**Chapter- 6**

**Investment, Multiplier, Accelerator & Business Cycles**

**Investment**

Investment, in the theory of income and employment, means, *an addition to the nation’s stock of capital* like the building of new factories, new machines as well as any addition to the stock of finished goods or the goods in the pipelines of production.  *Investment includes addition to inventories as well as to fixed capital*.  Thus, investment does not mean purchase of existing securities or titles, i.e., bonds, debentures, shares, etc.  Such transactions do not add to the existing capital but merely mean change in ownership of the assets already in existence.  They do not create income and employment.  Real investment means the purchase of new factories, plants and machineries, because only newly constructed or created assets create employment or generate income.

***Types of Investment:***

1. ***Gross and Net Investment:*** Net investment means gross investment minus depreciation.  In the theory of income and employment, investment means net investment.
2. ***Ex-ante and Ex-poste Investment:*** Ex-ante investment is planned or anticipated investment.  Ex-post investment is actually realised investment, or the investment which is not merely planned but which is actually invested or implemented.
3. ***Private and Public Investment:*** Private investment is on private account and public investment is by the State or local authorities.  The private investment is influenced by marginal efficiency of capital (MEC) i.e., profit expectations and the rate of interest.  Therefore, the private investment is profit-elastic.  In public investment, the profit motives do not enter into consideration.  It is undertaken for social good and not for private gain.
4. ***Autonomous and Induced Investment:*** Autonomous investment is independent of income level, and depends on population growth and technical progress.  Such investment does not vary with the level of income.  In other words, it is income-inelastic.  The influence of change in income is not altogether ruled out.  The examples of autonomous investment are ‘long range’ investments in houses, roads, public buildings and other forms of public investment.  Such investment is generally done by the State as necessitated by the growth of population and facilitated by technical progress and not as a result of change in NI.  These investments are independent of changes in income and are not governed by profit motive.  They are generally made by governments and local authorities for promoting general welfare.

Induced investment varies with NI.  Changes in NI bring about changes in aggregate demand which in turn affects the volume of investment. When NI increases, AD too increases, and investment has to be undertaken to meet this increased demand.  Thus induced investment is income-elastic.

Investment is made by the people as a result of changes in income level or consumption.  It is also influenced by price changes, interest changes, etc., which affect profit possibilities.  It is undertaken for the sake of profit or income and it changes with a change in income. Thus, induced investment is governed by profit motive.

***Factors Affecting Investment:***

1. ***Marginal Efficiency of Capital (MEC) or expected rate of profit:*** MEC or expected rate of profit the most important factor affecting private investment.  If the business expectations are good or if the MEC is high, more investment will be made.  On the contrary, if there is an economic depression in the country or there are bleak prospects of profits, investment will be discouraged.  Thus, the fluctuations in investment are mainly caused by the fluctuations in the MEC.
2. ***Rate of interest:*** The second important factor affecting investment is rate of interest.  The rate of interest does not quickly change; it is more or less sticky or constant.  Hence, the inducement to invest, by and large, depends on the MEC.  For a suitable investment condition, the rate of return or profit must at least equal to rate of interest.  So long as the expected rate of return exceeds the rate of interest, investment will continue to be made.  In other words, the MEC must never fall below the current rate of interest, if investment is to be worthwhile.
3. ***Excess capacity:*** There are some other factors that affect investment.  Excess capacity is one of them.  If a firm has already ‘excess capacity’ and can easily handle increased future demand, it will not go in for further investment in capital equipment.
4. ***Technological progress:*** Technological progress also affects current level of investment.  For instance, a new invention may render the present capital stock of a firm obsolete and adversely affect its ability to compete.  In this case, further investment will be called for.
5. ***Political and security conditions:*** This factor has become one of the major important factors that affect the investment, esp. with reference to under-developed countries including Pakistan.  Political instability, poor security arrangements and society’s negative attitude towards investment companies can badly damage the investment environment, and the country can be suffered from poverty and unemployment due to lack of investment.  Countries like Kenya, Zimbabwe, Sudan, etc. are the worst victims.

