Investment demand function pdf

Learning Objectives Learn the determinant of investment demand and the impact of changes in these variables. Investment demand refers to demand by businesses for physical capital goods and services used to maintain or expand its operations. Think of it as office and factory space, machinery, computer, desk, etc. used to operate the business. It is important to remember that the investment demand here does not refer to financial investments. Financial investments are a form of savings, usually by households who want to maintain or increase their wealth by postponing consumption until the next time. In this model, the demand for investment will be considered exogen. This means that its value is determined outside the model and does not depend on any variable in the model. This assumption is made primarily to facilitate analysis and to allow focus on changes in exchange rates later. A simple equation to an investment request can be written as an $ID = I0$, in which 0, or naughty, subscription on the right indicates that a variable is exogenous or autonomous. In other words, the equation says that investment demand is given exogenously as I0. Admittedly, this is not a realistic assumption. In many other macro models, investment demand is considered to depend on two other aggregate variables: GNP and interest rates. GNP can affect investment demand as the amount of demand for business expansion is more prone to higher economic size volumes. GNP growth rates may also be a related determinant as the GNP grows, a company that is more likely to predict better businesses in the future, inspiring more investment. Interest rates can affect investment demand because many businesses must borrow money to fund expansion. Interest rates are the cost of borrowing money; Therefore, the higher the interest rate, the lower the demand the investment should be, and vice versa. If we incorporate GNP and the effects of interest rates into models, the solution to the extended model will prove to be more difficult. Therefore, we facilitate things by assuming that investment is remarkable. Since many students have known about GNP and the effects of interest rates in previous courses, you need to keep in mind that this effect is not part of this model. Key Takeaways In &G⊧ Q, investment demand is considered to be exogenous, meaning not depending on other variables in models such as GNP or interest rates. A recall of the impact by GNP and interest rates on investment demand is made to facilitate the model. Run Jeopardy. As in the popular television game show, you are given answers to questions and you must respond with questions. For example, if the answer is tax on imports, then the correct question is What are the tariffs? Tenance of a type of investment by households wishing to retain or increase their wealth by postponing consumption into the future. Investment requests refer to these types of goods and services. From exogenous or endogenous, this explains the demand for investment in G&G models; S in text. The names of two variables are likely to influence investment demand in reality but are excluded from the G&S model as simplification. Business purchase van shipping company will represent the demand recorded in this component of aggregate demand in the G&S model. What is the investment demand function? Posted by Rahul Jain 2 years, 11 months ago The function of investment requests was something that could change. It is simply the relationship between interest rates and the amount of investment claimed. This curve can shift for a variety of reasons and that means that deprivedness can change as those factors change. From DETERMINATION of Investment Expenditure WikiEducator Investment Expenditure refers to the creation of new assets i.e. increases to the existing capital asset stock. According to keynes investment demand depends on two factors: ▲ Expectation of profits it calls the Marginal Efficiency of Capital (MPM). Investment demand increased with the expected increase in profit rates. ▲ Interest Rates (IR). Investment demand decreased by rising interest rates. Symbolically, Keynes' investment requests are expressed as Id = f (MPM, IR) The articles mentioned below provide an overview of investment requests in macroeconomics. Investment studies will help in a better understanding of fluctuations in economic output. Introduction: We examine investments to better understand the volatility in economic output. We've seen simple investment functions associated with investing with real interest rates: $I = I(r)$. That function states that, the actual increase in interest rates reduces investment. We now want to look more closely at the theory behind this investment function. There are three types of investment expenses. Business fixed investments include plant and machinery purchased by businesses in production. Inventory investments include items set aside by in-store businesses, including inputs, finished goods and work-in-empowerment. Residential investments include new housing that people buy to live in and landlords buy to rent. Here we build a model of each type of investment to explain this volatility. As we developed a model, it is useful to keep in mind the following questions: Why are investments associated with interest rates? What causes the investment function to shift? Why did investments rise during the boom and fall during the recession? At the end of our discussion, we came back these questions and summarize the answers offered by the model. Business Fixed Investment: A standard model called neo-classical neo-classical Investment. The model examines the benefits and costs of the forms of capital goods owed. This model shows how the level of investment - in addition to capital stocks - relates to marginal capital products (MPK), interest rates, and tax regulation affecting firms. Let us imagine that, there are two types of firms in the economy. Production firms produce goods and services using the capital they rent. Rental firms make all the investments in the economy; they bought the capital and rented it out to a production firm. However, most firms in the economy perform both functions: they produce goods and services and they invest in capital for future production. For the purposes of analysis, it is a lesson to separate these two activities by imagining that they are happening in different firms. Capital Rental Price: Let us first consider a typical production firm that decides how much capital to rent by comparing the costs and benefits of each capital unit. The firm rented out capital at an R rental rate and sold its output at P; The actual cost of the capital unit to a manufacturing firm is R/P. The actual benefit per unit of capital is MPK. DECLINE in MPK as capital volume increases: the more capital the