CHAPTER 2

INTERNATIONAL CAPITAL MOVEMENT:
THEORETICAL OVERVIEW

The phenomenon of capital inflows can be better understood theoretically by starting the analyses with the saving-investment-capital accumulation theories as they are considered to be the basic economic variables behind these flows.

2.1 Theories of Saving, Capital Accumulation and Investment

Adam Smith’s theory: According to Adam Smith the rate of investment depends upon the rate of saving. The ability to save and invest is limited by the income of a person. As long as there are profits over and above the compensation for risk of investing, capital accumulation will continue.

\[ \frac{dk}{dt} = k(r - r^*, y) \]

\( \frac{dk}{dt} > 0 \), \( r = \) rate of profit at time \( t \), \( r^* = \) minimum profit needed to cover risk.

Adam Smith also agrees that as capital accumulations increases the marginal efficiency of capital decreases. [Negatively sloping Marginal efficiency curve]

Smiths theory states that the fundamental economic determinant of growth is the rate of capital accumulation.

Ricardo’s theory: He believes that capital accumulates due to (a) an increase in income and (b) a reduction in consumption. The rate of capital
accumulation is determined by two factors – the ability to save and the willingness to save. Saving depends on profit. Ricardo postulates that when profit declines overtime savings decline and as a result capital accumulation slows down and reaches zero when \( r = \bar{r} \).

Where \( r = \text{rate of profit} \) \( \bar{r} = \text{minimum profit}. \)

**Marxian theory:** Marx believes that the surplus value produced by labour leads to accumulation of profit which in turn leads to capital accumulation. Hence the capitalists exploit the labourers for more profit. Overtime this leads to overproduction, unemployment and downfall of capitalism. Thus capital accumulation is the major factor behind the rise and fall of capitalism.

**Harrod –Domar Model:** Harrod and Domar addressed the conditions required for smooth growth in real national income. They assign key role to investment in the process of economic growth. They opine that capital accumulation has got a dual role (i) income generation through investment and (ii) increasing the productive capacity of the society by enlarging the capital stock. Thus they consider both demand and supply side of investment.

**Kaldors Model:** Kaldors approach to saving plays a central role in his model of economic growth. He believes that National income consists of wages and salaries and that the saving out of profit is greater than saving out of wage. The profit output ratio depends upon the multiplier and the level of investment. He showed that the rate of profit is determined by the ratio of natural growth rate to saving out of profit.

**Lewis Model:** Prof. Arthur Lewis asserts that many underdeveloped countries conform to classical model in which the supply of labour is
perfectly elastic at current wage level. He says that economic development takes place when capital accumulates as a result of withdrawal of surplus labour from subsistence sector to the capitalist sectors. The rate of profit stimulates the incentive to invest and the process of reinvestment continues.

**Other Models**

FeiRani’s model, Nurkse’s Balanced growth theorem, Hirshman’s unbalanced strategy of economic development, Nelson’s low level equilibrium trap and Rodan’s Big push strategy points out the importance of saving, investment and capital accumulation in the development process of an economy.

While Malthus and Mill propounded International trade as an escape route from economic stagnation Myrdal argues that international trade retarded the economic growth by strengthening the dualistic nature of the developing and underdeveloped economies. In the UDC’s the backwash effects and circular causation, along with the underdeveloped money and financial markets create hurdles for growth and development. Nurkse argues that in an underdeveloped economy low real income is a reflection of low productivity which arises out of lack of capital. Lack of capital evolves from small capacity to save. All these theoretical discussions reveal that the question of development for an underdeveloped or developing economy centers on how to bridge the gap of lack of capital i.e. how to find the necessary amount of capital for perpetuating growth and development.

By the late 70’s and early 80’s many developing and underdeveloped economies started facing the BOP crises. Nations began importing capital to
face these crises and under the guidance of the World Bank many started structural adjustment programmes in their countries. The end result was globalization and the phenomenon of capital flows across nations. Slowly these flows began playing a crucial role in the macroeconomic environment of the host countries. These prompted researchers to conduct studies and formulate theories about the capital flows.

The theories on capital flows draw from the linkages between the theories of macroeconomics, financial markets and capital markets. Section 2.2 discuss some such important theories.

2.2 Linkages between Macroeconomics, financial and capital markets

According to Hicks new technological inventions did not ignite the industrial revolution in England in the 18th century. Most of the innovations that characterized the early phases of the industrial revolution had been invented much earlier. Rather, more liquid financial markets made it possible to develop projects that required large capital injections for long period before the projects ultimately yielded profits. The industrial revolution therefore had to wait for the financial revolution.

