economies), pollution, global warming etc.

- Some of the negative externalities tend to have substantial negative effects and implications that are difficult to fully quantify and assess.
- Regulations can be established to mitigate negative externalities e.g. the Dodd-Frank Act developed to mitigate systematic risk.

Practice: Example 1, Volume 1, Reading 13.

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3. REGULATION OF COMMERCE

Study Exhibit 1, Volume 1, Reading 13.

The major role of Government regulation is to:

- Facilitate business and investment decisions and to facilitate the coordination and acceptance of responsibilities by developing a regulatory framework for contracting and setting standards, for financial liability and dealing with bankruptcy.
- Promote local, national, regional, and global trade.
- Support and promote domestic business interests e.g. by subsidizing domestic industries, using tariff and/or non-tariff barriers, restricting foreign

ownership or capital flows.
  o However, such regulatory policies tend to generate unfair competition by giving an unfair competitive edge to domestic producers.

Competition and antitrust laws: They set up rules that prohibit anti-competitive acts like price fixing, price discrimination, predatory pricing, monopolistic conduct (e.g. mergers and acquisition of major companies), and deceptive practices.

---

4. REGULATION OF FINANCIAL MARKETS

The regulation of securities markets and financial institutions is critically important to avoid losses associated with failures in the financial system that have significant and far-reaching consequences e.g.

- Losses to specific parties
- Loss of confidence among market participants
- Loss of savings and access to credit e.g. in bank failures

- Disruption of trade

Securities regulations include:

- Monitoring and supervision of financial institutions
- Registration requirements
- Disclosure requirements, including financial reporting requirements, accounting standards, proxy

proposals and contests, mutual fund disclosure rules, and price transparency disclosure rules etc.

- Regulations related to governance of listed companies, proxy voting in companies, best execution requirements on broker/dealers, treatment of "soft dollar" expenses in the trading process etc.

Objectives of Financial Market (securities) Regulation:

- To protect consumers and investors (primarily small investors) by mitigating agency, adverse selection and moral hazard problems*.
- To provide investors access to important information for investing in and valuing financial instruments purposes.
- To ensure safe, sound and stable financial institutions to:
  o Promote financial stability
  o Reduce system-wide risks
- To develop confidence in the financial markets by maintaining the integrity of the markets.
- To enhance and promote capital formation.
- To promote smoothly operating payments system.
- To maintain access to credit for entities.
- To meet macroeconomic goals i.e.
  o Price stability
  o Increasing employment levels
  o Promoting economic growth

Generally, it is difficult for regulators to set suitability standards for large investors (e.g. who invest in hedge funds, private equity, and VC funds); hence, for such large investors, regulatory bodies tend to follow a "buyer beware" rule.

Insurance against losses offered by regulators:
Regulatory bodies may set up funds by charging premiums or fees that are used to provide insurance to financial institutions against expected losses. However, such insurance may create a moral hazard problem and encourages market participants to take unduly greater risk.

Uses of Self-Regulation in Financial Markets:

- Due to technical expertise, market professionals may have better understanding about the technical aspects of financial market regulation.
- Since SROs are highly flexible, they may have greater ability to adapt to new developments.
- In SROs, since the directors and policymakers are elected by the members themselves, they are more willing to comply with those rules and regulations.
- Self-regulation also provides cost savings to federal government e.g. saving on enforcement and inspection costs.
- Self-regulation tends to generate lower regulatory burden on businesses.
- Self-regulation promotes better functioning of the market.
- Self-regulation improves corporate governance and reporting.

5.	COST-BENEFIT ANALYSIS OF REGULATION

There are costs and benefits associated with any regulation, and it is important that policy makers should consider all of the associated costs and benefits of regulations.

- Regulators and policy makers should ensure that the appropriate regulatory tool is selected so that government can achieve its intended policy objective with minimal costs i.e. should focus on net regulatory burden.

  Net regulatory burden = Private costs of regulation – Private benefits of regulation
  o Costs include adverse impact on competition within a market, choice and the effective workings of the market.
- Before enforcing any regulations, regulators and policy makers should consider all the associated direct and indirect costs (e.g. costs of competition restrictions); because failure to address indirect costs and possible spillover effects can result in a less effective policy and impose unnecessary economic costs in a market.

  o For example, before providing subsidies to some industries or sectors whereas taxing others, government should make sure that the benefits of subsidizing some industries outweigh the potential costs of distorting competition and shrinking size of some sectors by heavy taxation.

6.1	Effects of Regulations

Some regulations are very specific and focus on particular sector e.g. financial markets regulations whereas some regulations are wide-ranging and focus on various sectors.

- Regulators can increase capital requirements for financial institutions (e.g. banks)
  o To improve liquidity and stability of financial institutions;
  o To reduce dependence on governmental insurance against losses;
  o To make financial institutions bear most of the costs of the risks e.g. the marginal funding costs;

> ➤ However, since equity capital is more expensive than debt, increase in capital requirements may reduce access to credit and negatively affect economic growth.

- Financial institutions and financial services firms are largely debt-financed and they receive subsidies from the government in the form of lower taxes (tax advantage) as interest on debt is tax deductible; as a result, their cost of risk-bearing is understated.
- In addition, government guarantees and support available to protect institutions against losses represent a government subsidy that tends to reduce overall funding costs and encourages institutions to use greater leverage.

NOTE:

- According to the Modigliani-Miller capital structure theory, when there are no taxes and certain assumptions are met, capital structure is irrelevant to the value of the company.
- **Discount window borrowing from a central bank:** In case of poor liquidity, banks can borrow funds from a central bank. A central bank prefers not to disclose discount window transactions in order to maintain confidence and stability in the financial system. However, market participants may be able to anticipate likelihood of such borrowings based on other market information.

Practice: End of Chapter Practice Problems for Reading 13.