firm is, the less additional capital units will add to its withdrawal. To maximize profits, the firm's rental capital until MPK falls equal to the actual rental price. Figure 13.1 shows the thickness in the rental market for capital. Therefore, MPK determines the softness of the request. Demand softening soared down due to low MPK when high capital levels. At some point, the amount of capital in the economy is set, so the supply curve is vertical. The actual rental price of the capital adapts to complete the supply and demand. To see what variables affect the rental price of the balance, we need to consider certain production functions. We assume the Cobb-Douglas Production Function. The Cobb-Douglas Production Function is $Y = AK^{\alpha}L^{1-\alpha}$ where Y is output, K capital, L labor, parameters measure technological levels, and α parameters between zero and that measures the share of capital output. MPK for Cobb-Douglas Production Function is $MPK = \alpha A (L/K)^{1-\alpha}$ This equation identifies a variable that determines the actual rental price. It shows the following: (1) The lower the capital stock, the higher the actual capital rental price. (2) The greater the amount of labor employed, the higher the actual rental price of the capital. (3) The better the technology, the higher the actual rental price of the capital. Events that reduce capital stocks, or increase jobs or increase technology raise the actual rental price of capital congestion. Capital Costs: Let us consider rental firms. These firms capital goods and rent them out. As we wish to settle the investment made by rental firms, we start by considering the costs and benefits of owning capital. The benefit of owning capital is the result of renting it out to a production firm. It receives the actual rental price of capital, R/P, for each unit of capital owned and rented. The cost of owning capital is iPk - ΔPK + δPK = PK (i-ΔPK/PK + δ) Capital costs depend on capital prices, interest rates, rates where capital prices change, and depression rates. For example, consider capital costs to a car rental company. The company bought the car at £10,000 each and rented them to another business. Companies face interest i = 10% per year, so interest costs are £1,000 (iPK) per year for each car. Car prices rise at 6% per annum, so the firm earns capital ΔMD = £600 a year. Cars decrease at 20% per annum, so losses due to wear and tear δPK = £2,000 a year. Therefore, the company's capital costs are: Capital Cost = £1,000 - £600+ £2,000 = £2,400. The cost of a car rental company to keep cars in capital stock is £2,400 a year. We assume that, the price of capital goods goes up at the price of other goods. In this case. ΔMS/PK is equivalent to the overall inflation rate Π. Because, i – Π = r, we can write capital costs as: Capital Cost = PK (r+ δ) This equation states that, capital costs depend on capital prices, real interest rates, and depreciation rates. Finally, we would like to state the cost of capital relative to other goods in the economy. The actual cost of capital is The Actual Cost of Capital = (PK/P) (r+ δ) This equation states that, the actual cost of capital depends on the relative price of the good capital of the PK/P, the actual interest rate r, and the depreciation rate of δ. Determinant of Investment: Now to consider the firm's decision on capital stocks. For each capital unit, it earns real R/P results and incurs the actual cost (PK/P) (r+ δ). The actual gain per unit of capital is = Revenue - Cost = R/P - (PK/P) (r + δ). Due to the actual rental price in the balance of MPK, we can write the profit rate as: Profit Rate = MPK - (PK/P) (r + δ). The firm makes a profit if MPK > Capital. It incurs losses if MPK & Capital Cost. Let us look at the economic incentives located behind the firm's investment decisions. The firm's decision on its capital stocks depends on whether its capital is profitable. The change in capital stocks (net investment) depends on the difference between MPK and capital costs >. If MPK & lt; capital costs, they allow their capital to depreciation. We can also see that, the separation of economic activity between production and rental firms is not necessary for our conclusions on the Production firms add to capital stocks if MPK > Capital shares. Therefore, we can write ... ΔK = In [MPK-(PK/P) (r + δ)] where In the function shows how much net investment responds to incentives to invest. We can now get investment functions. The investment amount is the net investment amount and the replacement investment. The investment function is: I = In [MPK - (PK/P)(r + δ)] +δK Fixed investment depending on MPK, capital costs, and total depreciation. This model shows why investments depend on interest rates. The actual increase in interest rates increases capital costs and reduces the amount of profit from owed capital and incentives to accumulate more capital and vice versa. Therefore, investment schedules associated with investments to the interest rate slope decreased, as in Figure 13.2. The model also shows what causes the investment schedule to shift. Any incident that increases the MPK gives rise to investment profit and causes the investment schedule to switch out as per Figure 13.2 of I1(r) to I2(r). For example, technological innovation that improves the parameters of production function A raises MPK and, for any given interest rate, increases capital accumulation. Finally, consider what happens because the adjustment of these capital stocks continues over time. If MPK > capital costs, capital stocks will go up and MPK will fall. If MPK & lt; capital costs, the capital stock will fall and MPK will go up. Finally, when capital stocks adjust, MPK approaches capital costs. can we write MPK = (PK/P) (r + δ). Therefore, in the long run, MPK = capital costs. The speed of adjustment towards stable countries depends on how quickly firms adjust their capital stock, which in turn depends on how it costs to build, deliver and install new capital. Sometimes policymakers change tax laws to shift investment functions and influence AD. Here we consider some of the most important corporate tax provisions. Corporate income tax is a tax on corporate profits. Its impact on investment depends on how the law defines profits for tax purposes. as we do above – R/P capital less capital costs. In this case, although firms will share a fraction of their profits with the government, it would be rational for them to invest if R/P> capital costs, and to eradicate if R/P & capital costs. Taxes on profits, measured in this way, will not change investment incentives. However, corporate income tax does not affect investment decisions. There are many differences between the legal definition of profits and One of the main differences is depreciation treatment. Our profit definition