Gurley and Shaw have developed a theoretical framework which states that as economies develop, self financed capital investment first gives way to bank-intermediated debt finance and later to the emergence of equity markets as an additional instrument for raising external funds. They believe that Financial structure (Financial intermediaries and markets) changes as countries develop. Goldsmith supports the view of Gurley and Shaw. He points out that the size of the financial intermediaries as a share of GDP tends
to rise with per capita income. When a country grows faster than normal, the ratio of financial system assets to GDP also tends to experience above average growth.

McKinnon states that appropriate financial sector reforms expedite growth-inducing financial development. In 1993 King and Levine came out with the idea that financial development is a good predictor of economic growth. Economists like Bencivenga, Smith and Starr say that stock markets affect macroeconomic activity through the creation of liquidity. Liquid equity markets make investments less risky and more attractive because they allow savers to acquire an asset and sell it quickly in times of need. This leads to more saving and investment.

Alternative views on the effect of liquidity in long term economic growth points out that

i) By increasing returns to investment greater stock market liquidity may reduce saving rates through income and substitution effects.

ii) By reducing the uncertainty associated with investment greater stock market liquidity may reduce saving rates because lesser uncertainty also lowers demand for savings.

iii) Greater stock market liquidity adversely affects corporate governance by encouraging market myopia. Dissatisfied investors can sell quickly, liquid markets may weaken and reduce investor’s incentives to exert corporate control by overseeing managers and monitoring firm performance and potential.
Obstfeld proves that stock markets can affect economic growth by risk diversification through internationally integrated stock markets. Thus better functioning, more internationally integrated stock markets boost economic growth by shifting society’s savings into high return investments. However, greater risk sharing may lead to reduction in precautionary saving.

Kyle propounds that larger and more liquid stock markets increase incentives to research firms, the improved information will improve resource allocation and accelerate economic growth. Stiglitz argues that developed stock markets quickly reveal information through price changes. This may create a free rider problem, as investors can now obtain information about firms by observing prices.

The functioning of the domestic financial system may magnify the scale of the short term flows, as well as determine the extend of macroeconomic disruption created by a given degree of short term capital volatility.

The distortions in the domestic financial system can be divided into two.

a) **Under intermediation:** A situation in which the volume of domestic resources channeled through the domestic financial system is less than optimal.

b) **Over Intermediation:** This situation arises in liberalized financial system when savers receive excessively high returns on their placements in the domestic financial system. i.e. the returns offered to savers by the domestic financial system exceed the social rates of return that financial institutions can generate from their portfolios.
Shocks which originate in the financial sectors can have macroeconomic effects through a variety of mechanisms. Two such mechanisms have been of importance recently (i) emergence of lending booms and (ii) existence of unresolved financial sector insolvency.

Lending booms arise out of Financial Sectors insolvency leads to

- over intermediation
  - which is associated with
    - under intermediation
    
Boom bust cycles

Macroeconomic stagnation

Macro economic instability

Minsky, Gavin and Hausman states that financial crises are typically preceded by lending booms. They argue that the rapid growth of the bank portfolios causes the average quality of these portfolios to deteriorate. This may lay the seeds of a future reversal of the cycle. i.e. a boom bust pattern is implied rather than a transitory boom.

Sovereignty of Boom Bust cycle depends on

- Openness of capital account
- Exchange rate regime
The macroeconomic effects of the financial insolvency or the domestic debt overhang problem are similar to that of the overhang external debt. But Minsky Gavin and Hausman are silent in this regard. Also if the economy is opened up in the midst of a debt overhang problem it is likely to trigger capital outflows. From the perspective of macroeconomic stability this could directly lead to a BOP crisis. If the exchange rate is flexible it may lead to a collapse of the value of the domestic currency. These aspects are neglected by Gavin.

Thus it is evident that there are strong interlinkages between financial markets capital markets and macroeconomic elements in the growth and development of a country. The capital flows, especially the portfolio flows are associated with the stock markets. How these flows affect the host countries and what factors attract these flows are discussed in section 2.3.

2.3 Short term capital movement in the international adjustment mechanism.

When compared with the theories of International trade, the analysis of international capital movement is still in an infant stage. However since the 1950’s more attention has been paid to the role of short term capital flows in (i) the BOP adjustment process and (ii) the impact of capital flows on the domestic monetary and fiscal policies of industrial countries. Short term capital movement plays a much more important role in the domestic and international adjustment process of industrial countries because of the existence of highly developed foreign exchange market and short term capital market.
Model 1:

Frame work: Classical price specie flow theory and modern quantity theory of money applied to an open economy.