***Marginal Efficiency of Capital (MEC):***

MEC is the highest rate of return expected from an additional unit of a capital asset over its cost.  It is the expected rate of profitability of a new capital asset.  J.M. Keynes has defined MEC as being equal to the rate of discount which would make the present value of the series of annuities given by the returns expected from the capital assets during its life just equal to the supply price.  Symbolically it is expressed as:

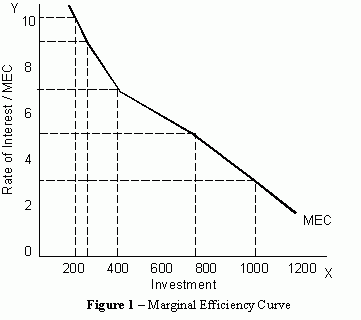
https://sites.google.com/site/maeconomicsku/_/rsrc/1332936949717/home/investment/invest1.gif

Where Sp denotes supply price or replace cost of the asset, R1, R2,…..Rn are the prospective annual returns or yield from the capital asset in the year 1, 2, and n respectively. *i* is the rate of discount which makes the capital asset exactly equal to the present value of the expected yield from it.

**Investment-Demand Curve:**

The investment-demand schedule is also known as MEC schedule.  The MEC schedule shows a functional relationship between MEC and the amount of investment in a given type of capital asset at a particular period of time for the whole economy.

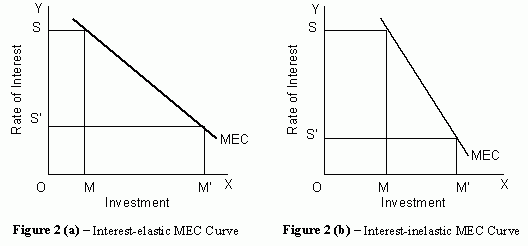
|  |  |
| --- | --- |
| **Investment**  **(In Million**  **US $)** | **MEC /**  **Rate of Interest**  **(In %)** |
| 200 | 10 |
| 250 | 9 |
| 400 | 7 |
| 750 | 5 |
| 1000 | 3 |



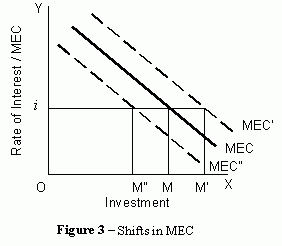
In the above diagram, the marginal efficiency of capital is represented by MEC curve.  It slopes downward from left to right which means that as investment increased its marginal efficiency goes down.

Investment at any time depends on the rate of interest prevailing at that time.  If the rate of interest is 5%, the investment is US $750 million, because, at this level, MEC is equal to the rate of interest.  The MEC represents the investor’s return and the rate of interest is his cost. Obviously, the return on capital must at least be equal to the rate of interest, which is its cost.  Suppose the rate of interest goes down to 3%, then it will become worthwhile to invest US $1,000 million.  Thus, the MEC and the rate of interest move together.

Position and Shape of MEC Curve: The elasticity of MEC determines the extent to which the volume of investment would change consequent upon changes in the rate of interest.  If MEC is relatively interest-elastic, a little fall in the rate of interest will result in a considerable expansion in the volume of investment.  On the other hand, if the MEC is relatively interest-inelastic, then a considerable fall in the rate of interest may not lead to any increase in the volume of investment.



**Shifts in MEC:** As the expectations regarding the prospective yields change, the MEC will change too and the MEC curve will shift upwards or downwards.  It is illustrated in the following diagram:



Suppose a war breaks out or demand for goods increases on account of some other reason.  As a result, entrepreneurs’ expectations of profit will rise high and the investment demand curve or the MEC curve will shift upwards to MEC’.  This means that at a given rate of interest, investment will be greater than before.  From the above diagram, it will be seen that whereas the rate of interest *i*, investment was OM before, it now becomes OM’.  Similarly, if for some reason demand for goods has decreased bringing down the MEC to MEC” at the same rate of interest*i*, investment will only be OM” as compared with OM before.

**Influence of Rate of Interest:** The rate of interest along with the MEC determines the volume of investment.  If the rate of interest is higher than the MEC, it will not be profitable to create a new physical asset.  This is because we assume that the aim of individual investor is to maximise the money profits.  Two courses of action are open to invest, either he can use his money to crease additional physical assets, i.e., he can invest in the Keynesian sense of the term, or else he can lend his money to others at a certain rate of interest.  Now, if MEC is lower than the current rate of interest, it is more profitable to lend money rather than use it for creating new assets.  On the other hand, if MEC is higher than the rate of interest, it is better to invest more.  At the point, where MEC equals the current rate of interest, we have the equilibrium level of investment.

