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ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD

Course: Monetary Theory and Policy (811) • Level: M.Sc

Semester: Autumn 2026

Assignment No. 1 (Units: 1-5)

Total Marks: 100 • Pass Marks: 40 • Credit Hours: 03

SOLVED ASSIGNMENT GUIDE

(For Study & Reference)

Note: This guide is prepared for study and reference purposes. Students are advised to read the relevant units of the course book, understand the concepts, and then write the assignment in their own words.

Copying this guide word for word is not recommended.

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Question 1: The Money Creation Process (20 Marks)

What is the money creation process?

Introduction

Money in a modern economy is not mainly printed paper. Most of it is bank money — the demand deposits that commercial banks create when they lend. The money creation process (also called the credit creation or deposit creation process) explains how an initial increase in reserves, usually provided by the central bank, is multiplied by the banking system into a much larger increase in the total money supply. It is one of the most important ideas in monetary economics because it connects the actions of the central bank, which controls the monetary base, with the behaviour of the commercial banks and the public, which together determine how far that base is multiplied. Understanding this process is also essential for understanding monetary policy: when the State Bank of Pakistan changes its policy rate or buys and sells securities, it is ultimately trying to influence this very process of deposit and credit creation.

This answer first explains the meaning of money creation and its key concepts — primary deposits, derivative deposits, reserves and the reserve ratio. It then shows how a single bank can lend, why a single bank cannot multiply money on its own, and how the banking system as a whole multiplies an initial deposit. A worked numerical example and a table trace the process round by round, the deposit multiplier is derived, and the answer closes with the assumptions of the simple model and the limitations that weaken the multiplier in practice.

Meaning and Key Concepts

Money creation is the process by which the banking system expands the total stock of money — currency held by the public plus demand deposits — on the basis of a given quantity of reserves. Reserves consist of the cash banks hold in their vaults and, more importantly, the balances they hold with the central bank. The monetary base (or high-powered money) is the sum of currency in circulation and bank reserves; it is called high-powered because each rupee of it can support several rupees of deposit money.

Two kinds of deposits must be distinguished. Primary deposits are created when the public deposits cash or a cheque drawn on the central bank with a bank; they bring new reserves into the banking system. Derivative deposits are created when a bank grants a loan or buys a security and credits the amount to the borrower's account. Derivative deposits do not bring in new reserves; they are created out of the reserves the bank already has. As the old saying puts it, loans make deposits: when a bank lends, it does not hand over notes from its vault; it simply opens or credits an account, and that credit balance is new money that did not exist before.

The cash reserve ratio is the fraction of its deposits that a bank must (by law or by prudence) keep as reserves and therefore cannot lend. If the reserve ratio is 20 percent, a bank receiving a

new deposit of Rs. 10,000 must keep Rs. 2,000 and may lend Rs. 8,000. The proportion kept back at each stage is why the process, although powerful, is finite rather than unlimited: at every round part of the money leaks into reserves, so each successive loan is smaller than the one before.

How a Single Bank Creates Credit

Consider a single bank that receives a new primary deposit of Rs. 10,000 in cash. Its balance sheet initially shows deposits and reserves both higher by Rs. 10,000. With a 20 percent reserve ratio the bank needs only Rs. 2,000 against this deposit, so it has excess reserves of Rs. 8,000, which it can profitably lend — banks earn interest on loans and nothing on idle reserves, so they have a strong incentive to lend excess reserves out.

The bank grants a loan of Rs. 8,000 by crediting the borrower's account. At that moment it has created Rs. 8,000 of new deposit money. However, the borrower took the loan in order to spend it. When he pays a supplier who banks elsewhere, the cheque is cleared and the first bank loses Rs. 8,000 of deposits and Rs. 8,000 of reserves to the supplier's bank. The first bank is then left exactly where sound banking requires: deposits of Rs. 10,000 backed by reserves of Rs. 2,000. A single bank, therefore, can lend only its excess reserves; it cannot multiply money by itself, because it must expect its loans to be drawn out and cleared through other banks. Money multiplication is a property of the banking system as a whole, not of any one bank.

How the Banking System Multiplies Deposits

What the first bank loses, the second bank gains. The supplier's bank receives a new deposit of Rs. 8,000 and reserves of Rs. 8,000. Keeping 20 percent (Rs. 1,600), it lends Rs. 6,400. That loan is spent and redeposited in a third bank, which keeps Rs. 1,280 and lends Rs. 5,120, and so on.

Each round produces a smaller new deposit, because a slice is held back as reserves at every stage, but the rounds continue until the original Rs. 10,000 of reserves is fully absorbed supporting a much larger total of deposits. The process works in exactly the same way in reverse: a withdrawal of reserves forces the system to contract deposits by a multiple of the withdrawal, which is why a loss of reserves can produce a damaging credit crunch.

Table 1: Multiple deposit creation with a 20 percent reserve ratio (initial new deposit Rs. 10,000)

Bank / round	New deposit received (Rs.)	Reserves kept 20% (Rs.)	New loan made (Rs.)
Bank A (1st)	10,000	2,000	8,000
Bank B (2nd)	8,000	1,600	6,400
Bank C (3rd)	6,400	1,280	5,120
Bank D (4th)	5,120	1,024	4,096
Bank E (5th)	4,096	819.20	3,276.80
All remaining banks	16,384	3,276.80	13,107.20
Banking system — total	50,000	10,000	40,000

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The table can be cross-checked in two ways, and both agree. First, the totals are a geometric progression: 10,000 + 8,000 + 6,400 + 5,120 + …, in which each term is 0.8 of the previous one, and the sum of this series is 10,000 / (1 − 0.8) = 10,000 / 0.2 = Rs. 50,000. Second, at the end of the process the whole original reserve of Rs. 10,000 must be held against deposits at the rate of 20 percent, and 20 percent of Rs. 50,000 is exactly Rs. 10,000, so the figures balance. Of the Rs. 50,000 total deposits, Rs. 10,000 is the original primary deposit and Rs. 40,000 is credit (derivative deposits) created by the banks' lending. The banking system has therefore created Rs. 40,000 of new money out of an initial deposit of Rs. 10,000.

The Deposit Multiplier: Derivation

The simple deposit multiplier is the reciprocal of the reserve ratio. If r is the reserve ratio, an initial increase in reserves of ΔR supports a total increase in deposits of ΔD = ΔR / r, so the multiplier is 1/r. With r = 0.20 the multiplier is 5, and Rs. 10,000 of new reserves support Rs. 50,000 of deposits, as the example showed. If the reserve ratio were 10 percent, the multiplier would be 10; if it were 25 percent, the multiplier would be only 4. This is why raising the reserve requirement is such a powerful anti-inflationary weapon and lowering it such a powerful expansionary one: the central bank changes r, and the whole multiple adjusts.

In reality the link between reserves and the money supply is expressed through the money multiplier, which also takes account of the behaviour of the public and the banks. If the public holds part of every increase in money as currency (the currency–deposit ratio, c) and the banks hold excess reserves over and above the legal requirement (the excess reserve ratio, e), the multiplier for the money supply becomes (1 + c) / (c + r + e). Because c and e are positive, this real-world multiplier is smaller and less stable than the simple 1/r. It also explains why the money supply is not fully under the central bank's control: the central bank supplies the base, but the size of the multiplier depends on decisions taken by thousands of bankers and millions of depositors.

Assumptions of the Simple Process

- A fixed and uniform reserve ratio applies to all banks and all deposits, and banks hold no excess reserves — they lend out everything they legally can.
- There is no cash leakage: every rupee lent is spent and redeposited in full in some bank, and the public does not increase its holdings of currency.

- There is an unlimited demand for loans from creditworthy borrowers, and banks are always willing to lend; the process is not held back by a shortage of good projects or by fear of default.
- All banks operate together as a system, cheques are cleared promptly, and there are no leakages abroad or into non-bank institutions.

Limitations of Money Creation in Practice

Each assumption points to a real limitation. First, cash leakage: if the public keeps part of its money in notes and coins — very common in Pakistan, where a large informal economy deals in cash — that part never returns to the banks and cannot be multiplied. Second, excess reserves: in uncertain times banks prefer safety and liquidity, hold reserves above the legal minimum, and the multiplier shrinks; this happened in many countries after the 2008 financial crisis, when huge increases in the monetary base produced little extra lending. Third, the demand for credit matters as much as its supply. Banks cannot force loans on unwilling borrowers; in a recession businesses postpone investment, households avoid debt, and money creation stalls however many reserves the central bank provides — the situation Keynes described as pushing on a string.

Fourth, the central bank itself sets the outer limit. It controls the monetary base through open market operations, refinancing facilities and its policy rate, and it fixes the minimum reserve ratio; banks can create money only on the foundation the central bank provides, and the central bank can always contract that foundation. Fifth, prudential rules beyond the reserve ratio — capital adequacy requirements, liquidity coverage rules and credit assessment standards — limit how far a bank can expand its balance sheet safely. Finally, the quality of

borrowers matters: money creation through bad lending ends in non-performing loans, which destroy bank capital and reverse the process. Sound money creation is therefore credit creation against real, productive activity, not lending without limit.

Conclusion

To conclude, the money creation process is the multiple expansion of bank deposits on the basis of reserves. A single bank can lend only its excess reserves, because its loans are cleared through other banks; but what one bank loses another gains, so the banking system as a whole expands deposits until the initial reserves are fully absorbed, by a multiple equal to 1/r in the simplest case — Rs. 10,000 of new reserves becoming Rs. 50,000 of deposits and Rs. 40,000 of created credit at a 20 per cent reserve ratio. The central bank governs the process from outside by controlling the monetary base and the reserve ratio, while cash leakages, excess reserves and the public's demand for loans determine how completely the theoretical multiplier is realised in practice.

Question 2: Tobin's Optimum Portfolio Theory (20 Marks)

Discuss Tobin's optimum portfolio theory in detail.

Introduction

James Tobin of Yale University presented his optimum portfolio theory in his famous 1958 paper “Liquidity Preference as Behaviour Towards Risk”. The theory explains how a wealth-holder divides his wealth between money, which is safe but earns nothing, and bonds (or other risky assets), which earn interest but whose capital value can fall. In doing so Tobin rebuilt Keynes's speculative demand for money on stronger foundations, replacing Keynes's all-or-nothing gamble with a realistic picture of a cautious investor who diversifies — who holds both

money and bonds at the same time and adjusts the proportions gradually as the rate of interest changes. Because the same framework later grew, in the hands of Tobin and Markowitz, into modern portfolio and capital-asset theory, it is a landmark in monetary economics.

This answer first sets out the problem Tobin inherited from Keynes and the weakness he identified in it. It then explains his assumptions about risk and return, his use of indifference curves and the opportunity (budget) line, and how the optimum portfolio is found at their tangency. The effect of a change in the rate of interest, and of a change in wealth, is analysed, the theory's implications for the liquidity trap and for monetary policy are drawn out, and a critical appraisal concludes the answer.

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The Problem: Keynes's Speculative Motive and Its Weakness

Keynes had argued that people hold speculative balances because they expect the rate of interest to change. If a wealth-holder expects interest rates to rise, bond prices will fall, so he holds all his wealth in money to avoid a capital loss; if he expects rates to fall, he holds all of it in bonds to enjoy a capital gain. Only at one critical expected rate is he indifferent. Keynes's demand for money therefore depended on each person's expectations, and for the individual it was a corner solution — everything in money or everything in bonds.

Tobin objected that this does not match observed behaviour. Real wealth-holders diversify: the same person commonly holds a bank deposit, some savings certificates and some shares at once. Nor do people need definite expectations about future interest rates in order to hold money; they hold money simply because bonds are risky and they dislike risk. Tobin's insight was that the demand for money can be explained by risk aversion alone, without assuming that every investor is a confident speculator with a precise forecast. This makes the theory more

general: Keynes's case becomes a special one within Tobin's framework rather than the whole story.

Assumptions of the Theory

- The investor divides a given amount of wealth between two assets only: money (cash and deposits), whose nominal value is certain and whose return is zero, and consols — perpetual bonds — which pay a fixed coupon but whose market price varies inversely with the rate of interest, so their total return is uncertain.
- The investor is risk-averse: he likes expected return but dislikes risk, and he will accept extra risk only if he is compensated by a sufficiently higher expected return.
- The return on the portfolio is described by two statistics: its expected value (mean) and its risk, measured by the standard deviation of the return. The investor chooses the portfolio that gives him the highest utility in terms of these two.
- The investor does not need a precise point forecast of the future interest rate; he works with a probability distribution of possible capital gains and losses on bonds, centred on the current rate.

Risk, Return and the Opportunity Line

Money contributes safety but no return; bonds contribute return but also all the risk of the portfolio. If the whole wealth is held in money, both the expected return and the risk are zero — this is point A in the figure. If the whole wealth is held in bonds, the expected return is the yield on bonds and the risk is at its maximum — point B. Any mixture lies on the straight line joining A and B, called the opportunity line or budget line. Moving along it from A towards B, the investor takes on more bonds, and both expected return and risk rise in the same

proportion: if he puts half his wealth in bonds, he gets half the maximum return and bears half the maximum risk. The slope of the opportunity line shows the terms on which the market lets him exchange risk for return, and it becomes steeper when the rate of interest is higher, because each unit of risk then carries a larger reward.

Against this line the investor's tastes are drawn as indifference curves in the same risk–return diagram. Each curve joins combinations of risk and expected return that give the investor equal satisfaction. The curves slope upwards, because more risk must be compensated by more return, and they become steeper as risk increases, because a risk-averse person demands ever larger compensation for each extra unit of risk. Curves farther from the risk axis represent higher satisfaction: everyone would prefer more return for the same risk if he could get it.

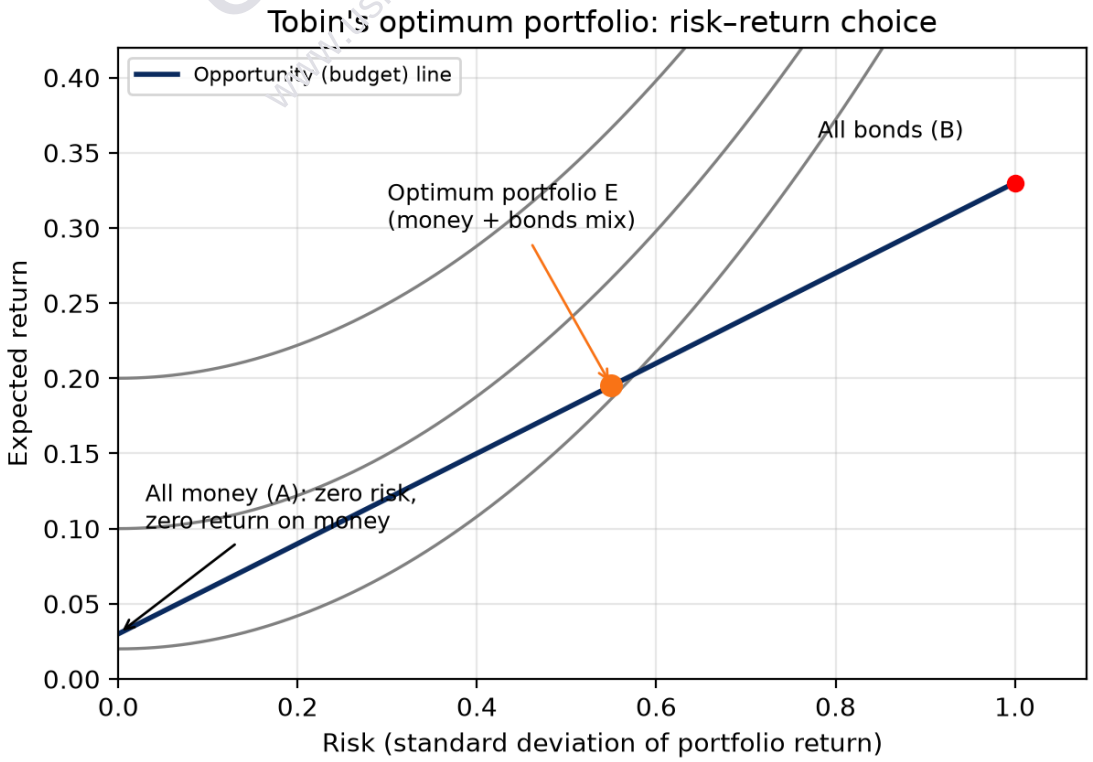


Figure 1: Tobin's optimum portfolio. The investor maximises satisfaction at E, where the opportunity line AB is tangent to the highest attainable indifference curve; he holds part of his wealth in money and part in bonds.

Determination of the Optimum Portfolio

The optimum portfolio is the point where the opportunity line is tangent to the highest indifference curve the investor can reach — point E in the figure. At E the investor holds a definite proportion of his wealth in money and the remainder in bonds. He will not move to the right of E, because the extra return would not compensate him for the extra risk on any higher point of the line; he will not stay to the left, because by accepting a little more risk he could reach a higher indifference curve and greater satisfaction. The tangency therefore balances, at the margin, the investor's dislike of risk against the reward the market offers for bearing it.

This single result transforms the theory of money demand. Because the optimum is normally an interior point, diversification is explained rather than assumed away: holding money and bonds together is rational, not inconsistent. The amount of money held is the residual of a considered portfolio decision, and it varies continuously with the rate of interest and with wealth, instead of jumping suddenly from all-money to all-bonds when expectations cross a critical point. Aggregating over many investors with different degrees of risk aversion, Tobin obtains a smooth, downward-sloping speculative (asset) demand curve for money of exactly the shape Keynes needed for his liquidity preference theory, but derived from risk behaviour rather than from rigid expectations.

Effects of Changes in Interest Rates and Wealth

When the rate of interest rises, two things happen. First, the opportunity line becomes steeper: each unit of risk now earns a bigger reward, so the investor is tempted to hold more bonds and less money — this is the substitution effect, and it works in the direction Keynes described. Second, the investor's expected total return is higher at every portfolio, which makes him feel better off and may tempt him either to enjoy more safety (holding more money) or to take more risk; this income effect can work either way. For the typical risk-averse investor Tobin showed that the substitution effect normally dominates at low rates of interest, so the demand for money falls as the interest rate rises, but the theory honestly allows the possibility that at very high rates the demand for money could even rise, something Keynes's theory could never produce.

An increase in wealth, with the rate of interest unchanged, shifts the investor to larger absolute holdings of both assets if both are normal goods: a richer man holds more money for transactions and safety and more bonds for return, although the proportions depend on how his risk aversion changes with wealth. Tobin also showed how the analysis extends naturally to many risky assets: once several securities are available, the optimum involves choosing first the best combination of risky assets and then dividing wealth between that combination and money — the celebrated separation or two-fund theorem that underlies the capital asset pricing model.

Implications for the Liquidity Trap and Monetary Policy

Tobin's theory softens Keynes's liquidity trap. In Keynes's version, at some very low rate of interest the speculative demand for money becomes perfectly elastic, because everyone

expects rates to rise and refuses bonds altogether, so monetary policy loses all power. In Tobin's world, even at a low rate some investors will still hold bonds, because they are less risk-averse than others or judge the small return worth the small risk; the aggregate demand curve for money approaches the axis gradually rather than suddenly becoming horizontal. Monetary expansion therefore retains some effect, though it may be weak. Conversely, the theory also shows why very large open market operations may be needed near the trap: the central bank must offer the public increasingly attractive terms to persuade cautious holders to exchange money for securities.

Critical Appraisal

The theory's strengths are considerable. It explains diversification, gives the demand for money a microeconomic foundation in rational choice under uncertainty, frees the analysis from dependence on a single expected interest rate, and founded modern portfolio theory, for which Tobin received the Nobel Prize in 1981. Its limitations are also real. It considers only two assets, money and consols, whereas real portfolios contain shares, property, foreign assets and many maturities of debt; measuring risk by the standard deviation assumes investors care only about the mean and variance of returns, which is exact only under special assumptions about tastes or distributions; it takes the transactions demand for money as given and analyses only the asset margin; and like Keynes's theory it works with a given expected distribution, whereas in crises expectations and perceived risk themselves shift violently — indeed, a modern reading stresses that in panics the indifference map and the perceived risk of bonds both change, so money demand can surge even at unchanged interest rates. Extensions to many assets, and the

related portfolio theories of Baumol and Miller–Orr for transactions balances, have answered part of this criticism.

Conclusion

To conclude, Tobin's optimum portfolio theory explains the holding of money as the result of a rational balance between return and risk. The investor compares the market's terms, shown by the opportunity line, with his own attitude to risk, shown by his indifference curves, and chooses the tangency portfolio — normally a mixture of safe money and risky bonds. A higher rate of interest steepens the opportunity line and, through the dominant substitution effect, reduces the optimum holding of money, generating Keynes's downward-sloping liquidity preference curve from more realistic assumptions, while a lower rate increases money holding without necessarily producing an absolute liquidity trap. The theory remains the standard micro-foundation for the asset demand for money and the starting point of all modern portfolio analysis.

Question 3: Classical and Keynesian Theories of Interest Rates (20 Marks)

Compare and contrast the classical and Keynesian theories of interest rates.

Introduction

The rate of interest is the price paid for the use of funds, and few prices matter more: it influences saving, investment, the demand for money and the whole level of economic activity. Two great traditions explain how this price is determined. The classical economists treated interest as a real phenomenon, determined in the market for saving and investment by productivity and thrift. Keynes, writing in the unemployment of the 1930s, treated it as a

monetary phenomenon, determined in the money market by liquidity preference and the quantity of money. The contrast between the two theories is not a minor technical dispute; it reflects two different views of how a capitalist economy works, of whether money matters, and of what policy can achieve. This answer explains each theory, draws the comparison out systematically in a table, notes the genuine points of similarity, and ends with the later attempts — the loanable funds theory and the IS–LM synthesis — to combine the insights of both.

The Classical Theory of Interest

In the classical system, developed by economists such as Marshall, Fisher, Böhm-Bawerk and Wicksell, interest is the price that equalises the demand for capital with the supply of saving. Households save part of their income, and their willingness to save increases with the rate of interest, because a higher rate is a greater reward for postponing consumption; the saving curve therefore slopes upward. Firms demand funds in order to invest in capital goods, and they invest up to the point where the marginal productivity of capital equals the rate of interest; since the marginal productivity of capital diminishes as more is employed, the investment curve slopes downward. The equilibrium rate of interest is found where the two curves intersect, as in panel (a) of the figure.

Three features define the classical view. First, interest is a real variable: it is determined by real forces — the productivity of capital on one side and the community's thrift or time preference on the other. Money does not enter the determination at all, except as a veil that fixes the absolute price level through the quantity theory. Second, the mechanism is self-equilibrating at full employment. If saving exceeds investment, the rate of interest falls, discouraging saving and

encouraging investment until the two are equal again; the classical theory thus underpins Say's law, because whatever is saved is automatically invested. Third, saving and investment are both assumed to respond significantly to the rate of interest, so the rate acts as the flexible price that keeps planned leakages and injections in balance. A change in thrift shifts the saving curve and changes the rate; a wave of inventions shifts the investment curve and also changes it; in both cases the economy returns to full employment at the new rate.

Keynes's Liquidity Preference Theory

Keynes rejected this account in The General Theory (1936). Interest, he argued, is not the reward for saving or waiting; a man who hoards his saving in cash saves just as much but earns no interest at all. Interest is the reward for parting with liquidity for a stated period — the price that equalises the desire to hold wealth in liquid form with the available quantity of money. The demand for money, or liquidity preference, has three motives: the transactions motive and the precautionary motive, which depend mainly on income, and the speculative motive, which depends negatively on the rate of interest, because a low rate means high bond prices, an expectation that prices will fall, and little income to compensate for the risk of a capital loss. Adding the three motives gives a downward-sloping demand curve for money, shown in panel (b) of the figure.

The supply of money, in Keynes's simplified treatment, is fixed by the monetary authority and drawn as a vertical line. The rate of interest is determined where the liquidity preference curve meets this money supply: it is the price at which the public is just willing to hold, rather than spend or invest, the quantity of money that exists. If the central bank increases the money supply, the rate falls, provided liquidity preference is unchanged; if an increase in income raises

transactions demand, or a wave of pessimism raises speculative demand, the rate rises for a given money supply. At a very low rate the liquidity preference curve becomes flat — the liquidity trap — because everyone prefers cash to bonds whose price is expected to fall, and further increases in money are simply hoarded without reducing the rate any further.

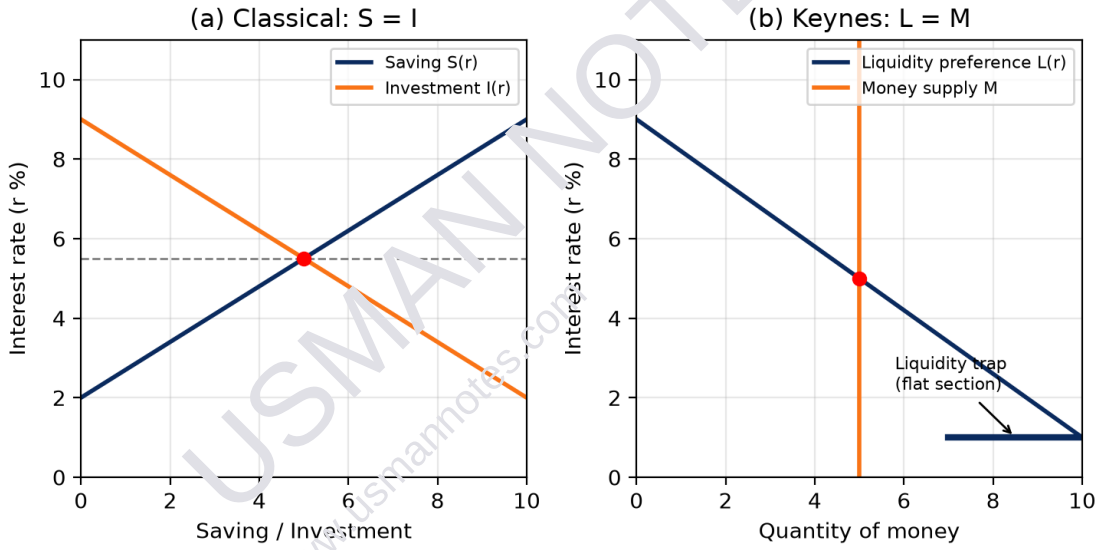


Figure 1: (a) Classical determination of interest by saving and investment; (b) Keynesian determination by liquidity preference and the money supply, with the flat liquidity-trap section at low rates.

Comparison of the Two Theories

Table 1: Classical and Keynesian theories of interest compared

Point of comparison	Classical theory	Keynesian theory
Nature of interest	A real phenomenon; the price of capital / reward for abstinence and waiting	A monetary phenomenon; the reward for parting with liquidity
Determined by	Saving (supply) and investment (demand) for capital	Liquidity preference (demand for money) and the quantity of money (supply)
Key underlying forces	Productivity of capital and thrift (time preference)	Expectations, the speculative motive and central bank policy
Role of money	Neutral; money determines only	Central; changes in money supply

	the price level (classical dichotomy)	change the interest rate and real activity
View of saving	Saving depends positively on the rate of interest and precedes investment	Saving depends mainly on income; saving and investment are equalised by changes in income, not by the rate
Employment assumption	Full employment; interest keeps the economy there automatically	Underemployment equilibrium is possible and normal
Curve behaviour	Saving upward-sloping, investment downward-sloping in the rate	Money demand downward-sloping in the rate, becoming flat in the liquidity trap; money supply vertical
Effect of more thrift	Lowers the rate and raises investment	May lower income through the paradox of thrift without lowering the rate
Policy implication	No monetary role in real outcomes; leave markets free	Central bank can lower the rate by expanding money, though the trap and weak investment response may require fiscal policy
Time emphasis	Long-run equilibrium of a growing economy	Short-run determination under uncertainty and unemployment

The deepest contrast is over what does the adjusting when plans clash. Suppose households decide to save more. In the classical story the interest rate falls and investment rises by the same amount, so total demand is maintained. In Keynes's story the attempt to save more reduces consumption, which reduces income, which reduces saving itself until saving again equals the (unchanged) investment — the paradox of thrift — while the interest rate, being set in the money market, may not move at all. Similarly, an increase in investment raises income and therefore saving in Keynes's system through the multiplier, whereas in the classical system it raises the interest rate and crowds out other spending. The two theories thus give opposite

accounts of causation even though both end with saving equal to investment in equilibrium: for the classics the rate of interest does the equalising, for Keynes the level of income does.

Points of Similarity

Despite these contrasts, the theories share important ground. Both treat the rate of interest as a price formed by the interaction of a demand side and a supply side, and both agree that, other things equal, a greater desire to invest or a smaller desire to save is associated with a higher rate, while abundant funds are associated with a lower rate. Both also recognise, implicitly or explicitly, that expectations about the future influence present decisions — in Fisher's classical analysis through expected inflation, in Keynes's through expected bond prices. Finally, both theories are partial: the classical ignores the money market, Keynes's early presentation ignores the effect of income on money demand within the determination itself, a gap his followers had to repair.

Criticism and Synthesis

Keynes criticised the classical theory as indeterminate: the saving curve shifts whenever income changes, and since income itself depends on investment, which depends on the rate, the classical apparatus tries to determine the rate using a curve that cannot be drawn until the rate is already known. Classicists replied that Keynes's theory is equally partial: his liquidity preference curve shifts with income, so it too presupposes a variable it claims to determine. The loanable funds theory of Ohlin and Robertson tried to absorb both by defining the supply of funds as saving plus new money and bank credit, and the demand as investment plus hoarding, making interest the price in the market for credit as a whole. Hicks's IS–LM model completed the synthesis: interest and income are determined jointly, the IS curve representing the

classical goods-market relation and the LM curve the Keynesian money-market relation, so that each older theory appears as one half of a general system.

Conclusion

To conclude, the classical theory makes interest a real price determined by productivity and thrift where saving meets investment, guarantees full employment, and leaves money neutral; the Keynesian theory makes interest a monetary price determined where liquidity preference meets the quantity of money, permits underemployment equilibrium, and gives the central bank real influence, limited by the liquidity trap. They agree that interest balances a demand and a supply of funds but disagree fundamentally about which market matters, what adjusts to restore equilibrium, and whether money is a veil or an active force. Modern macroeconomics, through loanable funds analysis and the IS–LM framework, retains both insights: real forces govern interest in the long run, while money and liquidity preference can dominate it in the short run.

Question 4: Explanation and Derivation of the LM Curve (20 Marks)

Explain and derive the LM curve.

Introduction

The LM curve is one of the two pillars of the IS–LM model constructed by John Hicks (1937) and Alvin Hansen to organise Keynes's theory. “LM” stands for liquidity preference equals money supply. The curve shows every combination of the rate of interest and the level of real income at which the money market is in equilibrium — at which the quantity of real money balances people wish to hold is exactly equal to the quantity the banking system, under the central bank, actually supplies. Points on the curve are not isolated curiosities; the whole curve is the menu

of positions from which the economy can choose only jointly with the goods-market (IS) condition. This answer explains the meaning of money-market equilibrium, derives the LM curve step by step using the money demand and money supply diagram, derives it algebraically, and then examines its slope, its special flat and steep regions, the shifts produced by monetary changes, and its usefulness and limitations.

Money-Market Equilibrium: The Building Blocks

The demand for real money balances, following Keynes, has two components. Transactions and precautionary demand rises with real income: richer economies make more payments and hold larger working balances, so this component can be written as kY, where k is the fraction of income held as money. Speculative (asset) demand falls with the rate of interest, because the interest forgone is the opportunity cost of holding money and because low rates raise fears of capital loss on bonds; it can be written as −hr, where h measures how sensitive money demand is to the interest rate. Total real money demand is therefore L = kY − hr. The supply of real money balances is M/P, the nominal money stock set by the central bank divided by the price level. Money-market equilibrium requires M/P = kY − hr.

This single equation contains the whole logic of the LM curve. Suppose income rises. Transactions demand increases, so at the unchanged money supply there is an excess demand for money. People obtain money by selling bonds; bond prices fall and the rate of interest rises. The higher rate chokes off speculative demand until demand again equals supply. Hence higher income is associated with a higher equilibrium interest rate: that is why the LM curve slopes upwards, and it is the relationship we now derive graphically.

Graphical Derivation of the LM Curve

Panel (a) of the figure draws the money market with real balances on the horizontal axis and the rate of interest on the vertical axis. The real money supply is a vertical line at M/P, because in the short run the central bank fixes the nominal stock and prices are taken as given. At the initial income Y1 the money demand curve L(Y1) intersects the supply line at E1, giving the equilibrium rate r1. Now let income rise to Y2. The whole money demand curve shifts to the right, to L(Y2), because at every interest rate people need larger transactions balances. With the supply unchanged, equilibrium moves to E2 and the rate rises to r2. Panel (b) transfers these results to income–interest space: the pair (Y1, r1) is plotted as one point and the pair (Y2, r2) as another, and joining all such pairs for every possible income produces the upward-sloping LM curve. Every point on it is a money-market equilibrium; points to the right of it represent an excess demand for money (income is too high for that interest rate), and points to the left an excess supply of money, which people would use to buy bonds, pushing rates down.

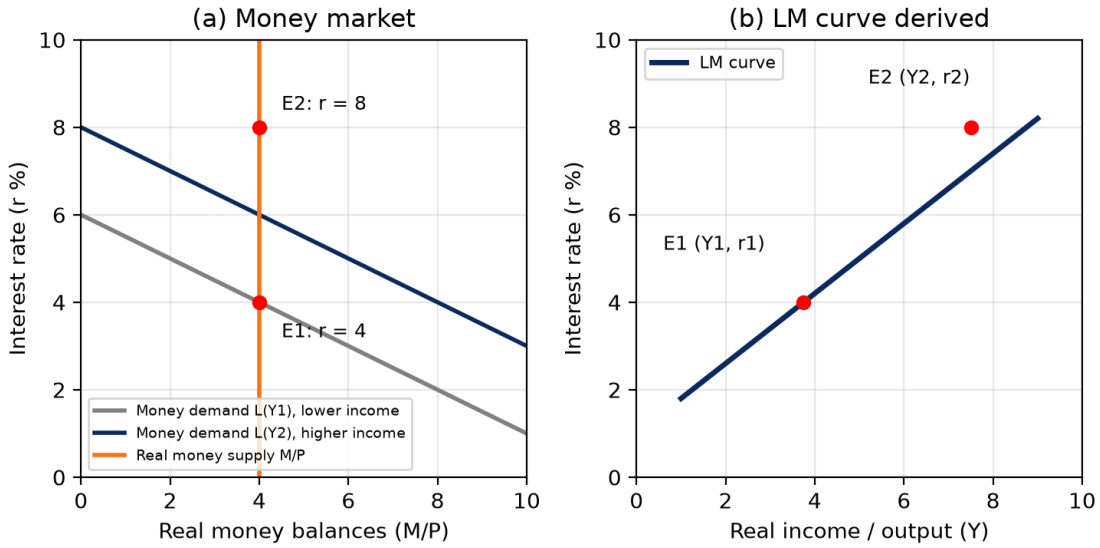


Figure 1: Derivation of the LM curve. In panel (a) a rise in income shifts money demand from L(Y1) to L(Y2) and raises the equilibrium rate from r1 to r2 at the fixed real money supply. Panel (b) plots the resulting (Y, r) pairs as the upward-sloping LM curve.

Algebraic Derivation

Starting from equilibrium, M/P = kY − hr. Solving for the rate of interest gives the equation of the LM curve: r = (k/h)Y − (1/h)(M/P). A numerical example makes the process concrete. Let k = 0.5, h = 10, and the real money supply M/P = 200. Then the LM equation is r = 0.05Y − 20. When income is 500, the equilibrium rate is 0.05 × 500 − 20 = 5 percent; when income rises to 700, the rate is 0.05 × 700 − 20 = 15 percent. In this deliberately simple illustration — the direction, not the size, is the point: higher income requires a higher rate to keep money demand equal to the fixed supply. If instead the central bank raises the real money supply to 300, the equation becomes r = 0.05Y − 30, and at income 700 the equilibrium rate falls to 5 percent: monetary expansion shifts the whole LM curve to the right (downward), exactly as the formula predicts, since the intercept term −(1/h)(M/P) becomes more negative.

Slope of the LM Curve and Its Special Regions

The slope of the LM curve is k/h. It is steep when money demand is very responsive to income (large k) or very unresponsive to the interest rate (small h), because a small rise in income then creates a large excess demand for money that only a big rise in the rate can remove. It is flat when money demand is highly interest-sensitive (large h), because a tiny rise in the rate releases enough speculative balances to finance the extra transactions demand. Two limiting regions, both taken from Keynes, are of special importance.

- The Keynesian (liquidity trap) region: at very low interest rates money demand becomes almost perfectly interest-elastic (h tends to infinity), so the LM curve is horizontal. Monetary expansion is absorbed into idle balances and cannot lower the rate further; monetary policy is powerless and fiscal policy works at full multiplier strength because it causes no crowding out.
- The classical region: at high interest rates speculative demand shrinks to nothing and money is held only for transactions, so money demand is interest-inelastic (h tends to zero) and the LM curve is vertical. Now fiscal expansion only raises the rate and crowds out private spending completely, while monetary policy has its maximum effect on income — the quantity-theory result reappearing as a special case.
- The intermediate region: between the two extremes the LM curve has its normal upward slope, and both monetary and fiscal policy are partly effective — the standard textbook case.

Shifts of the LM Curve

Anything that changes money-market equilibrium at a given income and interest rate shifts the whole curve. An increase in the nominal money supply, or a fall in the price level, raises real balances M/P and shifts LM to the right: the same income can now be supported at a lower interest rate. A decrease in money supply or a rise in prices shifts it to the left. Changes in money demand itself also shift the curve: a wave of financial uncertainty that raises liquidity preference at every income shifts LM to the left (higher rates are needed), while financial innovations such as mobile and internet banking, which economise on money holdings, reduce k and shift LM to the right and make it flatter. In Pakistan, the spread of digital payment

systems such as Raast and mobile wallets is a real-world example of such an innovation-driven fall in the demand for cash balances relative to income, though a large cash-based informal sector keeps k higher than in advanced economies.

Use and Limitations of the LM Curve

Used with the IS curve, the LM curve determines the equilibrium interest rate and income simultaneously and organises a great deal of policy analysis: the relative slopes of the curves explain when fiscal or monetary policy will be powerful, what crowding out means, and how the economy responds to money-supply changes. Its limitations should also be recognised. It assumes a fixed price level, so it describes the short run only; modern central banks, including the State Bank of Pakistan, set a short-term interest rate rather than a quantity of money, which in practice makes the relevant LM relation horizontal at the chosen policy rate until the bank changes it; and the stability of money demand, on which a tidy LM curve depends, has been disturbed in many countries by financial innovation — the criticism that led economists to the modern interest-rate-rule version of the model.

Conclusion

To conclude, the LM curve is the locus of income and interest-rate combinations that keep the money market in equilibrium, M/P = L(Y, r). It is derived by letting income shift the money demand curve against a fixed real money supply and recording the resulting equilibrium interest rates; algebraically it is r = (k/h)Y − (1/h)(M/P). It slopes upwards because higher income raises transactions demand and therefore the rate, is flat in the liquidity-trap region and vertical in the classical region, and shifts right with monetary expansion or falling prices and

left with monetary contraction, rising prices or increased liquidity preference. Together with the IS curve it remains the standard short-run framework for analysing monetary policy.

Question 5: The Role of Money in the Keynesian System (20 Marks)

Discuss in detail the role of money in the Keynesian System.

Introduction

In classical economics money was a veil: it fixed the price level and facilitated exchange, but real output, employment and the rate of interest were determined behind it by real forces, a separation known as the classical dichotomy. Keynes's General Theory (1936) tore down that separation. In the Keynesian system money is an active, powerful and sometimes dangerous force. It enters the determination of the rate of interest through liquidity preference; through the rate of interest it influences investment; through investment and the multiplier it governs income, output and employment; and through the liquidity trap it can also fail, leaving a depressed economy stuck with idle money and idle men side by side. Keynes himself said that his theory was a monetary theory of production — an economy in which money affects real decisions from the start, because contracts, debts and wages are fixed in money terms and because the future is uncertain. This answer traces the role of money through the Keynesian system step by step: in the theory of interest, in the transmission mechanism to output and employment, in the theory of prices, in the liquidity trap and the resulting case for fiscal policy, and in the reformulations that followed.

Money and the Rate of Interest: Liquidity Preference

The first place where money does real work in Keynes's system is the determination of the rate of interest. People demand money for transactions and precautionary reasons, which depend

on income, and for the speculative reason, which depends on the rate of interest and on expectations of future bond prices. Interest is the reward for parting with liquidity. Given liquidity preference, the quantity of money fixed by the central bank determines the rate: expand the money supply and, at first, the rate falls. This is a direct denial of the classical position that money cannot influence a real variable like the rate of interest. It also makes expectations central: because speculative demand rests on what people believe about future rates, a loss of confidence raises liquidity preference, raises the rate for a given money supply, and can tighten financial conditions without the central bank doing anything — an early recognition of how financial sentiment drives business cycles.

The Transmission Mechanism: From Money to Employment

The second role of money is as the starting link in the chain by which policy reaches the real economy. The Keynesian transmission mechanism runs: increase in money supply → fall in the rate of interest → rise in investment, as projects whose marginal efficiency of capital exceeds the lower rate become profitable → rise in income, output and employment through the multiplier, as investment spending becomes wages and profits that are partly re-spent → possibly some rise in prices as bottlenecks are approached. Money therefore affects employment indirectly but genuinely: unemployment in Keynes is not caused by wages being too high in some simple sense; it can persist because the money and financial system, through a high rate of interest or a collapse of investment expectations, holds effective demand below the full-employment level.

Every link of this chain can weaken, and Keynes insisted on the weak points. The demand for money may absorb the extra supply without letting the rate fall (the liquidity trap, discussed

below). Investment may respond little to a cheaper rate when expectations are depressed — the marginal efficiency of capital is governed by long-term expectations and "animal spirits", and in a slump a fall in the rate from, say, 5 to 4 percent will not persuade a businessman to build a factory he expects to stand idle. And even successful investment raises prices before it reaches full employment if supply bottlenecks appear. The role of money in Keynes is therefore real but unreliable, which is precisely why his policy conclusions differ from those of the monetarists who came later.

Money, Prices and Wages in the Keynesian System

Keynes replaced the simple quantity theory with an indirect theory of prices. An increase in money does not raise prices in proportion, dollar for dollar. It first lowers the interest rate and raises demand and output; prices rise only to the extent that rising demand meets diminishing returns, rising marginal costs and sectoral bottlenecks — what Keynes called semi-inflation — until full employment is reached. Only beyond full employment does extra money produce "true inflation", raising prices without raising output. Money wages are also part of the story: Keynes argued that money wages are sticky downward because workers resist cuts in relative wages and because contracts are written in money, and that a general money-wage cut would in any case be a clumsy cure, since it would reduce workers' spending, raise the real burden of debts and depress expectations. This money-wage rigidity is one reason the economy can rest at an underemployment equilibrium instead of automatically correcting itself.

The Liquidity Trap and the Limits of Monetary Policy

The most famous role Keynes assigned to money is a negative one: money can be hoarded. When the rate of interest has fallen to a very low level, bond prices are so high and the

prospective capital loss so feared that everyone prefers cash; the speculative demand for money becomes perfectly elastic, and extra money created by the central bank simply disappears into idle balances. The interest rate cannot be pushed lower, investment is not stimulated, and monetary policy is “pushing on a string”. This is the analytical basis of Keynes's preference, in deep depression, for fiscal policy — direct government spending and tax changes, which raise demand without depending on the interest-rate link — and of his striking proposals for the “socialisation of investment” and permanently cheap money to bring the rate low enough to secure full employment. The trap also explains unemployment as a monetary phenomenon in a deeper sense: it is the desire to hold a sterile asset, money, instead of demanding the products of industry, that leaves resources unemployed.

Money, Uncertainty and Financial Fragility

Behind these mechanisms lies Keynes's deepest point: money matters because the future is uncertain and money is the asset that carries purchasing power safely through time. In a world of certainty, nobody would hold a barren asset when productive assets exist. Because the future cannot be calculated, holding money is a rational response to fear, and shifts in confidence therefore shift liquidity preference, interest rates, investment and employment together. Later Keynesians such as Hyman Minsky developed this into the financial instability hypothesis: periods of calm encourage more debt and riskier finance, making the economy fragile, so that the monetary and financial structure itself generates cycles. Modern central banking after 2008 — quantitative easing, forward guidance and lender-of-last-resort action on a huge scale — is unintelligible without this Keynesian understanding that managing money and liquidity is managing the real economy in a crisis.

Assessment: How Later Economists Treated Keynes on Money

Subsequent schools repositioned rather than removed money in the Keynesian scheme. The neoclassical synthesis kept Keynes's short run but restored a more classical long run; monetarists under Friedman accused Keynesians of neglecting money, arguing that money growth is the dominant cause of both inflation and cycles; New Keynesians restored money's role through interest-rate rules, credit channels and sticky prices, showing how central bank rates affect demand even when money demand is unstable. In today's practice the quantity of money is rarely the operating target, yet every element of that practice — cutting rates in recessions, expanding central bank balance sheets when rates reach zero, watching credit conditions — descends from the Keynesian insight that money and finance are not a veil. For a country like Pakistan the lesson is symmetrical: monetary expansion cannot by itself create real growth when investment expectations, energy supply and fiscal deficits are the binding constraints, but monetary disorder — high inflation and unstable interest rates — can reliably destroy it.

Conclusion

To conclude, money in the Keynesian system is anything but neutral. Through liquidity preference it determines the rate of interest; through the interest rate and the marginal efficiency of capital it influences investment; through the multiplier it helps determine income, output, employment and, indirectly, prices; through money-wage rigidity and debt contracts it blocks the automatic self-correction the classics relied on; and through the liquidity trap it sets the limits of monetary policy and makes the case for fiscal action in depression. Money is, in Keynes's phrase, the link between the present and the future — and because that link is held by

fallible, uncertain human beings, the economy it governs can settle below full employment and stay there. That is the essential role of money in Keynes, and it permanently changed macroeconomics.

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