Assumption: Highly flexible

a) Prices  
b) production costs

The model analyzed

i) Effect of reserve movement on the domestic money supply

ii) Adjustments between relative interest rate changes, adjustments between prices and reserve movement.

In the model short term capital movement are determined by difference in yields. These flows were called as equilibrating movements by Nurkse because they helped to restore a temporary equilibrium in the BOP. Under the Gold standard capital movements also responded to expectations of exchange rate adjustments. These movements were called as disequilibrating movements by Nurkse as they tended to aggravate BOP disequilibrium.

This mechanism (classical) assumed a passive role for the central banks.

Here we deal with 3 theories

| STCM and foreign exchange market | Stock versus flows and the portfolio selection Approach | General equilibrium analysis of capital movements |
I. Short term capital movements (STCM) and foreign exchange markets

Tsiang (1959-60) Pioneered a rigorous theoretical system that showed how hedging, speculation and interest arbitrage on the one hand and activities on the spot exchange market on the other hand, jointly played a role in an equilibrium, determining both the spot and forward rates. This integration of the spot and forward markets was a key to the explanation of international short term capital movement.

a) Arbitrage

The greater the arbitrageurs risk and the higher his past commitments the larger will be differences between the forward premium and the interest rate differential needed to induce him to enter into new forward commitments. For an individual arbitrageur risk in different markets is determined by his own subjective valuation.

b) Speculation

Speculation on the foreign exchange markets results from an open position in a foreign currency following either a spot transaction of a forward contract. Important motives influencing the behaviour of an individual speculator in the forward exchange market are: (i) the difference between the expected spot rate at some future time and the current forward rate for a contract maturing at that same future time.

ii) Speculators estimate of risk attached to the realization of his expectations.

Assuming that the effect of past commitments on the risk estimate diminishes exponentially. Tsiang obtains the following linear expression.
\[ r_t = \alpha D_t + \lambda r_{t-1} \]

\begin{itemize}
  \item \( D \) = Current speculative forward position
  \item \( \lambda \) = length of the effective time horizon of the speculative expectations.
\end{itemize}

c) **Trade Hedging**

Tsiang assumed that all traders hedge so that all Trade that is not financed by long term credit would generate capital movements. The direction of the movements would be determined by the condition for interest arbitrage.

The participation in the forward exchange market by traders as hedge—speculators is determined by the size of their short term contracts and by a mean variance analysis. This analysis balances possible exchange gains from the risk of credit transactions not covered by hedging.

**Market Equilibrium**

Tsiang’s analysis shows that in the process of achieving a full equilibrium on the exchange markets (when market behavior of arbitrageurs and speculators is considered), the forward exchange rate is an endogenous variable. This is also true for the spot rate when flexibility of the exchange rate parities (either with the band of intervention points or in the freely flexible exchange rate system) is allowed for. Although individual participants in the exchange rate market take both spot and forward rates as data, the equilibrium can be achieved only when through the market mechanism the mutual adjustment of forward and spot rate is such as to satisfy the conditions just outlined.
II. Stocks versus flows and the portfolio selection approach

Another aspect analyzed by the theory of short-term capital movements was whether financial flows in general, and short term capital movements in particular, respond to absolute interest rate differentials or whether they respond to a change in these differentials.

*Rhomberg, Kenen* and *Black* followed the classical view restated by Nurkse, Ohlin and Iverson that an arbitrageur’s activity will generate financial flows whenever the gap between the interest rates exceeds the internal differences in risk.

Originally attempts were made to test the validity of the flow or stock approaches by econometric techniques. However, it was soon realized that the stock approach is consistent with the Tobin-Markowitz theory of portfolio selection. *Grubel* and *Wiollett* have suggested that applying the portfolio selection theory to international distribution of assets and also international capital movement can explain the international distribution of assets and also international flows of capital. Any change of interest rate or in the degree of risk of some of these assets will generate international flows of capital, until the reallocation of capital induced by these changes results in a new international distribution of assets.

Another important aspect of the portfolio selection theory as applied to international capital movements, raised by *Floyd* and *Willett and Forte* consists in the role played by a comparative growth of total assets as variables influencing asset reallocation among countries. A change in the interest rate differential among growing economies generates a stock adjustment effect and a flow adjustment
effect on capital movements. While the former effect is temporary and, ceteris paribus, is completed after a given period of time, the latter effect causes smaller, but more sustained, adjustments in the flow of capital.