**Factors of MEC:**

The marginal efficiency of capital depends upon psychological and objective factors:

1. ***Psychological Factors:***Whenever a firm undertakes an investment, it estimates its MEC in the light of the experience of the past, existing conditions and guesses about the future conditions.  If the businessmen are optimistic about the future, they will estimate the MEC higher and if they are pessimistic about the further business condition, naturally the MEC will be estimated low.
2. ***Objective Factors:***

**(a)**   **MEC and the Market:** If the market of a particular commodity is wide and is expected to grow further, the investment in that project will be favourable and the MEC high.  On the other hand, if the demand of a particular commodity is limited and is expected to decline in the future, the investment will be discouraged in that project and the MEC will be low.

**(b)**   **Rate of Growth of Population:** MEC is also influenced by the rate of growth of population.  If population is growing at a rapid speed, it is usually believed that the demand of various classes of goods will increase.  So a rapid rise in the growth of population will increase the MEC and a slowing down in its rate of growth will discourage investment and thus reduce MEC.

**(c)**   **Technological Development:** If inventions and technological development take place in the industry, the prospect of increase in the net yield brightens up.  For example, the development of automobiles in the 20th century has greatly stimulated the rubber industry, the steel and oil industry, etc.  So we can say that inventions and technological developments encourage investment in various projects and increase MEC.

**(d)**   **Existed Capital Goods:** If the quantity of any particular type of goods is available in abundance in the market and the consumers can partially or fully meet demand, then it will not be advantageous to invest money in that particular project.  So in such cases, the MEC will be low.

**(e)**   **Current Rate of Investment:** Another influence on the MEC is the rate of investment currently going on in a particular industry.  If in a relevant field, much investment has already taken place and the rate of investment currently going on in that industry is also very large, then new investors will hesitate to invest their money in that direction.  As the anticipated net yield from that project will be very small, so they can invest money in such project only if they expect extremely favourable demand conditions.

**(f)**    **Rate of Taxes:** MEC is directly influenced by the rate of taxes levied by the government on various commodities.  When taxes are levied, the cost of commodities is increased and the revenue is lowered.  When profits are reduced, MEC will naturally be affected. It will be low, if taxes are very high and high if taxes are low.

**Determinants of Private Investment:**

1. Prospective income from the capital asset;
2. Supply price of the capital asset; and
3. The rate of interest.

**Prospective Income:** it is defined as expected revenues from the use of the capital asset minus variable cost.

**Supply Price:** it refers to the cost of the asset. Suppose the machine costs SR 3000. This will be known as the supply price of the asset. Supply price is the current cost of the asset.

**Prospective yield:** it is the future return on the asset.

***Example:*** if you are given an option to accept SR 100 now or SR 100 five years hence, you will definitely like to have SR 100 now rather than five years afterwards. If you are to be asked to wait for five years, you will demand more than SR 100. Similarly, every person will evaluate SR 100 in present more than SR 100 in future. The present value of SR 100 in future will be less.

For t years, at a rate of interest of r per cent, the present value is calculated by this formula:

P =

**Example:** on the basis of the above formula, the present value of the expected returns of a machine which costs SR 3,000 and which is expected to last for five years will be calculated as follows:

Present value of prospective yield =

=

= 952.75 + 907 + 863 + 700 + 550.25 = SR 3,973

The present value of the prospective yield of an asset that is expected to last for five years will be equal to SR 3,973 which is greater than the supply price of the asset (or the current cost). Therefore, it will be desirable to invest.

For calculation of Marginal Efficiency of Capital (MEC), the formula will be:

Cr =

Where, *Cr* = replacement cost or supply price of an asset; *R1, R2, R2,….Rt*are the prospective annual yields for the periods *1, 2, 3, ….t,* respectively and *r* is the rate of discount.

**Marginal Efficiency of Capital (MEC):** The rate of discount (r) which equalizes the present value of the prospective yield of an asset with its supply price is known as marginal efficiency of capital (MEC).

With increase in investment, MEC falls. This is due to the following reasons:

1. The marginal revenue productivity of capital falls as more and more capital is employed;
2. The supply price of capital assets increases when more of them are demanded.
3. The increased output of the goods being produced with the help of capital will tend to drive down their prices.