deducts the present value of depreciation as costs that consider depreciation on how much it costs today to replace the applicable capital. On the other hand, under corporate tax law, firms conclude depreciation using historical costs. That is, depreciation deduction is based on capital price when it was originally purchased. During the period of inflation, the cost of replacement is greater than historical costs, so corporate taxes tend to smear the cost of depreciation and overstate profitability. As a result, tax laws see profits and are taxed even though economic gains are zero, which makes its own capital less attractive. Therefore, economists believe that, corporate income tax discourages investment. Investment tax credits are tax provisions that promote capital accumulation. These tax credits reduce the firm's taxes by a certain amount per pound spent on capital goods that reduce the effective purchase price per unit of PK. Hence, investment tax credits reduce capital costs and increase investments and therefore stimulate investments. Stock Markets and Tobin's q: There is a link between investment fluctuations and fluctuations in the stock market. The stock market is a market where stocks are traded. The stock price reflects an incentive to invest. James Tobin suggested that, the underlying firms of their investment decisions on the following ratio, called Tobin's q: Figures are the value of economic capital as determined by the stock market. Denominators are capital prices if purchased today. Tobin thinks that, net investment should depend on q value. If q > 1, then the market value of the stock installs capital at its replacement cost. In this case, managers can raise the market value of their firm's stock by buying more capital. On the other hand, if q & lt, the market value of the capital stock at its replacement cost is less than its replacement cost and therefore the manager will not replace the capital. Neoclassical models and closely related investment theories >. This profit makes rental firms desirable to own, which raises the market value of the firm's shares, implying a high q value. Likewise, if MPK & lt; capital costs, then the capital installed incurs losses, implies low market value and low q value. Tobin's advantage q as a measure of incentive to invest is that it reflects current profits and expected future profits. Tobin's investment theory emphasizes that, investment decisions not only depend on current economic policies, but also on expected policies in the future. Tobin's q theory provides a way to interpret the role of the stock market in the economy. Let's say we observe the fall in the share price. Given the cost of capital replacements quite stable, the fall in the stock market usually implies a fall in q Tobin. Fall q reflects investor pessimism about current or future profits and therefore the fall in investment, which could lower AD. Hence, the q theory gives reasons to expect volatility in the stock market will lie closely to volatility in output and jobs. Constraints on funding: When a firm wants to invest in new capital, it often raises the necessary funds in the financial markets. These financings can take some form — get loans from banks, sell bonds to the public or sell shares in the stock market. The neoclassical model assumes that, if a firm is willing to pay capital costs, the financial markets will make the funds available. But firms are facing financial constraints that could prevent firms from conducting profitable investments. Financial constraints influence the firm's investment behavior just as loan constraints influence household consumption behavior. Loan constraints cause households to determine their use based on current rather than permanent Y; Funding constraints result in firms determining their investments based on their current cash flow rather than the expected profits. Residential Investment: We consider here the determinant of residential investment. We start by presenting a simple model of the household market. The Stock Equilibrium and Supply Flows: There are two aspects of the model. Firstly, the market for existing house stock determines the price of a healthful house. Secondly, house prices determine the flow of residential investment. Figure 13.3(a) shows the relative price of PH/P housing is determined by the demand and offering of existing house stock. Relative prices then determine the flow of new housing that builds firms. At any time, the supply of houses is set as per Figure 13.3(a). This is indicated by a vertical supply curve. Tightness demand for slope houses down. Housing prices adapt to completing supply and demand. Figure 13.3(b) shows that, the relative price of housing determines the supply of new homes. The cost depends on the overall price level of P, and their income depends on the price of ph houses. The higher the relative housing price, the greater the incentive to build houses and the more houses are built. Therefore, the flow of the house depends on the price of the balance set in the market for existing homes. Relative prices play the same role for residential investments as Tobin did for regular investments in business. Housing Demand Changes: Upon demand housing prices are rising,seimlikan prices are changing, which is affects residential investments. The demand curve could shift for an economic boom, a huge population increase and a fall in interest rates. Fig. 13. 4(a) shows that, the shift in demand expansion increases the price of balance, which shows in Figures 13.4(b) that rising housing prices increase residential investment. Housing Tax Treatment: Tax law affects the accumulation of fixed business investments, so does it affect the accumulation of residential investments. However, the effect is the opposite. Rather than discourage investment, since corporate income taxes are not for businesses, personal income taxes encourage households to invest in housing. Homeowners are landlords with special tax treatment. He does not have to pay taxes on rent cuts, however he is allowed to deduct mortgage interest up to a mortgage amount (£50,000). The size of this subsidy to home ownership depends on the rate of inflation. That's because, tax laws allow homeowners to deduct their nominal interest payments. As nominal interest rates on mortgages increase as inflation rises, the value of subsidies is higher at higher inflation rates. Some economists have criticised the treatment of home ownership taxes, because of this; they believe that, there is too much investment in housing. Inventory Investment: Inventory investment is one of the smallest spending components, yet exceptional volatility makes it important. Reasons for Holding An Inventory: Before presenting a model to explain the volatility in inventory investment, we must discuss the motive for