The early model of an open economy developed by Polak used a quantity theory framework, where capital flows were treated as entirely exogenous but the money supply was allowed to respond to the balance of payments. The main interest of the model was to examine the relationship between changes in the credit creation of the banking system and the balance of payment. In this model, Polak has shown how an exogenous change in capital movements has an impact on the domestic money supply, which in turn influences both income and imports until equilibrium in the balance of payments is restored again.

**Later Models**

Frame work : Keynesian open economy
Area of Analysis : Macro economic policies for simultaneous equilibrium in

- Domestic full employment
- BOP


i) endogenous

ii) Sensitive to relative interest rates → This factor was a key element in determining a feasible policy mix for internal-external balance.
Exogenous variable in the model was interest rate. i.e. capital movements did not influence interest rates.

iii) Monetary authorities used sterilization policies to counteract BOP developments.

There were also other models which treated money supply as endogenous. These models assured either partial or no sterilization policies by the monetary authorities.

The appropriateness and relevance of these alternative Keynesian models are quite dependent on the extent or degree of sterilization by monetary authorities. *Argy and Kouri* suggest that in fact there may be only partial sterilization, but the issues are complicated and not easy to test empirically. More important, the feasibility of sterilization depends largely on the degree of capital market integration. The more financially integrated an economy, the larger the reserve volatility. If capital mobility is perfect, the domestic interest rate, and hence the domestic money supply, is completely at the mercy of developments in allied foreign markets.

Short term equilibrium can be interpreted as an “impact effect” of the change in an independent variable in which behavioral relations in the model are satisfied but the balance of payment is not necessarily in equilibrium; the actual surplus or deficit caused by such a change in an independent variable is equal to the ex ante surplus or deficit. Long-term or ‘full’ equilibrium implies that the adjustment process in the model has worked itself out in such a way as to eliminate any payments imbalance.
In formal two-country macro models developed by Floyd and Allen, a neutralization of the effect of capital movements on domestic money supply is assumed. Allen assumes a single type of asset in both countries and thus perfect capital mobility, Floyd considers the case of imperfect capital mobility with different interest rates in the two countries. Floyd’s Keynesian model is addressed to a comparative static analysis of effects of changes in the money stock and output in one country on international capital movements and the balance of payments. Allen’s model exhibits dynamic properties that enable her to distinguish between short run market equilibrium, when all markets are cleared, and a long-run portfolio equilibrium reached gradually through a sequence of short run equilibria, when the additional condition of unchanged desired holdings of assets by participants is also met.

Allen reaches an interesting conclusion that a change in one country’s liquidity preference or in money supply, will have no long-run effect on the balance of payments. The distribution of assets between countries achieved during this process depends on which country had a temporary balance of payments surplus; the surplus country will gain wealth. Finally, whether these disturbances in the liquidity preference or money supply are expansionary or contractionary in both countries will depend on their relative wealth effects on the demand for assets.

Kouri and Porter treat the money supply as endogenous but treats the real sector as exogenous to the model. By specifying demand and supply functions for money and domestic and foreign bonds, Kouri and Porter are able to solve the model for changes in the domestic interest rate and net
capital flows as a function of the same set of exogenous variables. In particular, the capital flow equation that they obtain enables them to directly estimate the effect of changes in domestic monetary policy on capital movements, under the assumption that the monetary authorities do not sterilize the effects of payment imbalances. Girton and Henderson have also developed a two-country financial portfolio model; however, the advantage of the Kouri-Porter approach is in the ability to use their reduced forms for quantitative analysis.

The relevance of all these models unfolds itself only when analysed in the context of growth theories hence the section 2.4 discusses the growth theory approach to capital flows.

2.4 Growth theory Approach to Capital flows in Developing Countries

Foreign capital is in principle beneficial for a developing economy whose capital requirement exceeds its saving capacity. But several dangers are connected with the external capital. At the same time one need to recognize the short term benefits from capital inflows. The models of capital mobility come to our aid here as they act as an instrument for the allocation of resources to the most productive investment opportunities.