Therefore, at higher rate of interest, less capital investment will take place. More private investment will take place at a lower rate of interest.

**Rate of Interest:** It refers to the cost of funds required to finance the project.

**Criterion for Investment:** Investors take decision on comparing MEC to rate of interest:

1. If the MEC > the rate of interest, the investors will be inclined to carry out investment;
2. If the MEC < the rate of interest, the investors will *not* be inclined to carry out investment; and
3. If the MEC = the rate of interest, the investors will be neutral to carry out investment;

**Question:** The supply price of a machine is SR 110 and its life is two years. In each year of its life it yields SR 72. Calculate its marginal efficiency of capital (MEC).

**Solution:** the marginal efficiency of capital can be found by equating the supply price (SR 110) and present value of expected yields (SR 72 in each year) with the help of this formula:

Cr =

110 =

110(1+r)2 = 72 + 72 + 72r

110(1+2r+ r2) = 144 + 72r

110 + 220r + 110r2 = 144 + 72r

110r2 + 148r – 34 = 0

Which gives,

r = 0.2 = 20%

Given the value of r as 20%, we can calculate the prospective yield per annum as follow:

I year: SR = = = SR 60

II year: SR = = SR 50

The rate of discount is 20%. The sum of discounted value of prospective annual yield (SR 60 + SR 50 = SR 110) equals the supply price of capital asset (SR 110). Investment in the asset is profitable if the cost of borrowing is less than 20%. In other words, if the rate of discount (MEC) exceeds the rate of interest (r), it will be desirable to invest.

**Role of Expectation in Private Investment**: Business expectations play a dominant role in determining the volume of private investment. The calculation of the MEC is full of uncertainty. If an investor is optimistic about the future, the net future income of a capital will be high, and vice versa.

**Determinants of Public Investment:** Public investment is motivated by social profitability considerations. The investment proposals in the public sector are subject to cost- benefit analysis.

**Multiplier**

**Meaning:** Multiplier shows the relationship between change in investment and the resulting change in income.

An increase in investment in an economy leads to an increase in income which is more than the proportionate increase in investment.

The multiplier coefficient (K) measures the change in income due to change in investment. In other words, K = = =

Higher the value of MPC, higher will be the value of multiplier.

Higher the value of MPS, lower will be the value of multiplier.

Kahn’s Multiplier is known as *Employment Multiplier*, and Keynes’ Multiplier is known as *Investment Multiplier*.

**Algebraic Derivation of Multiplier**:

Since, National Income = Consumption Expenditure + Saving

Or, Y = C + S = C + I (because S= I)

If there is change () in investment, income and consumption also change.

So,

=

Dividing both side by

1 =

1 - =

=

K = =

**Example 1:** Suppose mpc is ¾ and initial investment is SR 1,000 million then **Calculate:**

(a)    Multiplier,

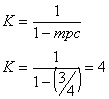
(b)   Marginal propensity to save,

(c)    Increase in the level of national income, and

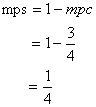
(d)   Draw conclusion.

**Solution:**

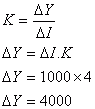
**(a) Multiplier (*K*):**



**(b) Marginal Propensity to Save (mps):**



**(c) Increase in the level of NI:**



**(d) Conclusion:**

From the above example, we can see that with an initial primary investment of SR. 1,000 million, with an mpc at ¾ and multiplier at 4, gives rise to an increase of SR. 4,000 million in the level of national income.

**Example 2:** What will be the value of multiplier if the marginal propensity to save is 0.4?

**Solution:** Multiplier, K = = = 2.5

**Example 3:** Given MPC = 0.6, calculate the value of when investment increases by SR 2000 million.

**Solution**: the calculation of these values is summarized in the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Round** |  |  |  |  |
| 1 | 2000 | 2000 | 1200 | 800 |
| 2 |  | 1200 | 720 | 480 |
| 3 |  | 720 | 432 | 288 |
| 4 |  | 432 | 259.2 | 172.8 |
| Last | ↓ | ↓ | ↓ | ↓ |
|  | **Total** | **5000** | **3000** | **2000** |

= = 5000

= 5000

**Question:** An additional investment of SR 1000 million in the Saudi economy creates how much additional income, if MPC = (i) 1, (ii) 0, (iii) 0.5?