holding the inventory. One motive for holding an inventory is to smooth out production levels over time. Consider a firm that suffers from temporary boom and chest in sales. Rather than adjusting production to match sales volatility, it may be cheaper to produce goods at a stable rate, when sales are low, accumulated inventory, when sales are high, de-cumules inventory. This motive for holding an inventory is called 'smoothing production'. The second motive for holding inventory is that they allow firms to operate more efficiently. For example, grocery firms can sell goods more efficiently if they have goods on hand to be shown to customers. Manufacturing firms keep spare parts inventory to reduce that time, the assembly line closes when the machine breaks. Therefore, we can see the inventory as a production factor: the greater the stock of the firm's holding inventory, the more output it can produce. The third reason to hold an inventory is to avoid running out of goods when sales are unexpected Firms often have to decide on withdrawals before knowing how many customer requests are. If the demand exceeds production and there is no inventory, the goods will run out of stock for the duration, and the firm will lose sales and Inventory can prevent it from occurring. This motive for holding the inventory is called avoiding stocks out. Finally, inventory is often shaded by the production process. Many stuff requires a few steps in production and, therefore, takes time to produce. When the product is only partially completed, the components are calculated as part of the firm's inventory. This inventory is called 'work in plantations'. Inventory Acceleration Model: There are many motives to hold inventory, and there are many inventory investment models. One simple model that, explaining the data well is the accelerator model used for all types of investments. Here we apply to the type in which it works well i.e. inventory investment. The third model assumes that firms hold stocks of inventory rated with the firm's output levels. There are various reasons for this assumption, when output is high, firms need more materials and supplies at hand, and they have more goods in the production process; as the economy grows rapidly, retail firms want to have more goods on the shelves to show customers. This assumption means if N is an inventory stock and Y output, then N = βY where β is a parameter that reflects how many inventory firms want to hold as part of the output. My inventory investment is a change in energy inventory ΔN. Therefore, I = ΔN = βΔY. Accelerator models predict that, inventory will be protracted by changes in output. As output rises, firms want to hold more inventory, so they invest in it. When output falls, firms want to hold less inventory, so they allow their inventory to get off. How did the model get its name? Since the Y variable is the rate at which firms produce goods, ΔY is a production acceleration. The model tells that, inventory investment depends on whether the economy is accelerating or slowing down. Real Inventory and Interest Rates: Inventory investments also depend on actual interest rates. When a firm holds well in inventory and sells it tomorrow it hands over the stakes it can gain between today and tomorrow. Therefore, actual interest rates measure the cost of the opportunity to hold inventory. As real interest rates rise, holding inventories becomes more expensive, so firms are trying to reduce their stock. Therefore, an increase in actual interest rates is deceiving inventory investments. Conclusion: The purpose here is to examine the investment determinant. Of the various investment models, three themes arise. First, we have seen that, investment expenses are related to actual interest rates. Higher interest rates increase capital costs to firms, the cost of borrowings to homebuyers and also raises the cost of holding an inventory. Therefore, the models developed here justify the investment functions of the investment Secondly, we have seen what causes the investment function to shift. The improvement of technology boosts MPK and therein, increases the fixed investment of the business. The increase in the population raises demand for housing and thereby residential investment. Importantly, various economic policies, such as, changes in investment tax credits and corporate income taxes, change incentives to invest and therein, shift investment functions. Third, we have seen why investments are so volatile over the business cycle: investment spending depends on economic output and at interest rates. In the neoclassical model of business fixed investment, high employment increases MPK and incentives to invest. Higher Y also raised demand for homes, which increased house prices and residential investment. Higher output increasing the stock of inventory firms wants to hold, stimulates inventory investment. The model predicts that, the economic boom should stimulate investment, and a recession should slow down. Now we want to discuss other theories of investment demand. Demand Investments: Investment expenses are a very important topic in macroeconomics for two reasons. First, changes in investment accounts for fluctuations in GDP movements in the business cycle. Secondly, it determines the rate at which the economy adds to its capital stocks, and with it, helps determine the long-term growth and productivity of the economy. The fast-growing economy generally invests most of their GDP from a slowing economy. Investments often refer to the purchase of financial and physical assets. In macroeconomics, investment is a spending flow that adds to the physical stock of capital. Investment expenses may be aggregated into three categories. The first is the regular investment of the business. The second category is residential investment. And the third is inventory investment. Investment may either drive autonomy. Investments driven by changes in income levels or changes in interest rates are known as driven investments. Autonomous investments are types of investments that are free from changes in income levels or interest rates. The shift in autonomous investments is influenced by factors other than interest rates or income levels, such as, innovation, public policy, size and composition of the population, etc. In a simple Keynesian model, investment is considered an autonomy. Investments driven occur either due to changes in income levels or due to changes in interest rates. If the investment is the income level function then it can be written as I = I(Y). The I/Y ratio will be called the average tendency to invest and dI/dY called marginal tendencies to invest. We combine autonomous and induced investments in one function. If the investment function is written as $I = g + hY$ where g and h Constants. Here g represents the autonomous investment hY is an investment driven. Here g is free of income level, even though $Y = 0$, $I = g$. The share of hY depends on earnings and therefore, it is an investment driven. Marginal Capital Efficiency: In Keynesian theory, investment expense is considered an interest rate function. Keynesian investment theory is known as the small efficiency of investment theory (MEI). Before considering the efficiency of marginal investment theory, let us consider in advance the relationship between capital stocks and investment flows in the economy. Investments are in addition to capital stocks measured at any time while investments are measured over a period of time. For example, if the capital stock at the beginning of the year is K_1 and if it equals K_2 at the end of the year, then $(K_2 - K_1)$ is the total investment during the year, if the capital stocks remain unchanged there is zero investment, if it increases, there will be a positive investment and if it decreases there will be a weakness, whether the investment is taking place or not depending on the growth of the capital stocks. Capital stocks can grow, if a net investment occurs. Since capital is a production factor, it will be used in such a way as to maximize profits. There are an optimal amount of capital stock that maximizes profits. For example, if the firm's real capital stock is less than optimal, the firm is not in balance with respect to its capital stock. In such circumstances, the firm can increase profits by adding to its capital stocks, so that, the real capital becomes equal to its optimal capital. In this case the investment will occur. Similarly, there will be disadvantages if the actual capital is greater than the optimal capital. Therefore, it is clear that investment will occur only when the firm is not in the eleventh. If the actual capital stocks are similar to the firm's optimal capital stocks in balance and there will be no more investments. This analysis can be announced for the whole economy. For the economy as a whole, we can get an optimal amount of real capital and stock. Investments will last if the actual stock of capital is less than the optimal economic stock. Optimal capital stocks are shares that maximize the amount of profit. To maximize profits, firms use any factor up to the point where marginal costs are equal to marginal yield products or marginal yield products are equal to that factor price. However, it is difficult to use this rule for any durable capital assets that remain productive for some period and provide a series of revenue throughout its lifetime. Therefore, it is difficult to determine the marginal productivity of durable capital assets. Although we can determine marginal productivity other problems remain: whether we should take the market interest rate as the capital price or the price of capital supply as the price of the capital. These problems can be solved with the help of marginal efficiency of capital theory, which helps determine the optimal capital stock. The slightest capital efficiency is the value of the i for which the following equations are satisfied, $c = Y_1/(1 + i) + (1 + i)^2 + \dots Y_n/(1 + i)^n$, where $Y_1, Y_2 \dots Y_n$ is the capital yield in various years and C is the supply price of the machine. Marginal capital efficiency is defined as a discounted rate for which the present value of the series of returns derived from the machine during its lifetime is equal to its supply price. Will produce $Y_1, Y_2 \dots Y_n$ and the price of the c supply is taken as given. Therefore, we only have one equation and one unknown, i, that can be determined from the above equation. We have a problem in solving the above equations. Equation has root n because it is a nth degree equation. Therefore, can we get values n i, which one should be taken as a marginal capital efficiency? Moreover, what is the guarantee that, there will be at least one real value i? However, we can point out that, if we consider (a) $Y_1, Y_2 \dots Y_n$, C > 0 and (b) > – 1 , then exist at least one real value i. This can be given as follows: Leave, $V = Y_1/(1 + i) + Y_2/(1 + i)^2 + \dots + Y_n/(1 + i)^n$, where $Y_1, Y_2 \dots Y_n$ given and shy. Therefore, the value of V depends on the value that is, V = V (i). Further, if → , V → 0 or if, i → -1, V → ∞. Therefore, V varies inversely with i. As I increased the V decreased and vice versa. Therefore, the V (i) function will go down the slope. This is shown in Figure 13.5. V (i) its function is asymptotic. Since C is given and free of i it is represented by a straight horror line. At point A, where V = C, MEC is determined. Therefore, we can get at least one real value i which V = C. Equations If we assume that, C. $Y_1 \dots Y_n \geq 0$ and $i \geq -1$, then in this equation we have a change of marks. It can be said that there is a real root of positive which of the above equations are satisfied. Investments can be conventional or non-conventional. Conventional investment is one where all yields are not negative. Non-conventional investments are one where some yields are negative. Now, let us know how MPM determines the optimal stock of capital. Let 'r' become a market interest rate. If the firm wants to get the same result $Y_1, Y_2 \dots Y_n$ by lending money at a market interest rate, it is necessary to lend a sum of money, D, given by the following equation: $D = Y_1/(1 + r)\ Y_2/(1 + r)^2 + \dots + Y_n/(1 + r)^n$ where D is the capital value of income capital generating income. The firm can get the same results $Y_1, Y_2 \dots Y_n$ Yn either by purchasing capital goods at a cost of C or by lending a sum of money, D. If D > C, it would be profitable for the firm to buy machines instead of lending the amount. But C< D, > i. that is, when marginal capital efficiency is greater than the market interest rate. If C> D, the firm can get the same result by lending a smaller amount compared to the cost of purchasing a machine. In this case the firm will benefit by lending volume instead of buying capital goods where & r, that is, when MPM & lt; r. When C = D and i = r, it is a matter of indifference. Firms can buy machines or can lend the amount. Therefore, we can say that, the firm will benefit by investing in real capital goods only when MEC > interest rates market interest(r). So far, we assume that the firm has sufficient amounts of money and problems before the firm is either to lend money or buy machines. Let us now assume that, the firm does not have enough amount of money and it can only invest if it can borrow money at the V market rate, which means that it will borrow money only if THE MEC is larger than the market interest rate, that is, if i > r then it will benefit the tor firm to borrow funds to buy machines. However, if, i & r or MPM < market interest rates, the loan will not be profitable. Marginal Efficiency of Capital (MEC) is a rate of return on a procidion more cost than investment in real capital goods. It depends on two factors: the price of supply and the series of potential revenue. But the result of capital goods will not remain the same. If more and more capital items are being employed in the production process of other factors that remain unchanged, the marginal productivity of new capital goods will decrease. Therefore, if the firm employs more capital units, the result of consecutive units will also decrease which means the law reduces marginal productivity will operate, therefore we can operate the MEC will decrease as more capital goods are used in the production process. If, as in Figure 13.6, the units of capital goods are measured in the cruel axis and MEC on the vertical axis, we can get a downward relationship between MEC and the capital goods unit known as MEC's SCHEDULE. optimal capital stock. If the market interest rate is r_0 firms will be able to maximize profits using K_0 units of capital goods, where MEC is equal to the market interest rate. If capital employment is less than K_0, when the market interest rate is r_0,, MEC > r_0 , so that it will be profitable to use more capital. This process will when K0 K0 capital will be employed where MEC is equal to r_0. Similarly, when the interest rate is r_1, point B will be the maximum point of profit at which MEC is equal to the interest rate and the capital share is equal to K, as shown in Figure 13.6. Therefore, we can say that the optimal capital stock is K_0, when the interest rate is r_0 and equal to K_1, if the interest rate is r_1 and so on. MEC can give us optimal capital stock. Proceedings in this way we can get an MEC schedule for the rest of the economy that will go down the slope as well. It will give us optimal capital stocks for the economy at different interest rates. MEC Determinant: As we have seen above, MEC is the value of i which the following equations are satisfied: $C = Y_1/(1 + i) + Y_2/(1 + i)^2 + \dots + Y_n/(1 + i)^n$. From this equation can be seen that, MEC directly depends on two factors: (1) future revenue and (2) prices of capital supply. Other matters still equal to MEC vary directly with the yield perspective and inversely with the price of supply. This means that if the yield decreases and the price of supply increases, MEC will fall. The expected revenue is derived from the operating costs of total revenue. Moreover, these outcomes are prospective and, therefore, they may change as expectations change. The higher the operating cost, the lower the yield and the lower will be the MEC. Therefore, if the raw material becomes more expensive or if the wage rate increases, the MEC will fall. If the output price increases, the other thing remains the same, MEC will rise. On the other hand, if the output price falls, other things left unchanged, meC will also fall. The expected results may also change due to changes in entrepreneurs' expectations. If entrepreneurs are more optimistic about the future, they will expect higher yields to apply. If, on the other hand, they are pessimistic about the future, they might expect lower yields. Therefore, during the boom period, they will have a bright view for the future and the MEC will be higher. Alternatively, during the period of decline, MEC will be lower. Apart from the above factors, MEC can also rely on the following exogenous factors, such as population size, market size, changes in production methods, etc. Other things that are still the same, the greater the market size or the larger the size of the population, the bigger the will be the MEC. Similarly, if new technologies were created that reduced the cost per unit of output, the result would increase and MEC would rise. The MEC table goes down the slope as it is assumed that, the yield decreases when more capital goods are used. Furthermore, it may be assumed that larger output can be sold lower prices, other things that are still the same. For this MEC fell. However, as other factors change, the MEC's schedule shifts its position. MAY and MEC: Optimal capital stocks are determined by MEC at different interest rates. If the actual capital stock is not the same as the optimal capital stock then the capital stock must be adjusted to make it equal to the optimal level. The problem is to determine how the rate at which real stocks run towards optimal stocks. We actually have two problems: (1) is to determine the optimal shares and (2) is to determine the growth rate of real capital stocks for the flow of investments. The first problem is solved by MEC's theory. The second problem requires a MAY theory. Previously, we discussed the may theory, it was necessary to distinguish between gross and net investment. Gross investments are in addition to capital stock over a period of time. Net investment is equal to the difference between gross investment and depreciation. Therefore, in any time frase if the gross investment is equal to zero, the net investment is equal to depreciation and will be negative. Net investment would be zero if gross investments were equal to the depreciation amount. If the gross investment rate is equal to the depreciation amount, it is called a replacement investment, which is necessary to maintain the capital stock intact. In calculating the MEC we assume that, the price of capital supply is continuous and it is determined by the level of replacement of the investment. In Figure 13.7, SS' is the curve of capital supply. Let Ox become the amount of capital required for replacement, xy is the supply price for this level of capital stock. The price of this supply, xy, is taken into account in calculating the MEC. Therefore, the MEC's schedule corresponds to the supply price where the net investment is zero. If the positive net investment of the required amount of capital stock is greater than Ox and, therefore, the supply price is greater than xy. Further, the supply price will vary for different levels of investment. However, may revenue expectations (little investment efficiency) are calculated on the assumption that capital supply prices are increasing. As such, MEC is calculated assured that the continuous price of capital supply while MEI is calculated assertive of variable supply prices. MAY will be different for different levels of investment. As investment rates increased, rising supply prices and MAY decreased. So, we can get a MAY schedule like the MEC's schedule. Although the MEC's schedule refers to capital stocks but the MAY schedule refers to investment flows. Relations between the two were given in Figure 13.8. Let's say the market interest rate is Or2 and from the MEC's schedule we can find out that the optimal capital stock is OKm. Now, let's say that the real stock of capital is OK0 that is less than optimal capital stocks. Therefore, there is scope for more investment. Now, we need to determine the rate at which investment will occur when the interest rate is Or2. If the interest rate is Or0 then the real capital stock is K0 equal to the optimal capital stock and zero net investment. As capital stock increases exceed K0, there is a positive net investment and the price of supply of capital goods will increase. Supply prices increased as investment rates rose. MAY is calculated based on rising supply prices and therefore, will be below the MEC. We can get a MAY schedule for different investment rates. As investment rates increased MAY which depended on the schedule rate of capital goods. Therefore, the MAY schedule is considered a mirror image of the table of capital goods supply. Given Or2's interest rate, the investment rate will be equal to K0I0, where MAY is equal to interest rates. K0I0 is a short-term investment rate and MAY is an investment schedule when we start from the interest rates of r0 and the original capital stock of K0 and, as capital stocks rise from the OI0, the MAY schedule diverts its position from MAY1 to ME12. This table again shows the investment rate at different interest rates assuming that the current capital stock is OI0. Therefore, the investment rate depends on the interest rate and on the initial capital stock. The investment function can be written as $I = I(r, K_0)$ where K_0 is the initial capital stock. If real capital stocks are closer to optimal capital stocks, the investment rate will be slower. When real capital stocks are equal to optimal capital stocks, net investments will be zero. However, net positive investments may still be possible if interest rates fall or if the MEC schedule shifts upwards due to technical progress. In this way the investment rate is determined by the equality of MAY and the interest rate. The MAY schedule can be taken, as in Figure 13.9, by placing MAY on a vertical axis, and investments on the cloaky axis. In Figure 13.9, we also get an investment schedule when the interest rate is on the vertical axis. If the interest rate is Or0, the investment amount is OI0 and MAY is equal to the interest rate. The investment rate is determined by the MAY schedule and the optimal capital is determined by the MEC's schedule. Keynes is confused between these two concepts. What he called MEC is actually a MAY schedule. This confusion was first cleared by Prof. Lerner. Current Value Criteria for Investments: Current value criteria are alternatives to MEC's criteria for assessing investment projects. According to the MEC's criteria, we know that, any capital goods are worth buying if MEC is larger than interest rates. But MEC's criteria suffer significant limitations. It is difficult to determine the MEC; to avoid this difficulty one can use the present value criteria. According to the current value criteria, the firm determines its present value by deploying a series of revenue to be derived from capital goods. From the present value of this discount the cost of capital goods is taken. This gives us the net present value (NPV) of capital goods. S say C is the cost of capital and capital goods will produce for n years producing $Y_1, Y_2 \dots Y_n$ during her life. Let r mark the interest rate of the market. Then NPV capital goods are given by the formula: The revenue and cost of capital goods are taken as given. Therefore, given the discount or interest rates, we can determine NPV from the formula above. On the basis of these criteria the project will be accepted if its NPV is positive. If the project's NPV is negative, it will be rejected. The firm can land projects based on their NPVs. If the capital supply is unlimited the firm will invest in all projects with positive NPVs. However, if the firm's limited investment capital would invest in projects with the highest NPV until its funds run out. In Figure 13.10 we plot NPV on vertical axes and real investments on horror axes. Now let us assume the interest rate is continuing at r0. At this rate the interest of NPV different capital units is calculated and have listed NPV values. The NPV curve is V0I0 when the interest rate is r0. If the firm has sufficient funds, it will invest up to I0 where the NPV marginal project is zero. Therefore, we can say that, investment will be OI0 when the interest rate is r0. If interest rates rise to r1, the NPV for each project will be lower than ever, provided that prices and supply yields remain unchanged. That means the NPV curve will shift down as interest rates rise and the NPV curve becomes V1I1. This indicates that at a higher interest investment rate will be lower and therefore there is an inverse relationship between interest rates and the level of investment. Therefore, the investment function can be written as I = I(r) as I(r) & 0. Expectations: MEC is calculated based on the results that can be obtained from the time of life of the machine. This result is expected but not real. The expected revenue requires expectations of variable costs associated with the production of this output and the expected future price level. Therefore, expectations enter into the determination of the level of investment. But expectations may or may not be met. There is no certainty that the expected outcome required in the MEC's calculations will come true in practice. Volatile expectations also volatile. They may change drastically in response to the general mood of the business community, news of technical developments, political events, rumours, etc. One source of uncertainty is the possibility that machines can be obsolete technology earlier than expected. For this reason the firm often considers 'an exit payment period- for a new plant, rather than its lifespan. The payment period is the period to recover the cost of the plant. Firms typically calculate the yield by setting a payment period. If the firm takes a five-year payment period, it implies a 20% yield on plant costs. If the firm is not sure that it can achieve this return, it will not carry out investments, it is true that some machines may have a relatively short life expectancy that is possible, in fact, two or three years but not ten out of fifteen years. This reduces uncertainty. When the uncertainty of less investment will be more elastic. Uncertainty problems can be addressed in two ways. One is to consider the frequency distribution of possible outcomes of any year with a corresponding probability. The meaning of arithmetic weighted results can be taken as the most likely outcome of the year. Another way is to consider the equivalent certainty of uncertainties of uncertainties that conspise the asset value of the distribution, plus any premium or less discount for uncertainty. Capital Goods Sector Capacity: Gross investment means an addition to capital stock. Investments occur when the firm is not in balance or optimal. If the firm has less optimal capital, and if capital goods are available, then the investment can occur quickly. However, if the capital goods are in short supply, then the investment rate will be determined by the production capacity of the capital goods industry. Now, let's say that a firm is in optimal capital stocks. No investment will occur unless the interest rate falls. However, if interest rates fall, optimal capital stocks will rise and the investment rate for one firm will depend on the capacity of the Capital Goods Sector. For the economy as a whole gross investment will also depend on the production capacity of the Capital Goods Industry. Net investment also depends on the capacity of the capital goods industry less annual depreciation rates. In the current analysis three rates of investment are possible. It's the optimal capital stock is larger than real stocks, firms are demanding more capital and the capital goods industry will operate at full capacity to meet gross investment needs and net investment will equal minus depreciation. If optimal capital stocks do not grow at the same rate as real stocks, the actual stock will equal optimal shares and the net investment will be The third rate of investment will occur when optimal stocks fall short of real stocks. In that case, the net investment will be negative, at a rate determined by the depreciation rate. This analysis has significant implications as the capital goods industry plunders violently between the conditions of fever and staging activities. When the industry, generally, lacks capital, the capital goods industry operates at full capacity and it is trying to expand its own capacity. Thus, the efforts of the capital goods industry to increase its capacity are widespread and intensify the boom. In depression, the capital goods industry itself has excess capacity and it will prolong depression. From this analysis, we can conclude that, if we start from a balance position and if optimal stocks rise, a huge consequence boom can be followed. On the other hand, when real is greater than optimal, gross investment is zero, the capital goods industry stops producing and depression spreads across the economy. Sprint Investment Theory: Now we like to discuss the theory of 'sprint' investment. According to this theory, the current level of net investment depends on past changes in income. In its simplest form, this can be written as follows: $I_t = v(Y_t – Y_{t – 1})$, where I_t is a net investment in the current period, Y_t is the current national income, $Y_{t – 1}$ is the national income in the previous period, v is a 'sprint', which continues. Gross investments are equal to net investment plus any replacement investment. So we can write: $GI = v (Y_t - Y_{t - 1}) + R_t$, where GI is the current gross investment and R, is the current replacement investment. For legitimate sprint theories, it is necessary that firms must demand additional capital to meet increased demand for their products. Consider the following examples. Let us assume that, a single firm that initially had a stock of ten machines each capable of producing 50 units of output per year. To ensure a simple analysis, assume that, there is no depreciation so that, there is no need to think about replacement investments. Specify initially the total demand for the firm's products was 500 units. This is indicated for year 1 in Table 1: note that, the capital stock required to meet these demands is ten machines and because the firm already has ten machines, no net investment is required. As long as demand remains at 500 units, no net investment is required. Now, supposedly in year 2, demand rose to 1,000 units - the desired capital stock will rise to 20 machines and to achieve this, a net investment of ten machines is necessary. In year 3, demand has increased to 1,500 units, so that, the capital stock up to 30 machines— as the firm already has 20 machines, another 10 need to be added. Note that, although demand has increased in 3 years, net investment remains permanent In year 4, demand continued to increase by 250 units to 1,750 units: the required capital stocks increased by up to 35 and so net investment of 5 machines was necessary. Since demand has increased by a small amount than ever before, investment has actually fallen. In 5 years, demand is still 1,750 units - the firm has had 35 machines needed to meet these demands and therefore no new (investment) machines are required. This example highlights the following on this: (a) To maintain net investment at an ongoing positive level, the demand for firm products must rise at a stable rate. (b) For net investment to increase, demand must increase at a growing rate. (c) If demand should level and stay continuous, the net investment will fall to zero. Note that, the relationships set out in Table 1 can be written as follows : $NI = 1/50 (D_t – D_{t - 1})$ where NI is the firm's net investment, D_t is the current demand for firm products and $D_{t - 1}$ is a request last year for firm products. If all firms behave in a similar way to this, then we can say that, the aggregate of net investment in the economy will depend on changes in aggregate demand - they need to be measured in terms of value and because the value of aggregate demand in balance is equal to national income, we have $I_t = v (Y_t - Y_{t - 1})$. Two major criticisms could advance against this theory: (1) It assumes that, firms faced with increased demand for their products will immediately try to raise their capital stock. This means that there is no excess capacity. This is unrealistic - it is more likely that firms will be able to meet the increased demand early by allowing excess capacity that it already has. (2) It failed to take into account the businessman's expectations. If businessmen consider increasing demand for a temporary nature, they won't respond to it at all: This may happen if they are generally pessimistic about the future. Alternatively, if they are generally optimistic and see increasing demand as a signal for further increases, they can buy more machines than the theoretically predicted. In conclusion, we can say that, net investment in the economy will depend on the following factors: (1) Interest rate (r); (2) Changes in national income in the past; (3) Conditions of business expectations (B). We can write functions as: $I_t = f (r, Y_t - Y_{t - 1}, B)$. However, since it takes time for firms to adjust their capital stocks in response to changes in demand, it may be realistic to introduce time into function and write: $I_t =f(r, Y_{t - 1} - Y_{t -2}, B)$. Only empirical analysis can tell which of the three variables are the most important. Important. Important.