The model says that by focusing the attention to the central features of production technology, we can arrive at an adequate analytical treatment of the predictions concerning capital movements.
The basic Solow model is

\[ Y_t = A \alpha K_t^\alpha \]

\( Y \) = Output of homogenous good  
\( K \) = Physical capital  
\( A \) = Technical coefficient  
\( t \) = Time index

The rate of growth of per capita income is an increasing function of the growth rate of \( K \).

\[
\frac{\dot{y}}{y} = \frac{(d \log y)/dt}{y} = \alpha[(d \log K)/dt], \quad 0 < \alpha < 1
\]

The main result of the Solow model is that there exists an exogenous steady state growth rate (equal to zero in the simplified version) which does not depend on taste nor is affected by policy variables.

Implications of Solow model for international capital movements. The arbitrage condition

\( r^* = r_d \) reflects the assumption of perfect capital mobility.

\( r^* \) and \( r_d \) = international and domestic interest rate.

If \( r_d > r^* \) → There will be net inflow of capital  
\( r_d < r^* \) → There will be net outflow of capital

Whenever interest parity conditions are fulfilled, net capital flows do not occur.

Thus the Solow model predicts that the amount of capital inflow is inversely related to \( K \) i.e. capital should move from capital rich to capital poor countries.
But this has not been so, particularly with respect to the volatile portfolio flows. During the crisis of 1997 the south East Asian economies experienced a large outflow of capital which collapsed their economy.

2. **Augmented Neoclassical Model**

Proponents : Mankiw, Romer and Weil (1992)

The augmented neoclassical model predicts that countries with low levels of physical capital and high levels of human capital will benefit from net capital inflows and that capital movement will persist until:

\[ r^* = r_d \]

and \[ r_d = \propto A K^{\alpha - 1} L^{\gamma - \delta} \] or \[ r_d = \propto A^{1/2} Y^{\alpha - 1/2} Y^{\gamma - \delta} \]

However in reality the developing economies could not reap much benefit from the capital inflows, because of the underdeveloped capital and money markets. They are yet to develop a mechanism which will enable them to sponge up the benefits from these flows to other sectors of the economy.

3) **International capital flows in models of Endogenous growth**

i) **Romers Model**

\[ Y_t = \alpha A K_t L_t^\beta \]

Where \( \alpha = 1, 0<\beta<1, \gamma = 0 \)

*Implications of Romer’s model for international capital movements*

Larger economies will benefit from net capital inflows, regardless of this relative capital endowment.
ii) Modified Lucas Model (1988)

Lucas model predicts that as far as capital movements are concerned, countries with low levels of physical capital and high levels of human capital will benefit from net capital inflows. [Provided physical capital is the only internationally mobile input (partial capital mobility)]

Domestic interest rate is given by
\[ r_d = \alpha A^{1/\alpha} Y^{\alpha-1/n} h^{\gamma/\alpha} L^{\alpha/\alpha} - \delta \]

Where \( 0 < \alpha \), \( \beta < 1 \), \( \alpha + \beta + \gamma > 1 \)
\[ \hat{r} = \gamma_p + \gamma_c > \gamma \]


Rebelo’s linear Model is derived from the general set up with the following restrictions.
\[ \beta = 0; \alpha + \gamma = 1; h \equiv K \equiv Z \]

Where \( z = a \) single type of capital good (a composite good of human and physical capital)

Rebelo provides a peculiar prediction – There exists no incentives for capital movements under the standard assumptions on technology transaction costs and saving behaviour. The domestic interest rate in the Rebelo model is given by
\[ r_d = A - \delta \]

\( \delta = \) depreciation rate.

Rebelo argues that if the marginal tax rate on capital is larger in
developing countries than in industrial countries or the average tax rate is expected to be higher in future for the developing countries then,

Capital flows from Developing Economies to Developed Economies.

Phenomenon called as capital flight.

This will occur even in the presence of capital controls.

All the models rely on the partial correlations between the marginal product of ‘K’ and the economic fundamentals. He says that

If partial correlation is positive then

a) larger values of explanatory variable increase MPK and result in net inflows of capital

b) Smaller value of explanatory variable decrease MPK and result in net outflows of capital.

The exact opposite happens when partial correlation is Negative.

**Capital flows in a Neoclassical Model with Restricted Capital Mobility.**

**Manzocchi-Martin (1997) Model**

They elaborated on the open economy version of the augmented Solow model featuring partial capital mobility.

\[ Y = AK^\alpha H^\beta L^{1-\alpha-\beta} \]

Where \( Y = \) Output

\( L = \) labour
K = Physical Capital

H = Human Capital

The model predicts that international capital flow favors conditional convergence rather than absolute convergence.

**Demography and international capital movements**

Let us analyse the basic structure of OLG Model (Overlapping generation Model)

If only young individuals work and save, (while the old generation does not dissaves), aggregate, saving (of the young) is given by

\[ S_t = K_{t+1} - B_{t-1} \]

Where \( S_t \) = aggregate saving

K = Capital stock

B = Net foreign debt

Implication of the model

- A rise in population tends to improve the current account and reduces per capita net foreign borrowing (vice versa). Because higher the number of young high will be the saving in the economy.

- A larger growth rate of population negatively affects the MPK.

**Growth and Convergence in Neoclassical Model with Capital Mobility.**

Mankiw, Romer and Weil distinguish between absolute and conditional convergence in capital mobility.
**Absolute convergence:** Narrowing of income differentials among economies so that all are moving towards a unique steady state.

**Conditional Convergence:** Here rate of growth of an economy is proportional to the distance in different steady states and their income levels may not converge.

Absolute convergence in a closed economy is conditional on the evolution of physical and human capital, as well as other variables. Barro and Mankiw, Romer and Weil following the Solow Model stressed on the investment rate as far as physical capital was concerned. They believed that investment rate positively influences the convergence of income levels among countries.

**Open economy version of the neoclassical growth model (with one capital good)**

**Prediction:**

1) If there is full capital mobility and no adjustment costs convertibility will occur immediately

2) Recent empirical studies reject the hypothesis that capital mobility is absent in Developing countries.

3) Limited capital mobility.

Barro, Mankiw and Sala-i-Martin (1995) shows that the speed of capital mobility is substantially lower, if mobility is limited to only a sub-set of capital assets. (Partial capital mobility).

The speed of convergence is inversely related to the capital share ‘α’ i.e. larger the capital share the less effective are diminishing returns to capital
accumulation. Hence the transition to steady state takes a longer time period.

When

$$\alpha = 1 \rightarrow \text{endogenous growth takes place}.$$  

The speed of convergence is larger in an open economy, than in the closed economy.

The empirical testing of the model with the data from 50 developing countries gave the following result.

1) A developing country gains from international integration as the speed of convergence is enhanced.

2) The speed of convergence is always finite.

An overlapping generation model with restricted capital mobility

Obstfeld and Reogoff (1996) in their two period OLG model reach somewhat similar conclusion as in the partial mobility model of Barro and others.

Condition: A country’s net foreign debt should not exceed a fraction of current wage income

$$(S + \eta) W_u < K_u$$

Where $S = \text{Young generation saving rate}$

$\eta = \text{Positive parameter less than unity}$

$W_u = \text{Wage rate of unconstrained equilibrium}$

$K_u = \text{Capital stock of the unconstrained equilibrium}$

Obstfeld and Reogoff show that under some conditions unlimited
capital mobility can be consistent with absolute convergence even if preferences differ among countries.

**A co-ordination failure Model of sectoral change and foreign borrowing**

Cross country economic studies of growth stress two relevant features of development.

1) Absolute convergence in per capita income occurs only between those countries which have overcome some ‘threshold’ level of development and the industrial countries. The poor countries lag behind.

2) Industrialization comes along with a strong increase in average factor productivity, a true peak in the rate of change of output per worker that partly account for the solow residual of growth accounting studies (Total Factor Productivity).

Here we analyse capital mobility in a simple two sector model of resource allocation and industrialization.

**Questions that we address**

| In a developing country what are the effect of capital inflows for the development process? | Under what conditions can the amount of foreign borrowing of a developing country be sub optimal? |

The amount of external borrowing of a poor country is bounded by

a) The inability of the individual agents to co-ordinate themselves.

[problem of co-ordination failures]

b) Occurrence of positive production externalities.
Main conclusion: It is contrary to the neo-classical Model. Even full capital mobility may not be a sufficient condition for conveyance whenever there exists a co-ordination deficit.

**The Model with No capital Mobility**

Here we analyze two cases

<table>
<thead>
<tr>
<th>Case I</th>
<th>Domestic discount factor less than ratio of the unit cost of adjustment to the average productivity advantage of the modern industry when all the workers move away from the traditional industry.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finding (Result):</td>
<td>Productive specialization of a developing country is necessarily static.</td>
</tr>
<tr>
<td>Case II:</td>
<td>Where it is convenient for an industrial worker to enter the modern sector if at least $l_2$ of the other agents do the same.</td>
</tr>
<tr>
<td>Result:</td>
<td>Coordination failure can prevent the structural change associated with the average increase in factor productivity, in a decentralized economy.</td>
</tr>
</tbody>
</table>

**The case of perfect financial integration and sub-optimal borrowing.**

Analyzing the conditions of perfect financial integration i.e. the small economy is perfectly integrated with the financial markets the conclusions that we arrive at are.

i) A developing economy may get stuck in the inferior equilibrium as a consequence of co-ordination failure.

ii) Foreign borrowing cannot by itself remove the second type of bottleneck – i.e. co-ordination failure.

iii) The amount of capital inflows depends on the co-ordination of individual agents in an economy.
iv) The co-ordination failure is associated with a sub-optional level of foreign borrowing.

v) Higher the amount of co-ordination higher will be the inflow of capital.

**Solution for co-ordination failure**

i) Introduce a central planner   ii) Introduction of Industrial Trusts

### 2.5 Capital Market Theory

It deals with asset pricing based on optimal portfolio selection (diversification of portfolio). The following theories deal with stock price movements and its impact.

#### I. Fundamental and Technical Analysis

Fundamental analysis explains stock price movements in terms of the fundamentals of the company, the industry and the economy.

<table>
<thead>
<tr>
<th>Fundamentals of company</th>
<th>Industry specific indicators</th>
<th>Economy specific indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS, GPM, NPM, RONW, PE Ratio, payout Ratio etc.</td>
<td>Sunrise industry</td>
<td>Growth rate of GDP, Sector specific growth rate, inflation rate, interest rate, fiscal and current account status, exchange rate, foreign exchange reserves etc.</td>
</tr>
<tr>
<td></td>
<td>Sunset industry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cyclical downturn or Cyclical upturn</td>
<td></td>
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</tbody>
</table>

In technical analysis price and volume movements reflects the decisions of thousands of investors and speculators who play with fundamental information. Technical analysts called chartists study the price and volume movements in the market and try to find patterns in them. Based on these future trends are predicted. However these predictions may lack accuracy as stock market trends are influenced by external stocks also.
II. Dow Theory

Formulated by Charles H. Dow. The theory says that the trends in the stock market shape the general direction of the market. Hence by following these trends the general market direction can be predicted.

Basic tenets of the Dow Theory are

i) Averages like prices and volumes discount every known and forcible factor.

ii) The market moves in three trends – primary, secondary and minor trends. They have a general direction.

   Primary trends: Long range cycles that moves the market up and down (extensive movements). Duration: Up to 7 years. They bring about 20 percent up or down in prices.

   Secondary trends: Interruptions in primary trends which bring about opposite movements. Duration: 3 months to 3 weeks.

   Minor trends: Day to day fluctuations lasting for a few days

   Minor trend1 + Minor trend 2 + Minor trend n = short term trends.

iii) Trading volume has a directly proportional relationship with the price trends.

iv) Lines sometimes substitute for secondary trends. Lines are sideward movements that last for 2 or 3 weeks to 8 months (range of price fluctuations amount to 5 percent)

The drawback of the theory comes from the fact that it fails to predict the crises because large outflows occur on rumor and it takes only a few
seconds to withdraw funds via the internet services.

III. Portfolio Theory

Portfolio = package of securities. The theory is based on risk diversification. i.e. Investing in securities of diverse industries. The theory believes in spreading the risk.

IV. The Markovitz Model (Modern approach)

It was developed by Harry Markovitz (1951). He introduced optimal portfolios based on risk return relationship. Efficient portfolios are those portfolios when

a) one cannot have a higher portfolio return with the same risk.

\[ R = \text{maximum} \quad R = \text{Return} \]

b) one cannot have a lower risk with the same return

\[ r = \text{minimum} \quad r = \text{risk} \]

c) One cannot have a higher portfolio return with a lower risk.

V. The sharp Index model (1963)

Sharp tried to simplify the Markowitz Model by simplifying the process of data inputs and data tabulation.

The return for each security

\[ R_i = a_i + B_i I + e_i \]

\[ R_i = \text{expected return on security } i. \]

\[ a_i = \text{intercept of a straight line or alpha coefficient} \]

\[ B_i = \text{Slope of a straight line or } \beta \text{ coefficient}. \]
\[ I = \text{expected return on Index} \]
\[ e_i = \text{error term with a mean of Zero and a standard deviation which is constant.} \]

**VI. The Efficient Market Model**

Fama (1969) examines the relationship between (i) historical stock prices and rate of return and (ii) future stock prices and rates of return. This Efficient market hypothesis has 3 forms.

a) **Weak form : The Random Walk theory**

It says that the current stock prices already fully reflect all the information contained in the historical sequences of prices. It thus repudiates the analysis of historical sequences of prices (i.e. technical analysis).

b) **Semi-strong form**

This form says that current prices of stocks reflect the following.

i) Information on historical prices.

ii) All publicly available knowledge about the firms e.g.: corporate reports, announcements of dividends, bonus, stock splits etc. are absorbed by the public and reflected in stock prices.

iii) Price adjustments need not be always correct i.e. there may be over and under price adjustments.

iv) Adjustments need not take place immediately.

v) Analysts need not get superior returns.

Hence, it is difficult to develop a trading strategy based on publicly
available information.

c) **Strong form**: This hypothesis argue that all information is useless i.e. No information – public or inside – helps in earning constant superior return.

The general efficient market model recognizes market imperfections eg: transaction cost, information costs and delays etc. These imperfections eg. Transaction cost, are not adequate to yield superior return to the analysts who develop trading strategies to exploit these imperfections.

**VII. The Capital Asset Pricing Model**

It is a relationship which explains the pricing of assets in capital markets.

Assumptions

i) Investors are risk averse.

ii) Individuals have homogenous expectations on returns, variance of returns and co-variance between securities.

iii) Individuals can borrow and lend at a risk less return

iv) The quantity of risky securities is given.

v) There are no transactions costs: the market is perfect.

The return on portfolio

\[ R_p = X R_m + (1-X) R_f \]

\[ X = \text{Percentage of funds invested in risky portfolio} \]

\[ R_m = \text{Return from risky portfolio} \]
I-X = Percentage of funds invested in risk free asset

R_f = risk free returns

This is the most commonly used model for evaluating the international portfolios.

VIII. Arbitrage pricing theory

Ross (1976) recognizes that security returns depends on several systematic factors.

The actual return of a security or portfolio

\[ R = E + bf + e \]

E = expected return on security

b = security’s sensitivity to change in the systematic factor

f = the actual return on the systematic factor

e = return on the unsystematic, idiosyncratic factors.

i.e. actual Return = expected return + (factor sensitivity x factor movement) + residual risk.

Many World Bank studies rely on this model for analyzing the determinants of capital flows across countries.

The theoretical analysis of the various aspects of capital flows reveals a close knitted and highly sensitive structural relationship between the capital market, financial markets, macro economic environment, growth and development which can be represented diagrammatically as follows.
I. When capital inflow occurs

- Saving
- Financial market environment
- Capital Market
- Investment
- Growth and development
- Macro economic environment
- Capital inflows

II. When capital outflow occurs

- Saving
- Financial market environment
- Capital Market
- Investment
- Crisis
- Macro economic environment
- Capital outflows
Various theories discussed reveal the following

- Saving, Investment and capital accumulation triggers off growth and development.
- Capital markets act as channels for mobilizing the savings.
- The integration of spot and forward markets act as a key to explanation of international short term capital movement.
- The effect of capital movements on domestic money supply lacks a clear theoretical explanation.
- Solow model, Augmented Neoclassical model and modified Lucas Model believes that capital movements will benefit the developing economies while Romer believes that it will benefit the larger and developed economies.
- Rebelo links tax rate with the capital flows and say that if the tax rate is high in developing countries than the developed ones then capital outflow takes place.
- OLG model traces out negative links between population growth and MPK.
- Manzocchi and Martin believe in conditional convergence. While Obtfeld says that unlimited capital mobility can be consistent with absolute convergence even if preferences differ among countries. However gross country studies say that absolute convergence takes place only in the case of developed economies while poor countries lag behind.
- Existence of co-ordination failure and lack of productive specialization negatively affects capital inflows.
The theories on capital market stresses various aspects of capital market efficiency, risk return relationship, stock prices and rates of return.

Thus from the theoretical discussion it is clear that the phenomenon of capital flows is complex and affects numerous economic variables. These variables differ from country to country. Also 90 percent of the theories concentrate on what attracts capital flow rather than how these flows affect the capital market and the economy. This gives rise to a research gap especially in the Indian context. i.e. we are faced with two questions:

(i) Has the capital inflows benefited the Indian economy? Is the impact positive or is it negative?

(ii) Has the impact of these flows trickled down to the monetary and real sectors of the economy?

Chapters 3, 4, 5 and 6 try to find answers to these questions.

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