**Question:** An additional investment of SR 20,000 million in the Saudi economy will create how much additional income, if MPS = (i) 1, (ii) 2, (iii) 3?

**Question:** If the Saudi economy plans to generate SR 1000 million of additional income, how much additional investment will be required if MPS = (i) 0.5, (ii) 0.4?

**Question:** If the Saudi economy plans to generate SR 200 million of additional income, how much additional investment will be required if MPC = (i) 0.3, (ii) 0.4?

**Question:** Find the value of MPC and MPS if an additional investment of SR 100 million generated an additional income of SR 500 million.

**Question:** Calculate mpc, mps and multiplier (K):

|  |  |  |
| --- | --- | --- |
| **mpc** | **mps** | **K** |
| 4/6 | ? | ? |
| ½ | ? | ? |
| ? | ¼ | 4 |
| ? | 1/7 | ? |
| 1 | ? | ? |
| 0 | ? | ? |

**Accelerator**

The multiplier describes the relationship between investment and income, i.e., the effect of investment on income.

The multiplier concept is concerned with original investment as a stimulus to consumption and thereby to income and employment.  But in this concept, we are not concerned about the effect of income on investment.  This effect is covered by the *‘accelerator’*.

The term *‘accelerator’* is associated with the name of J.M. Clark in the year 1914.  It has been proved a powerful tool of economic analysis since then.

Keynes, astonishingly, has altogether ignored this concept.  That is why, the concept of accelerator is not considered the part of Keynesian theory.

According to the principle of accelerator, when income increases, people’s spending power increases; their consumption increases and consequently the demand for consumer goods increases.  In order to meet this enhanced demand, investment must increase to raise the productive capacity of the community.  Initially, however, the increased demand will be met by over-working the existing plants and machinery.  All this leads to increase in profits which will induce entrepreneurs to expand their plants by increasing their investments.

Thus a rise in income leads to a further induced investment.  The accelerator is the numerical value of the relation between an increase in income and the resulting increase in investment.

***(Figures in SR. ‘000)***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Years** | **Demand** | **Required**  **Stock of**  **Capital** | **Replacement**  **Cost** | **Net**  **Investment** | **Gross**  **Investment** |
| 2007 | 500 | 5 machines 1500 | 1 machine 300 | 0 machine | 300 |
| 2008 | 500 | 5 machines 1500 | 1 machine 300 | 0 machine | 300 |
| 2009 | 800 | 8 machines 2400 | 1 machine 300 | 3 machines 900 | 1200 |
| 2010 | 1000 | 10 machines 3000 | 1 machine 300 | 2 machines 600 | 900 |
| 2011 | 1000 | 10 machines 3000 | 1 machine 300 | 0 machine | 300 |
| 2012 | 800 | 8 machines 2400 | 1 machine 300 | – 2 machines 600 | – 300 |

 Cost per machine: SR. 300,000 per machine

In the above example, suppose we are living in a world, where the only commodity produced is cloth.  Further suppose that to produce cloth SR. 100,000, we require one machine worth Rs. 300,000, which means that the value of the accelerator is 3 (i.e., the capital-output ratio is 1:3).  That is, if demand rises by SR. 100,000, additional investment worth SR. 300,000 takes place.  If the existing level of demand for cloth remains constant, let us say, at SR. 500,000, then to produce this much cloth we need five machines worth SR. 1.5 million.  At the end of one year, let us suppose, that one machine becomes useless as a result of wear and tear, so that at the end of one year, a gross investment of SR. 300,000 must take place to replace the old machine in order that the stock of capital is capable of producing output worth SR. 500,000.

In the third period, i.e., the year 2009, demand rises to SR. 800,000. To produce output worth Rs. 800,000, we need 8 machines.  But our previous stock consisted of only 5 machines.  Thus if we are to produce output worth SR. 800,000, we must install 3 new machines, worth SR. 900,000.  The net investment for the year 2009 will be SR. 900,000 and with the replacement cost of one machine SR. 300,000, our gross investment jumps from SR. 300,000 in the year 2008 to SR. 1.2 million in the year 2009.  A 60 per cent increase in demand led to a 400 per cent increase in gross investment.  Here we have a glimpse of the powerful destabilising role of accelerator.

***Assumptions of the Accelerator:***

1. Under the principle of accelerator, it is assumed that ***there is no excess capacity existing in the consumer goods industries***.  No machines are lying idle and shift working is not possible.
2. ***In capital goods industries, it has been assumed that there is an existence of surplus capacity.***If there is no excess capacity in capital goods industries, increased demand for machines could not lead to increase in the supply of machines.
3. ***Output is flexible.***  The machine-making industry or capital goods industry can increase its output whenever desired.
4. ***The size of the accelerator does not remain constant over time.***  It value will be affected by the businessmen’s calculations regarding the profitability of installing new plants to make more machines on the basis of their probable working life.
5. ***The demand for machines will remain stable in the future,*** although the increase in demand has suddenly cropped up.

**Trade/ Business Cycles**

Trade cycles refer to regular fluctuations in the level of national income.  It is a well-observed economic phenomenon, though it often occurs on a generally upward growth path and has a variable time span, typically of three years.

In trade cycles, there are upward swings and then downward swings in business.  The periods of business prosperity alternate with periods of adversity.  Every boom is followed by a slump, and vice versa.  Thus, the trade cycle simply means the whole course of trade or business activity which passes through all phases of prosperity and adversity.

Several suggestions have been put forward as to the cause of cycles.  The most well known are developed by Samuelson, Hicks, Goodwin, Phillips and Kalecki in the 1940s and 1950s, combine the multiplier with the accelerator theory of investment.  More recently, attention has been paid to the effects of shocks to the economy from technology and taste changes.

***Phases of Trade Cycles:***

Typically economists divide business cycles into two main phases – depression and recovery.  Boom and slump mark the turning points of the cycles:

**(a)**   **Depression:** In this phase, the whole economy is in depression and the business is at the lowest ebb.  The general purchasing power of the community is very low.  The productive activity, both in the production of consumer goods and the production of capital goods, is at a very low level.  Business settles down at a new equilibrium point with a low level of prices, costs and profits.  It may last for a number of years.  Following are the characteristics of depression:

* The volume of production and trade shrinks,
* Unemployment increases,
* Overall prices fall,
* Profits and wages fall, thus, the income of the community falls to a very low level,
* Aggregate expenditure and the effective demand come down,
* There is a general contraction of credit and little opportunity to invest,
* Stock markets show that prices of all shares and securities have fallen to a very low level,
* Interest rates decline all round,
* Practically, all construction activity – whether in buildings or machinery, comes to an end.

**(b)**   **Recovery:** This phase is also known as *‘expansion’*.  The depression period of trade cycle ends in the recovery period.  The economic situation has now become favourable.  Money is cheap and so are the other materials and the factors of production.  Productive activity has been increased.  The entrepreneurs have now sufficient financial backing.  Constructional and allied industries are receiving orders and employing more workers, thus creating more income and employment.  This stimulates further investment and production.  The whole economy is moving faster towards the boom.

**(c)**    **Boom:**Boom or peak is the turning point of the trade cycle.  It is the highest point of economic recovery.  The typical features of boom are as follows:

* A large number of production and trade,
* A high level of employment and job opportunities in sufficient amount to permit a good deal of labour mobility,
* Overall rising prices,
* A rising structure of interest rates, so that a bullish tendency rules stock exchanges,
* A large expansion of credit and borrowing,
* High level of investment, i.e., manufacturing or machinery
* A rise in wages and profits so that the community’s income rises, and
* Operation of the economy at optimum capacity.

**(d)**   **Recession:** It is a sharp slowdown in economic activity, but it is different from depression or slump which is more severe and prolonged downturn.

Just as depression created the conditions of recovery, similarly, the boom conditions generate their own checks.  All idle factors have been employed and further demand must raise their prices, but the quality is inferior.  Less efficient workers have to be taken on higher wages.

Rate of interest rises and so also of the necessary materials.  The costs have after all started the upward swing.  They overtake prices ultimately and the profit margins are first narrowed and then begin to disappear.  The boom conditions are almost at an end.

Then starts the downward course.  Fearing that the era of profits has come to a close, businessmen stop ordering further equipment and materials.  The prudent businessmen want to get out altogether and cuts down his establishment ruthlessly.  The government applies the axe mercilessly.  The bankers insist on repayment.  The bottlenecks appear, stocks accumulate.  Desire for liquidity all round.  This accentuates the depression.

The trade cycle is depicted in the following diagram:

