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Paper: Intermediate Macroeconomics-I

Course: B. A.(Hons.) Economics II Year

Year: 2024

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Paper : **EC0N008:** Intermediate Macroeconomics–I
(Foundations of Aggregate Income Determination)

Course : B.A. (Hons.) Economics II Year

Duration : 3 Hours Maximum Marks : 90

Semester–3
Dec./Jan.
2023–24

The questions paper is divided into three sections.

SECTION A

(Questions 1 is compulsory) 15×2=30

Q. 1. (i) Assume that the economy is closed (i.e. no import or export). There is a decrease in taxes. What happens to interest rate in Medium Run due to the Labour Market?

(a) Increase

(b) Decrease

(c) Unchanged

(d) Indeterminate

(ii) The permanent income of a consumer in Friedman's model of consumption is

(a) Present value of her income/interest rate

(b) Present value of her income X interest rate

(c) Interest rate/ Present value of her income

(d) None of the above

(iii) Which of the following event increases natural rate of unemployment?

(a) Decrease in Government Spending

(b) Increase in Real Money Supply

(c) Decrease in competition amongst firms

(d) Weakening of Labor Union

(iv) Assume that expected inflation follows $\pi_1 = \pi_{1-1}$. What inflation level is consistent with the government maintaining output below the natural level?

(a) Positive Inflation

(b) Negative Inflation

(c) Zero Inflation

(d) All of the above

(v) Which of the following variables will change in the long run in response to a demand shock if prices are able to adjust fully?

(a) Unemployment

(b) Output and unemployment

(c) Price level

(d) None of the above

(vi) The life cycle hypothesis implies that in a growing economy with increasing social security benefits for old-age people may

(a) Increase gross private savings

(b) Reduce gross private savings

(c) Increase gross government savings

(d) Increase aggregate savings

(vii) What happens to the short-run Aggregate Supply curve as the money wage rate rises?

(a) the short-run aggregate supply curve shifts rightward.

(b) the short-run aggregate supply curve shifts leftward.

(c) the long-run aggregate supply curve shifts rightward.

(d) both the long-run aggregate supply curve and the short-run aggregate supply curve shift leftward.

(viii) According to the pipeline theory, inventory investment is

(a) Countercyclical

(b) Procyclical

(c) Both (a) and (b)

(d) Constant overtime

(ix) Which of the following best explains how an economy could simultaneously experience high inflation and high unemployment?

(a) The government increases spending without increasing taxes.

(b) Inflationary expectations decline.

(c) Women and teenagers stay out of the labor force.

(d) Negative supply shocks cause factor prices to increase.

(x) According to Friedman the covariance between current consumption and transitory income is

(a) Greater than zero

(b) Less than zero

(c) Equal to zero

(d) Equal to 1

(xi) The modified Phillips curve tells us that the only way to reduce inflation is through

(a) unemployment rates higher than the natural rate

(b) expansionary fiscal policy

(c) unemployment rates lower than the natural rate

(d) contractionary fiscal policy

(xii) The natural rate of unemployment depends on all of the following except :

(a) The level of unemployment insurance

(b) The mark-up

(c) The bargainiyng power of workers with firms

(d) Money supply

(xiii) In terms of the Phillips Curve, wage indexation results in

(a) a weaker/flatter relationship between unemployment and changes in inflation.

(b) no effect on the relationship between unemployment and changes in inflation.

(c) a stronger/steeper relationship between unemployment and changes in inflation.

(d) an ambiguous effect that depends on the mark-up of firms.

(xiv) The stagnation thesis formed around 1940 was based on the ground that

(a) If the marginal propensity to consume (MPC) < average propensity to consume (APC) is accepted, then government expenditure share to GDP (g/y) must be increasing with GDP (y) to balance the drop in APC to maintain full-employment demand.

(b) If MPC < APC is accepted, then g/y must be decreasing with y to balance the increase in APC to maintain full employment demand.

(c) If MPC > APC is accepted, then g/y must be increasing with y to balance the drop in APC to maintain full employment demand.

(d) If MPC = APC is accepted, then g/y must be decreasing with y to balance the increase in APC to maintain full-employment demand.

(xv) According to the Phillips curve, unemployment will return to the natural rate when :

(a) Nominal wages are equal to expected wages

(b) Real wages are back at long-run equilibrium level

(c) Nominal wages are growing faster than inflation

(d) Inflation is higher than the growth of nominal wages

Ans. (i) (b) decrease

(ii) (b) Present value of her income × interest rate.

(iii) (c) Decrease in competition amongst firms

(iv) (b) Negative inflation.

(v) (c) price level

(vi) (b) or (d)

(vii) (b) The short-run aggregate supply curve shifts lefhand.

(viii) (b) Procyclical

(ix) (d) negative supply shocks cause factor prices to increase

(x) (c) Equal to zero

(xi) (a) Unemployment rates higher than the natural rate.

(xii) (d) Money supply

(xiii) (C) A strong/steeper relationship between unemployment and changes in inflation.

(xiv) (a) If the marginal propensity to consume (MPC) < average propensity to consume (APC) is accepted, then government expenditure share to GDP (g/y) must be increasing with GDP (y) to balance the drop in APC to maintain full-employment demand.

(xv) (a) nominal wages are equal to expected usages.

SECTION B

(Attempt any 6 out of the following 8 questions. Eqach question carries 5 marks.) **6×5=30**

Q. 2. (a) Describe the concept of NAIRU. What are its determinants?

(b) Can NAIRU change with time and across countries? **2+3**

Ans. (a) The natural rate of unemployment is the rate of unemployment required to keep the inflation rate constant. This is why, the natural rate is also called the non-accelerating inflation rate of unemployment (NAIRU)

$$u_n = \frac{\mu + z}{\alpha}$$

The higher the markup (μ) or higher the factors (z) that affect wage setting function, the higher the natural rate of unemployment.

$$\boxed{\pi_t - \pi_{t-1} = -\alpha (u_t - u_n)} \Rightarrow \text{NAIRU}$$

(b) Yes. The natural rate of unemployment depends on all the factors that affect wage-setting function, represented by the catch all variables, z, mark-up set by firms, μ, and the response of inflation to unemployment representd by 'α'. If these factors differ across countries, there is no reason to expect all countries to have the same natural rate of unemployment. And natural rates, indeed, differ across countries, sometimes considerably.

We implicity treated ($\mu + z$) as a constant. But there are good reasons to believe that μ and z may vary over time. The degree of monoploy power of firms, the cost of inputs other than labour, the structure of wage bargaining, the system of unemployment benefits, and so on, are likely to change over time, leading to changes in either μ or z, by implication, changes in the natural rate of unemployment.

Q. 3. (*a*) The Phillips curve is $\pi^t = \pi_t^e + (\mu + z) - \alpha u_t$. Rewrite this relation as a relation between the deviation of the unemployment rate from the natural rate, inflation, and expected inflation.

Ans. Imposing the condition that actual inflation and expected inflation be the same.

$(\pi = \pi^e)$; when $u_t = u_n$

$$\pi_t = \pi_t^e + (\mu + z) - \alpha u_t$$

$$0 = (\mu + z) - \alpha u_t$$

$$u_n = \left(\frac{\mu + z}{\alpha}\right) \quad (u_t \text{ will become } u_n \text{ is this case})$$

Then,

$$\pi_t - \pi_t^e = -\alpha\left(u_f - \frac{\mu + z}{\alpha}\right)$$

$$\pi_t - \pi_t^e = -\alpha\,(u_t - u_n)$$

$$\pi_t - \pi_{t-1} = -\alpha\,(u_t - u_n) \qquad [\text{when } \pi_t^e = \pi_{t-1}]$$

(b) Online job websites are getting popular amongst job-seekers and enable them to connect with employers easily. What impact should this have on the natural rate of unemployment in an economy? 3+2

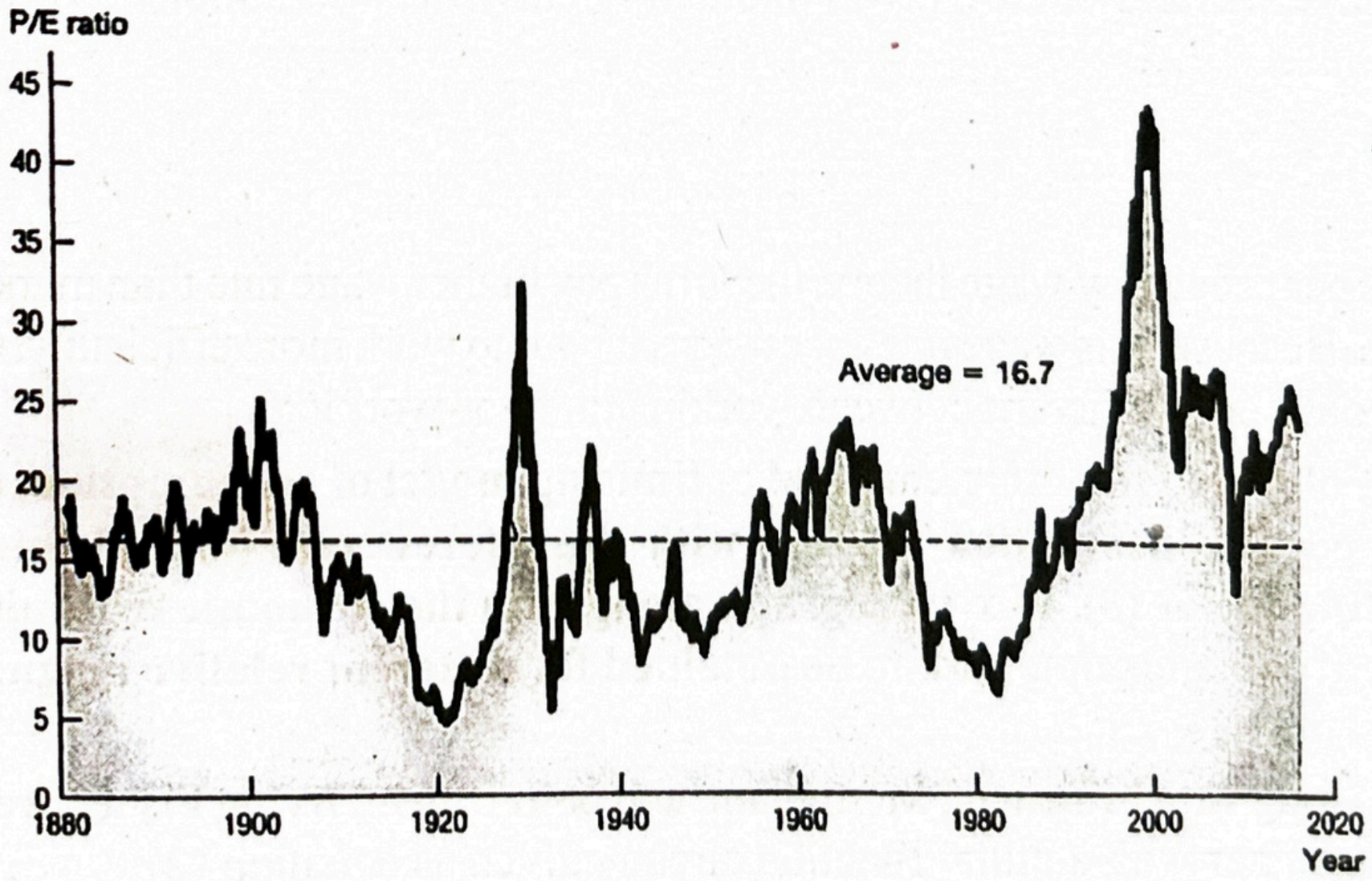
Ans. natural rate of unemployment would decrease when online job websites become popular amongst job-seekers and enable them to connect with employers easily.

Q. 4. Determine the price-earnings ratio for a stock using the arbitrage argument for financial investment. Can this measure be used to detect bubbles in the stock market? 5

Ans.
$$\frac{P_s}{\text{Earning}} = \frac{\text{Dividend/earning}}{\text{Interest rate} - \text{Capital Gain}}$$

This equation says that the price-earnings ratio should equal the dividend-earnings ratio divided by $R - g$. Now take a look at Figure to see what this ratio looks like in the data. This ratio is very volatile. In the early 1980s, this ratio was under 10; but then it rose sharply over the next 20 years, peaking in 2001 at more than 40; after the dot-com crash and the financial crisis, the ratio fell sharply to below 15.

The Price-Earnings Ratio in the Stock Market



How can we understand these movements? According to the simple model, the price-earnings ratio should be relatively stable to the extent that (1) the dividend-earnings ratio is stable and (2) the difference between the real interest rate and the growth rate of dividends is stable. One view is that the sharp increase in stock prices at the end of the 1990s reflects a bubble in stock prices. But an alternative view—and one that many

observers were highlighting at the time when they were discussing the "new economy"—is that the difference between the interest rate and the growth rate of dividends declined because of faster growth, justifying an increase in the P/E ratio.

What this analysis emphasizes is that it's easy to draw a line at the average P/E ratio of 16.7 in Figure and call any departures "bubbles." And there is certainly some merit to this approach. However, a more careful economic analysis of this ratio gives you solid economic reasons how and why the ratio might change. At any point, it may be difficult to know for sure if these fundamentals have changed or not, and this makes identifying potential "bubbles" a tricky enterprise.

Q. 5. "Disinflation typically leads to a period of higher unemployment." Explain. What is the basis of Lucas' assertion that the unemployment costs of disinflation can be reduced significantly? Do you expect faster disinflations to be associated with lower sacrifice ratios? 5

Ans. Even if a decrease in nomial money growth is neutral in the medium run, unemployment increases for sometime before returing to the natural rate of unemployment.

Lucas challenged the nation that disinflation necessarily required an increases in unemployment rate sometime. Under rational expection, he argued, a credible disinflation policy might be able to decrease inflation without any increase in unemployment.

Q. 6. (a) Compute the real interest rate using the exact formula and the approximation formula for $i = 4\%$; $\pi^e = 2\%$.

(b) Explain possible reasons for the firms to pay higher than market-clearing wages. 2+3

Ans. (a) Real interest (r) = Nomial interest rate – inflation

$$r = (i) - \pi$$
$$= 4\% - 2\%$$
$$r = 2\%$$

(b) As per efficiency wage theory, the firms pay higher wage rate than market-cearing wage rate. Because, this wage rate encourages labour to work more efficiently. Otherwise, labour would be indifferent between working and not-working.

Q. 7. Following the intertemporal optimising model of consumption, derive the intertemporal consumption relation with the interest rate (r) and future-utility discounting factor (8). Provide a graph along with the economic reasoning behind the typical consumption path to be obtained for different relative magnitudes of r and δ. 3+2

Ans. Along with Friedman, Modigliani, and before them, Irving Fisher, we can begin with a consumer with a utility function already given as equation (2):

$$U = U\{c_0,...c_t...c_T).$$

To make the problem analytically tractable, we will take as an example a particular form of the utility function. Let us assume first that the underlying utility function is logarithmic, that is,

$$u(c) = \ln c.$$

$$u = \ln c_0 + \frac{\ln c_1}{1+\delta} + \ldots + \frac{\ln c_t}{(1+\delta)^t} + \ldots + \frac{\ln c_T}{(1+\delta)^T}$$

$$= \sum_0^T \frac{\ln c_t}{(1+\delta)^t} \qquad \ldots(1)$$

The constraint on the consumer's choices in this many-period case comes from total resources available: current plus all future income. With no bequests, the *intertemporal budget constraint* over the remaining T years of life is

$$c_0 + \frac{c_1}{1+r} + \ldots + \frac{c_T}{(1+r)^T} = y_0 + \frac{y_1}{1+r} + \ldots + \frac{y_T}{(1+r)^T},$$

or in more compact notation,

$$\sum_0^T \frac{c_t}{(1+r)^t} = \sum_0^T \frac{y_t}{(1+r)^t} \qquad \ldots(2)$$

The consumer faces the problem of maximizing the utility function given by (1), subject to the constraint given by (2). This is usually written in the form:

$$\max_{c_t} \sum_0^T \frac{\ln c_t}{(1+\delta)^t},$$

subject to the constraint that

$$\sum_0^T \frac{c_t}{(1+r)^t} = \sum_0^T \frac{y_r}{(1+r)^t}$$

To solve this problem and obtain the maximizing stream of consumption $c_0, \ldots, c_T$, we will use the method of *Lagrange multipliers*. We incorporate the constraint and the objective together into one expression:

$$\max_{c_t,\,\lambda} L = \sum_0^T \frac{\ln c_t}{(1+\delta)^t} + \lambda\left[\sum_0^T \frac{y_t}{(1+r)^t} - \sum_0^T \frac{c_t}{(1+r)^t}\right] \qquad \ldots(3)$$

$$\frac{\partial L}{\partial c_0} = \frac{1}{c_0} - \lambda = 0 \qquad \ldots(4a)$$

$$\frac{\partial L}{\partial c_t} = \frac{1}{(1+\delta)^t} \cdot \frac{1}{c_t} - \frac{\lambda}{(1+r)^t} = 0 \qquad \ldots(4b)$$

....

$$\frac{\partial L}{\partial c_t} = \frac{1}{(1+\delta)^T} \cdot \frac{1}{c_T} - \frac{\lambda}{(1+r)^T} = 0 \qquad \ldots(4c)$$

$$\frac{\partial L}{\partial \lambda} = \sum_0^T \frac{y_t}{(1+r)^t} - \sum_0^T \frac{c_t}{(1+r)^t} = 0 \qquad \ldots(4d)$$

First, we'll compare time 0 consumption c_0 to time t consumption, which represents

any of the future periods. If we move the terms in λ to the right-hand sides of (4a) and (4b), and then divide equation (4a) by (4b), we get

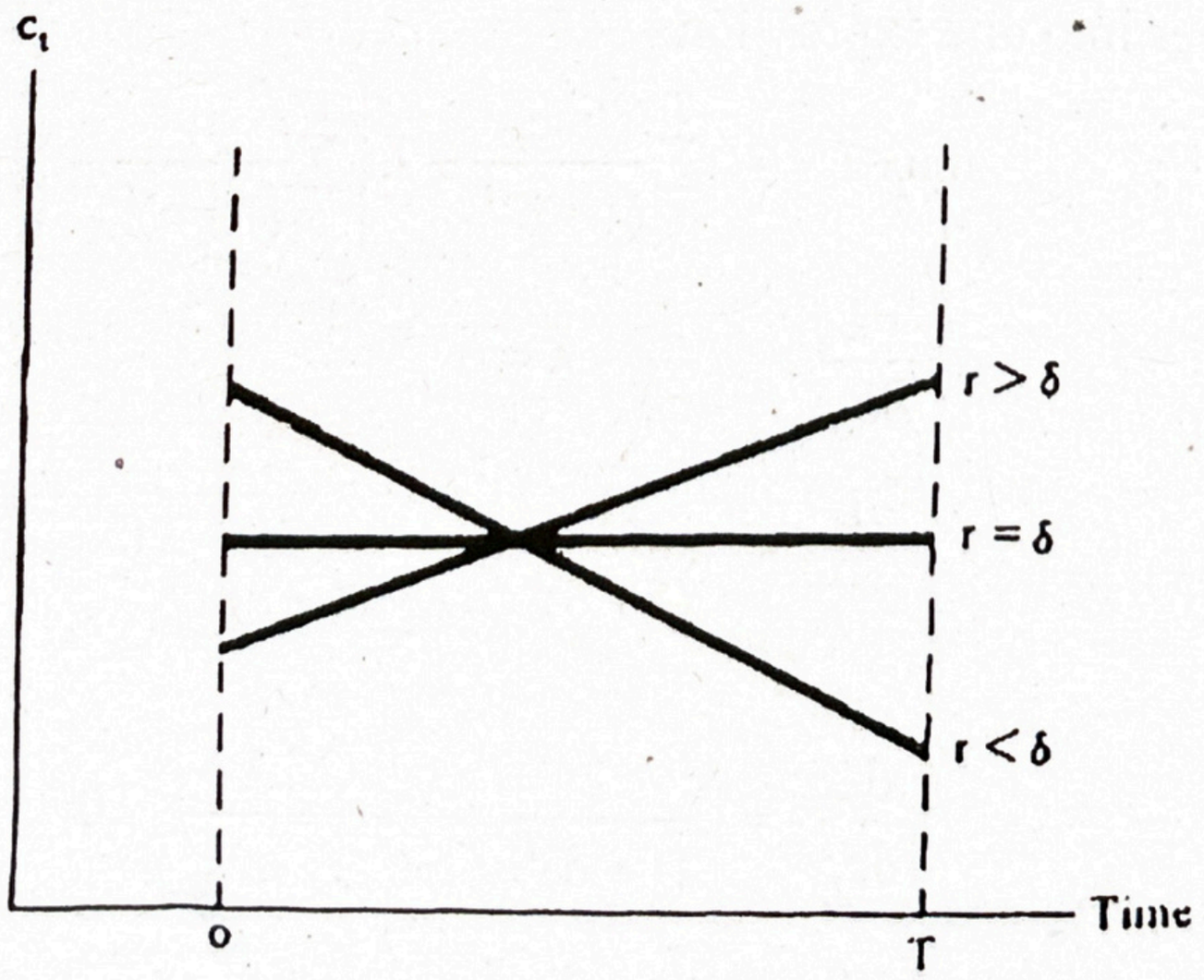
$$\frac{c_t}{c_0} = \left(\frac{1+r}{1+\delta}\right)^t \qquad ...(5)$$

and in general for any two adjacent periods we would have

$$\frac{c_t}{c_{t-1}} = \frac{1+r}{1+\delta}, \quad \text{or} \quad c_t = \left(\frac{1+r}{1+\delta}\right) c_{t-1}. \qquad ...(6)$$

$$\frac{u'(c_t)}{u'(c_{t-1})} = \frac{1+\delta}{1+r}$$

These intertemporal consumption relations have some interesting implications. First, from (13) or (14) we see that whether consumption rises or falls over time depends on whether the market rate of return is larger or smaller than the individual's discount rate, that is, whether $r > 8$. From the technical solutions we see that if $r > 8$, the consumption path would be rising over time. This makes sense. The market interest rate /-measures the return in additional saving, whereas the discount rate 8 gives the individual's loss from waiting to consume. If $r > 5$, it pays to save to consume later; if $r < 8$, it pays to consume more now, less later. This gives us the time profiles of consumption in this simple example shown in Figure. Each consumption path is constrained by the period 0 present value, defined already as the right-hand side of the constraint in equations (3) and (9). This is total resources available in time 0. The discounted integral of consumption from time 0 to time T cannot exceed PV_0; this is what the constraint says. Therefore, a consumption path that begins high because $r < 5$ must cross one that begins low because $r > 5$. Their integrals must equal the same constraint. This is what is shown in Figure.



Alternative time profiles of consumption

Q. 8. Discuss an alternative theory of consumption that modifies the intertemporal budget constraint used in the intertemporal optimising models of consumption.

Flow does this alternative theory modify the consumption path proposed in Ando-Modigliani's model of consumption (i.e., *Life Cycle Hypothesis*)? **5**

Ans. The Role of Liquidity Constraint: In discussing both the two-period and many-period intertemporal maximizing model, we made heavy use of the intertemporal budget constraint of equation (3):

$$\sum_{0}^{T} \frac{c_t}{(1+r)^r} = \sum_{0}^{T} \frac{y_t}{(1+r)^t}$$

This budget constraint assumes that the consumer can in fact move resources through time in both directions He or she can save today for consumption through time in both directions. He or she can save today for consumption tomorrow, or can borrow today to consume against future income. The second case is the one illustrated in Figure 12-4. Both saving (lending) and borrowing are assumed to be possible at the same rate of interest. It is obvious, just from everyday experience, that this assumption does not hold generally at the level of the individual household. Many households cannot borrow freely for consumption against future income. They are constrained in their consumption decisions by current liquidity—current income plus existing assets. Thus, the term liquidity constraint.

There are two basic causes of liquidity constraints in the form of banks' unwillingness to lend for consumption against repayment out of future income. One is the uncertainty that both bank and borrower feel about future income. The second is the risk of default by the borrower. The combination of these uncertainties causes banks to place credit limits on borrowers, so that they cannot borrow freely against future income. It may be possible to borrow against the purchase of durable goods, such as houses and cars, because they provide collateral. The bank owns the item until the loan is paid off. Banks will lend against education because in many cases the government guarantees repayment of the loan. In this case public policy is attempting to break the liquidity constraint on investment in education.

Generally, however, these limits apply to how far you can go in borrowing to consume. If the borrower goes beyond a reasonable limit in committing uncertain future income to repayments, he or she faces the possibility of bankruptcy. Once faced with that situation, the borrower may as well go broke on a grand scale, enjoying life in the short run. This possibility adds to banks' reluctance to lend for consumption.

The extreme case of liquidity constraint would be characterized by a level of consumption limited by current liquidity. For these consumers, the budget constraint would be

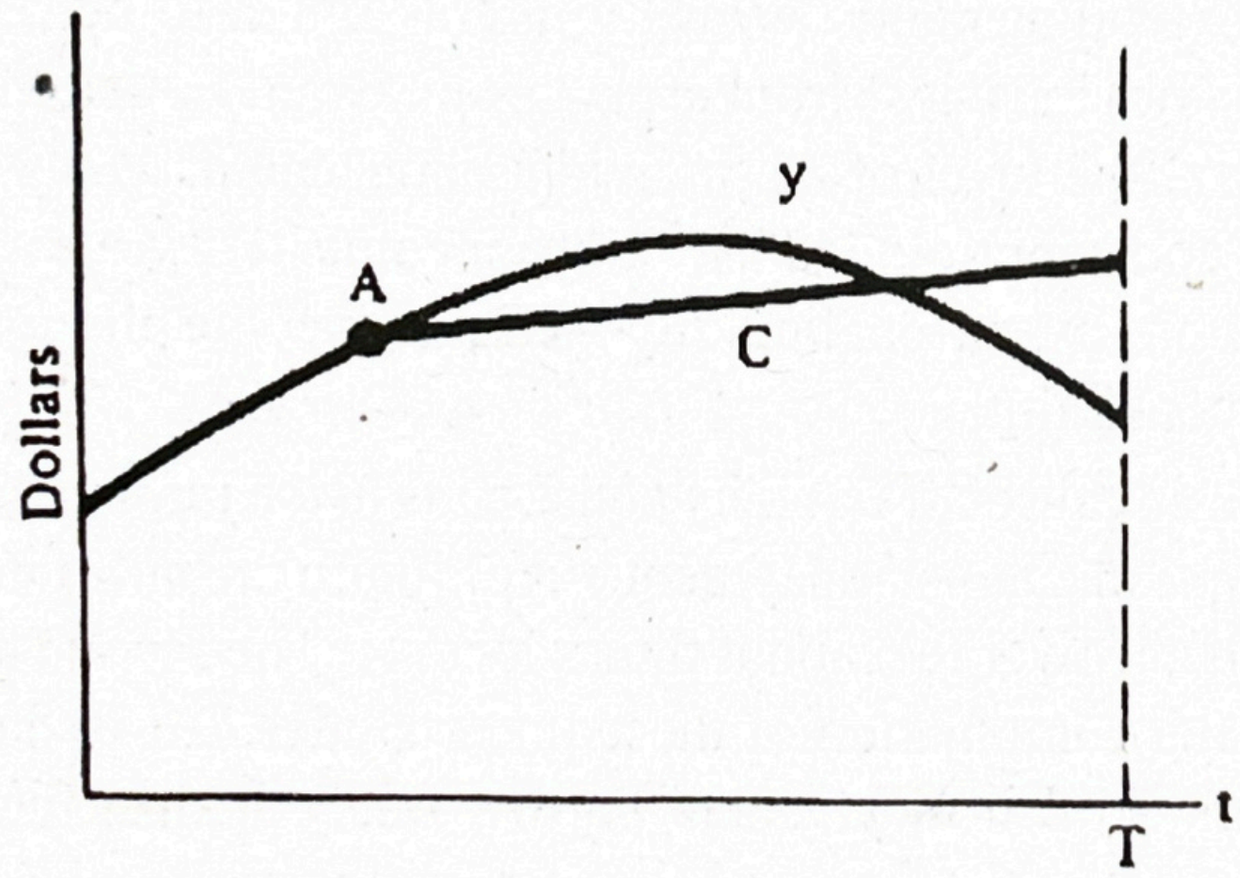
$$c_t^i \geq y_t^i + a_t^i \qquad ...(35)$$

where y_t is current.net income (net of past repayment obligations). In an economy with a mixture of consumers, some constrained by liquidity as in (35) and some under the usual intertemporal constraint of equation (3), the aggregate consumption function would then resemble that of Ando and Mo-digliani:

$$c_t = \alpha_0 y_t + \alpha_1 a_t, \text{ with } \alpha_0, \alpha_1 < 1 \qquad ...(36)$$

Pervasive liquidity constraints would therefore lead us back to a "Keynesian" consumption function with an important role for current wealth.

The existence of liquidity constraints would not eliminate life-cycle patterns in consumption and saving, since the constraint is one-sided. It would constrain borrowing at the young end of the life-cycle. But saving in the middle years for retirement would still be optimal. So the consumption path would follow income in Figure 12-10 up to points where $c_t = y_t$. From there on it would follow the life-cycle path of Figure 12-6. In a cross section of the population, we would expect to find liquidity constraints most binding among the young. This expectation is borne out by empirical studies, such as the research of Hubbard and Judd. It also implies that the effect of cyclical fluctuations in income on consumption is felt most sharply by the younger segments of the working population.



Liquidity-constrained life cycle

Q. 9. Fiscal policy as well as Monetary policy cannot change the level of output in the medium run. Why is then monetary policy considered neutral but not fiscal policy? 5

Ans. This fiscal policy is not neutral because it changes the composition of aggregate demand on the foods market in the mdeium run. An increase in government expenditure causes a decrease in investment. Conversely, a decrease in government expenditure caues an increase in investment. In analogous argument can be applied by analysing a decrease in taxes (expansionary fiscal policy) or an increase in taxes (deficit reduction). But the monetary policy keeps all real variables at natural rate or unchanged in the medium run and it makes monetary policy neutral in medium run.

SECTION C

(Attempt any 3 out of the following 4 questions. Eqach question carries 10 marks.) **3×10=30**

Q. 10. In a faraway country, the total population is 5000 people (all of them non-institutional civilian people), 3000 are working and 250 are looking for a job.

(a) What is the size of the labour force? What are the participation rate and unemployment rate? 3

(b) In this economy, the labour productivity is 1. And the wage-setting process is described by $\frac{W}{P^e} = Z - 100u$, Where Z is the unemployment insurance provided by the government and u is the unemployment rate. What is the Price Setting equation for a mark-up level $\mu = 1.5$? Show graphically and mathematically. **2+1**

Ans. (a) Labour force (L) = Employment (N) + Unemployment (U)

$$= 3000 + 250$$

$$= 3250$$

$$\text{Participation rate} = \frac{\text{Labour force } (L)}{\text{Non-institutional civilian people}}$$

$$= \frac{3250}{5000} = 0.65$$

$$\text{Unemployment rate} = \frac{\text{Unemployment } (U)}{\text{Labour force } (L)}$$

$$= \frac{250}{3250} = 0.0769$$

(b) When the mark-up level (μ) = 1.5

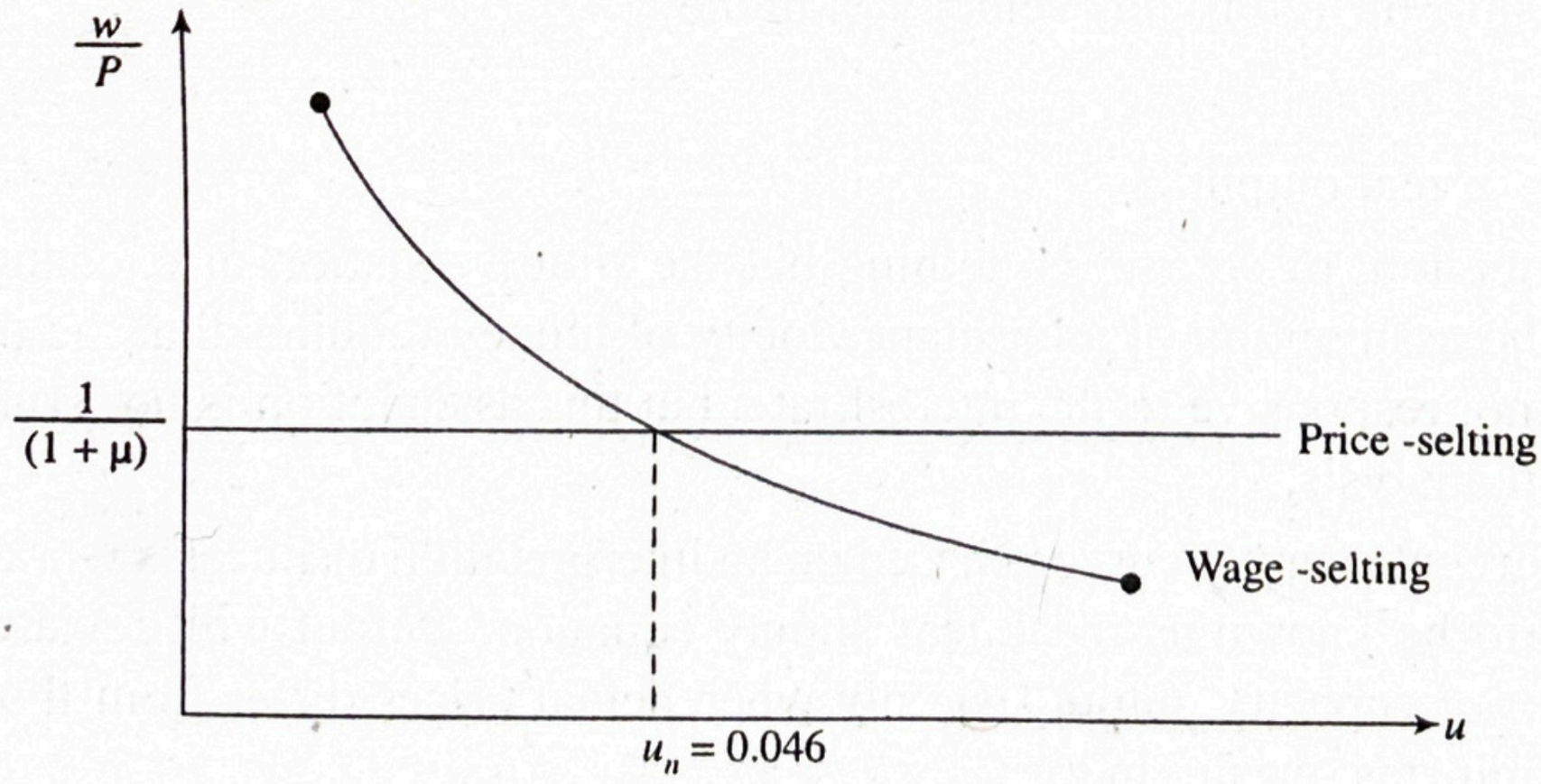
$$\frac{W}{P} = 0.4$$

(c) What is the natural unemployment rate (show it graphically as well), natural level of employment and natural level of output if $Z = 5$? **2+1+1**

Ans. $U_n = 0.046$

Natural level of employment = 3399.5

Natural level of output = 3399.5



Q. 11. How does Lucas's supply relation describe the possibility of the output in any economy to deviate from its full capacity level? What characteristic(s) of the rational expectation is (are) are required to prove the policy effective proposition.

Using the model proposed by Sargent and Wallace (1976), explain the possibility of ineffectiveness of expansionary monetary policy to increase output from its full capacity level. **2+2+6**

Ans. How robust is the policy ineffectiveness proposition? ___1

Some of the most well known propositions associated with rational i expectations and macroeconomics actually derive from models that are much I simpler in structure than Lucas's model and focus more on the demand side. | Perhaps the most famous of these is the so-called policy ineffectiveness proposition, which asserts that any predictable part of the money supply should have *no effect* on output, employment, or any other real variables in the economy. Only *unpredictable* money-supply changes can affect output. In particular, it makes no difference for the behaviour of output and employment whether the Fed follows an activist policy (e.g. increasing the money-growth rate during a recession and decreasing it during a boom) or sticks to a constant money-growth rule. The behaviour of the price level and the inflation rate will be affected by both anticipated and unanticipated parts of the money supply, but only those movements that were not anticipated can affect output.

The policy ineffectiveness proposition can be seem within a simple model based on thr work of Sargent and Wallace (1976). The model has three components: an aggregate-demand relation, an aggregate-supply relation, and a money-supply rule.

The aggregate demand for output will take a very simple, form. Fiscal policy will be assumed to be held constant and monetary policy will be the only policy variable affecting the demand for output. For expositional purposes only, the velocity of money will also be a constant. With these assumptions, the aggregate demand for output can be written, in logs, as

$$M_t + \bar{V}_t = P_t + y_t \quad \text{aggregate demand} \qquad ...(2.1)$$

where

M_t = log of the money supply,

$\bar{V}_t$ = log of the (constant) velocity of money,

P_t = log of the price level

y_t = log of real output.

This equation, of course, is nothing but the simpe equation of exchange, written in logs. The assumption of a cosntant vlocity of money requires that the demand for money is not responsive to the interest rate, but this assumption is not crucial for the subsequent analysis.

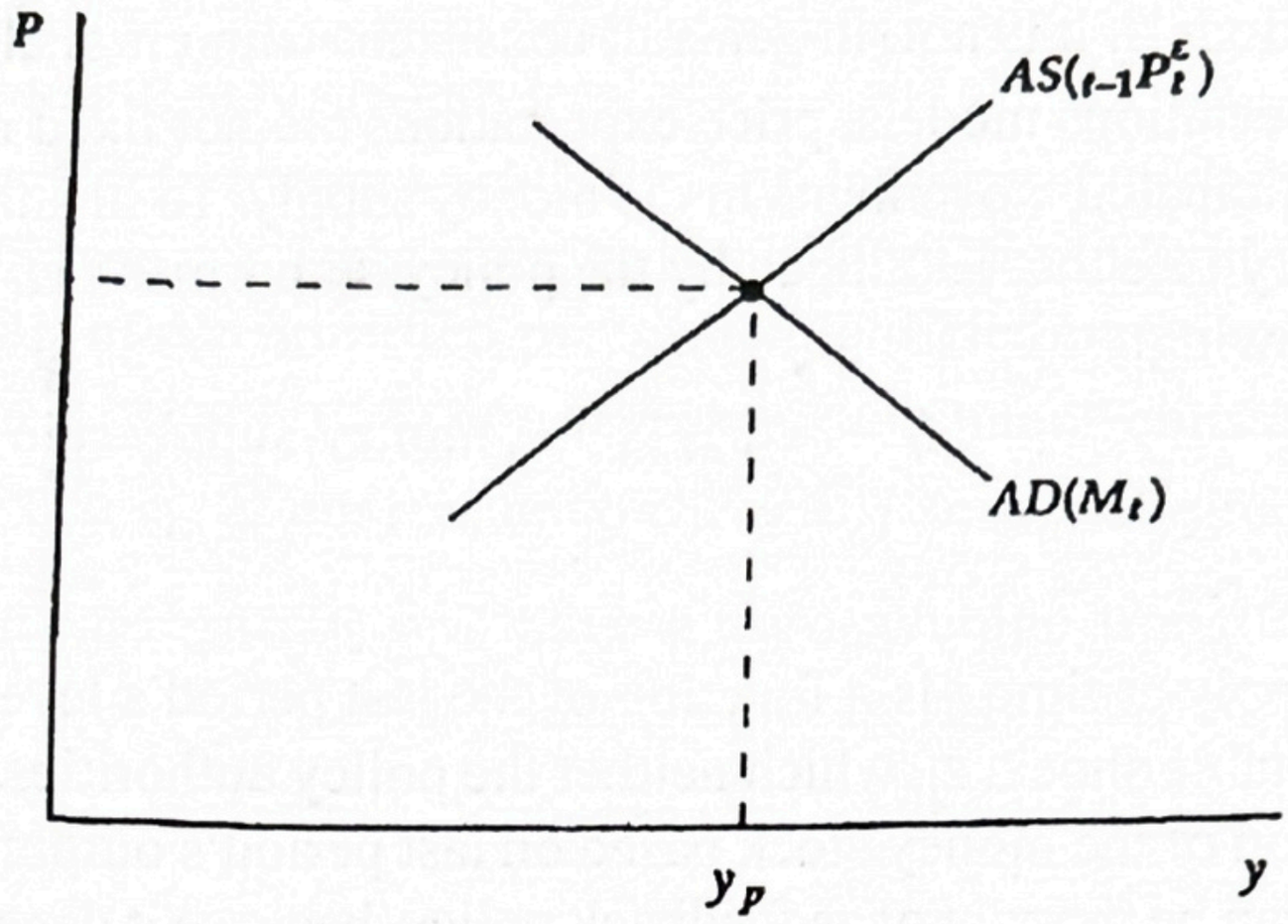
The aggregate supply curve is based on an interpretation of Lucas's work and hence has come to be known as the Lucas supply equation. Output will deviate from full emplyment or capacity output (y_t) only when actual prices differ from those that the public anticipates. Again, in logs:

$$y_t = y_p + b\,(P_t - {}_{t-1}P^{\varepsilon}_t) \quad \text{Lucas supply equation,} \qquad ...(2.2)$$

where

y_p = full employment output,

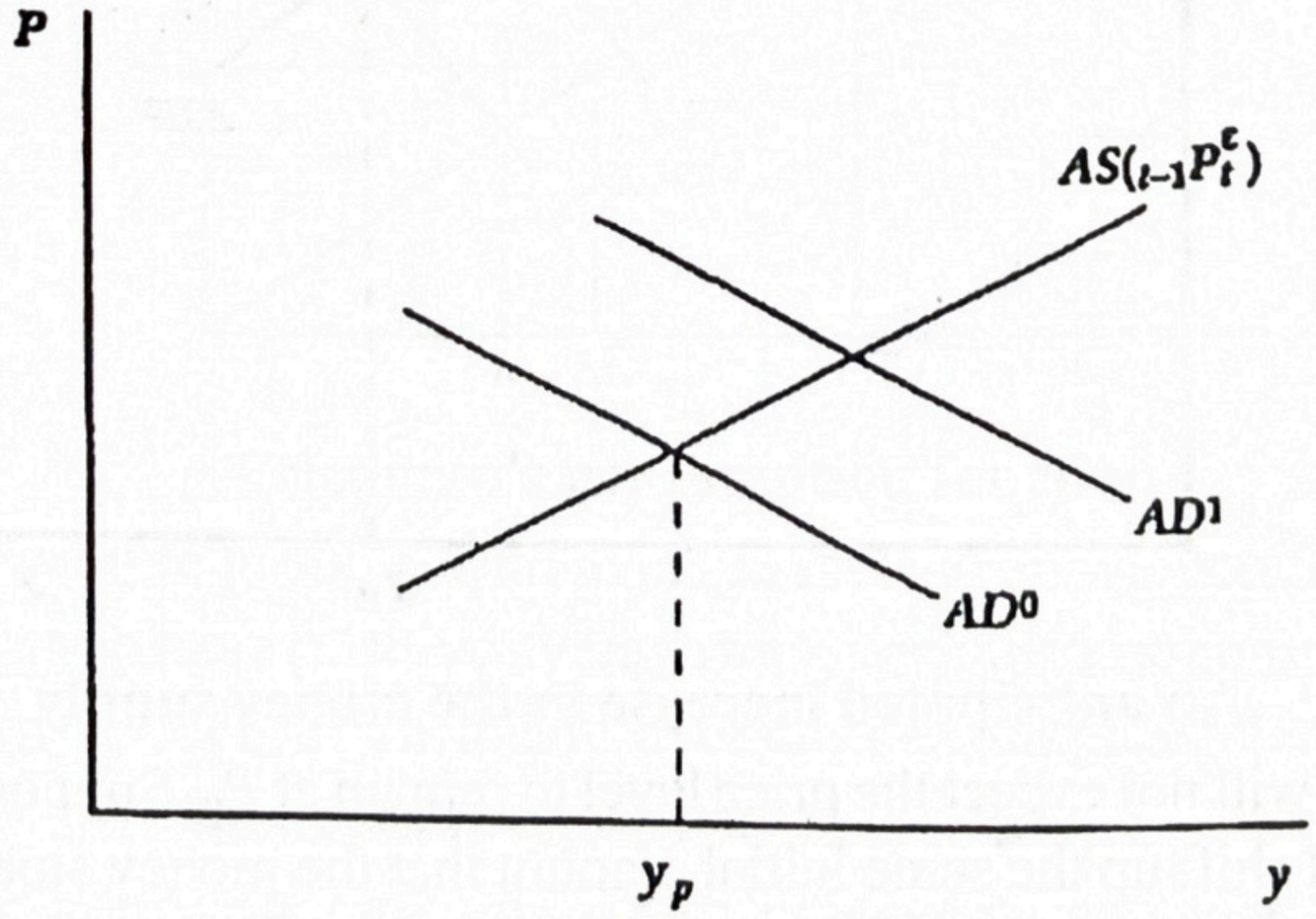
$_{t-1}P^{e}_{t}$ = log of the price level thatnthe public expects will occur in time t viewed from period $t-1$.



Price and output determination

The public is assumed to form expectations about the price level that will prevail in period t at the end of period $t-1$. If the actual price level exceeds the anticipated price level, representative producers will attribute part of this to an increase in their relative price, and output will be above trend. On the other hand, if the price level is below the level anticipated, producers will, in part, believe that relative prices are low. and output-will-fall below its tread value.

Assuming the money supply and price expectations are fixed or predetermined, we can present a simple graphical analysis in $p-y$ space. In Figure the aggregate-demand curve is downward sloping, reflecting the fact that with a given money stock, higher prices must lead to lower output to keep nominal demand constant. The aggregate-supply curve, drawn for a given level of expected prices, is upward sloping, reflecting the fact that at higher price level is the gap between actual and expected prices increases, leading to higher levels of output. If price expectations did not change when the money supply increased, then output and prices would both increase, as shown in Figure.



An increase in the money supply with no change in expectations

In Figure the increase in the money supply shifts the aggregate-demand from AD^0 to AD^1, thereby raising prices and, output Although this result is typical of most macroeconomic models, it is not, in general, consistent with rational expectations.

In rational expectations models, price expectations are not fixed or predeter-mined but respond to anticipated movements in the money supply. To illustrate this, one must provide a monetary rule that is utilized by the policy authorities. An example of a rule might be the following:

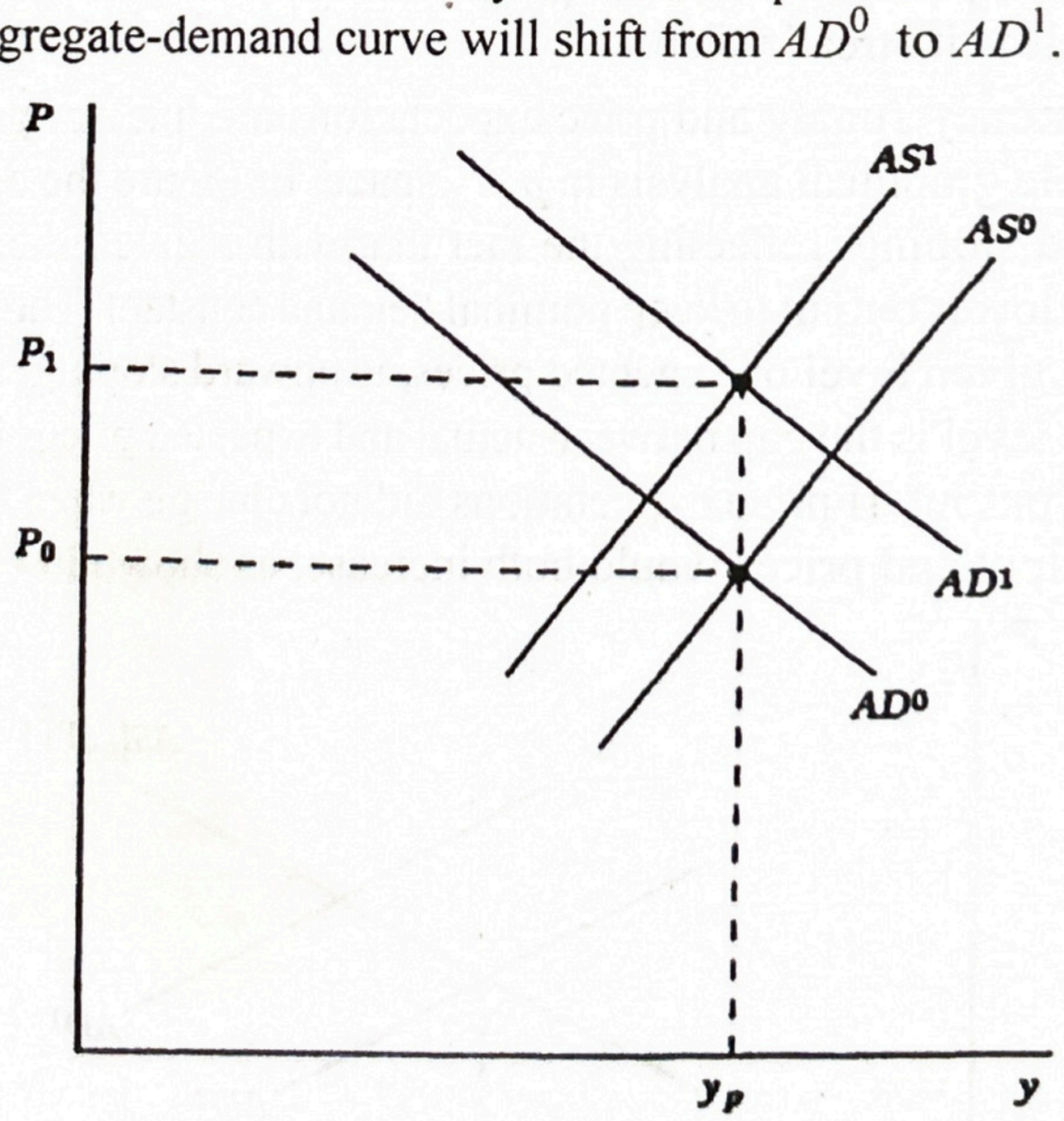
$$M_t = \alpha_1 y_{t-1} + \varepsilon_t \text{ money-supply rule} \qquad ...(2.3)$$

where

$$E(e_t/I_{t-1}) = 0$$

The money supply at time t is a function of the last period's level of output. plus a random, unpredictable shock, ε_t, which neither the policy authorities nor the public can predict. The portion of the money stock based on last period's output ($\alpha_1 y_{t-1}$) is known to the public and can be thought of as feedback policy, because it depends on past values of observed variables. The policy ineffectiveness proposition states that the parameter α_1 of the feedback rule that is set by the authorities has no effect on the behavior of output in the economy. Only the unanticipated part of the money stock (ε_t) will cause output to deviate from its full-employment level.

The nature of this result can be illustrated in Figure. Suppose the public expects the money authorities to increase the money stock from period $t-1$ to period t, which implies that the aggregate-demand curve will shift from AD^0 to AD^1.



An anticipated increase in the money supply

Rational actors will not expect the price level to remain at P_0. Suppose they guess that the price level will shift up the same initial amount that the money stock increased, that is, the vertical distance from AD^0 to AD^1. Then, as they change their price expectations, the aggregate-supply curve will shift from AS^0 to AS^1. In fact, the actual price level

will, in the absence of any shocks, be P_1. The public's expectations will turn out to be correct. Output remains at y_p, whereas prices rise by the same amount as the money stock is expected to rise. Thus, anticipated increases in the money stock will have no effect on output but will only affect prices.

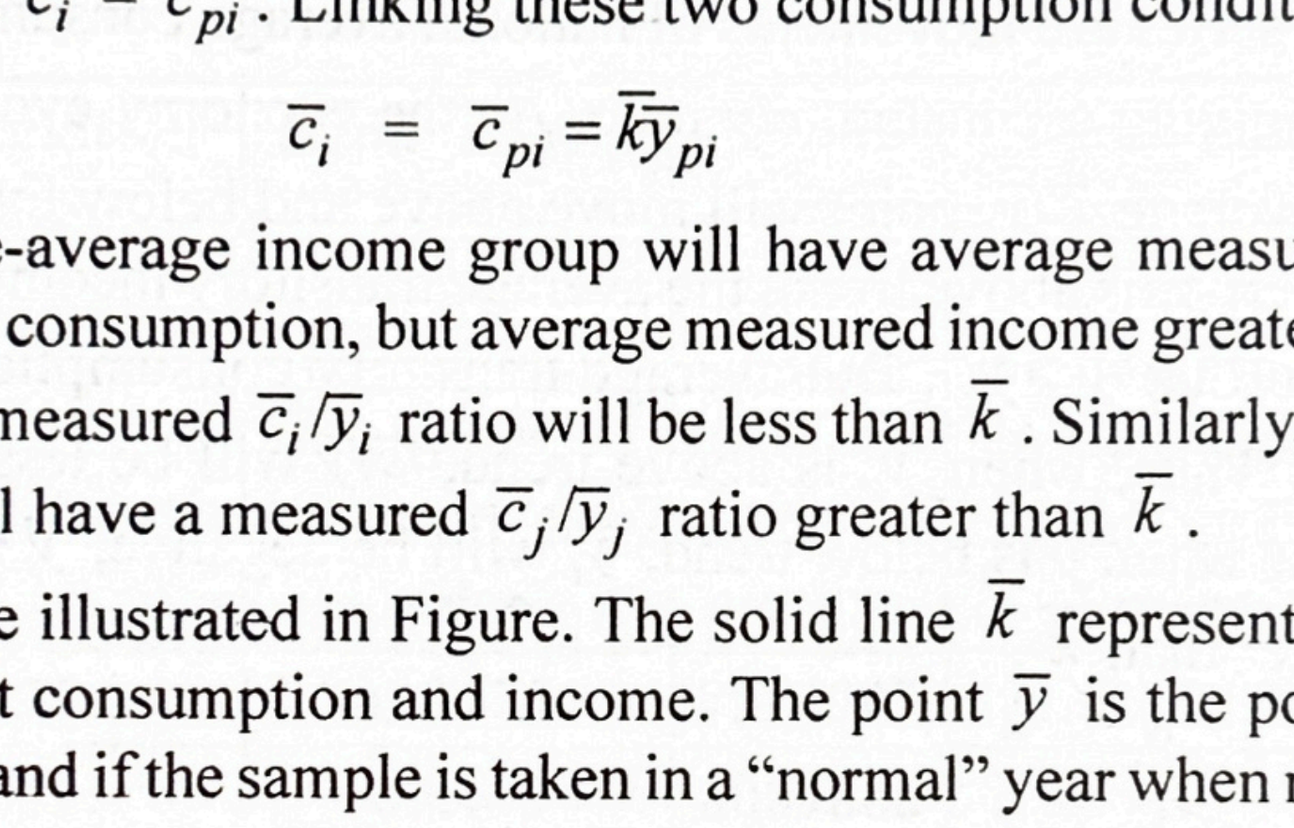
Q. 12. Explain the short-run variability and long-run constancy of the ratio of consumer expenditure to income with the level of income, in light of the Permanent Income Hypothesis of consumption postulated by Friedman. **10**

Ans. All income groups will have average permanent consumption given by $\overline{c}_{pi} = k\overline{y}_{pi}$. But since $\overline{c}_{ti}$ is not related to either $\overline{c}_{pi}$ or $\overline{y}_{ti}$, all groups, including the above-average income group, will have a zero average transitory-consumption component, so that $\overline{c}_i = \overline{c}_{pi}$. Linking these two consumption conditions gives us

$$\overline{c}_i = \overline{c}_{pi} = \overline{k}\overline{y}_{pi} \qquad ...(29)$$

Thus, the above-average income group will have average measured consumption equal to permanent consumption, but average measured income greater than permanent income, so that its measured $\overline{c}_i/\overline{y}_i$ ratio will be less than $\overline{k}$. Similarly, a below-average income group j will have a measured $\overline{c}_j/\overline{y}_j$ ratio greater than $\overline{k}$.

These results are illustrated in Figure. The solid line $\overline{k}$ represents the relationship between permanent consumption and income. The point $\overline{y}$ is the population average measured income, and if the sample is taken in a "normal" year when measured average income is on trend, average transitory income will be zero, so that $\overline{y} = \overline{y}_p$. The point $\overline{c}_p$ is the population average measured and permanent consumption.



Friedman's consumption function

First, consider sample group i, with average income above population average, so that $\overline{y}_i > \overline{y}$. This group has a positive average transitory-income component $\overline{y}_{ti}$, so that $\overline{y}_{pi} < \overline{y}_i$ as shown in Figure. To locate average consumption, both measured and permanent, for group i, we multiply $\overline{y}_{pi}$ by $\overline{k}$ to obtain $\overline{c}_i = \overline{c}_{pi}$ along the $\overline{k}$ line. Thus, for an above-average income group i, we observe $\overline{c}_i$, and $\overline{y}_i$ at the point A which lies below the permanent consumption line $\overline{k}$ in Figure.

Next, observing lower-than-average income group *j*, we see that the average income of the group y_j is less than the national average income $\bar{y}$. so that the average transitory income of the sample group, $\bar{y}_{tj}$, is less than zero. Furthermore, we observe $\bar{c}_j$ and know that $\bar{c}_j = \bar{c}_{pj} = \bar{k}\bar{y}_{pj}$ along the $\bar{k}$ line. The location of $\bar{c}_j$ and y_j gives us the point *B* lying above the $\bar{k}$ line for the below-average income group *j*. Connecting the points *A* and *B*, we obtain the cross-sectional consumption function that connects observed average income-consumption points. This function has a smaller slope than the underlying permanent function, so that in cross-sectional budget studies, we expect to see *MPC* < *APC* if (but not only if) the Friedman permanent income hypothesis is correct.

Over time, as the economy and the national average permanent income grow along trend, the cross-sectional consumption function of Figure shifts up. What we observe in a long-run time series are movements of national average consumption and income along the line $\bar{k}$. giving a constant *c*/*y* ratio. As the economy cycles about its trend growth path, the average $\bar{c}/\bar{y}$ point will move above and below the long-run $\bar{k}$ line. In a boom year when $\bar{y}$ is above trend, the average transitory income of the population will be positive, so that $\bar{y} > \bar{y}_p$. But average transitory consumption will be zero, so that $\bar{c} = \bar{c}_p = \bar{k}\bar{y}_p$. Thus, when $\bar{y}$ is above trend, $\bar{c}/\bar{y}$ will be less than $\bar{c}_p/\bar{y}_p = \bar{k}$. Similarly, in a year when *y* is below trend, $\bar{y}_t$ will be negative, $\bar{y} < \bar{y}_p$, and the $\bar{c}/\bar{y}$ ratio will be greater than $\bar{k}$.

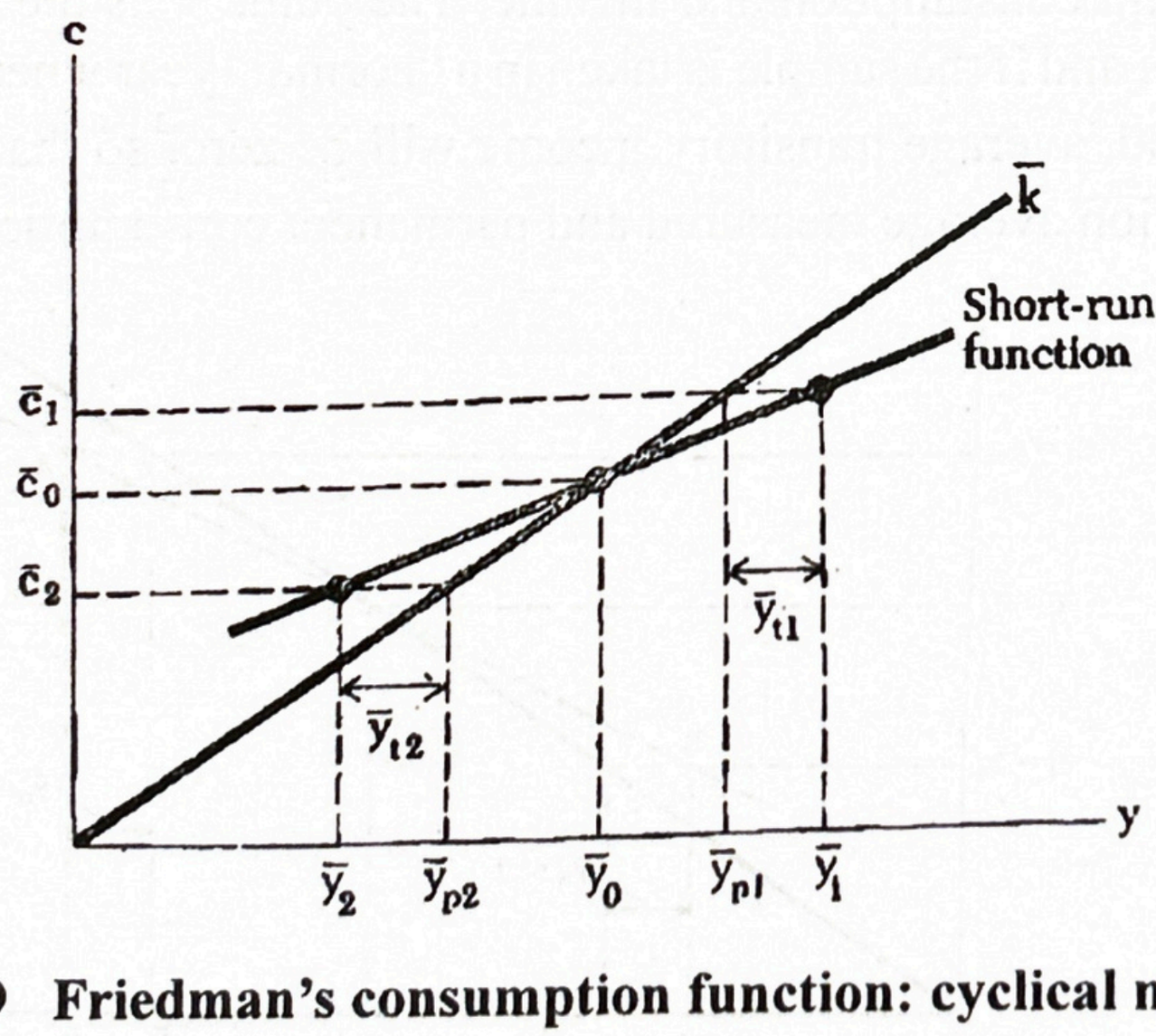


Figure 12-9 Friedman's consumption function: cyclical movements

This cyclical movement is illustrated in Figure, with a slight rein-terpretation of the horizontal axis. Instead of showing a cross section of income, we interpret it to show national income at various points in time. Now transitory components are cyclical swings, while permanent income and consumption move up along the trend growth path given by $\bar{k}$. In an average year, when $\bar{y}_t = 0$, the $\bar{c}_0, \bar{y}_0$ point falls on the long-run *k* line. In a year with above-trend income $\bar{y}_1$, transitory income is positive, so that $\bar{y}_{p1} < \bar{y}_1$, and the $\bar{c}_1, \bar{y}_1$ point is below the $\bar{k}$ line of Figure. In a year with below-trend income $\bar{}$, the $\bar{c}_2, \bar{y}_2$ point is above the $\bar{k}$ line, giving us the short-run function of Figure 12-9.

The difference between Figures 12-8 and 12-9 is just that in Figure 12-8 the variation in income and consumption is in a cross section at any one time, while in Figure 12-9 the variation is an average c and y over the business cycle.

Q. 13. Suppose a house in *X-Y* city can be rented for Rs. 30,000 monthly. The house depreciates at the rate of 5 percent per year, the annual interest is 10 percent, and mortgage interest is tax deductible, where the relevant tax rate is 30 percent. Following the arbitrage argument in residential investment,

(a) Determine the change in the house-price, in case of a reduction in the downpayment rate from 25 to 15 percent, given the expected annual growth rate of the house-price is at 8 percent. What do you infer regarding the cause of the housing price bubble from this change in house-price. 4+1

Ans.

Rent	Depreciation rate	Denominator in price of house calculation with 8% growth in price	Price with 8% growth	Denominator in price of house calculation with 10% growth in price	Price with 10% growth
360000	0.25	0.0475	7578947	0.0275	13090909
	0.15	0.0445	8089888		

The House price changes from 7578947 to 8089888 with respect to a reduction in the downpayment rate from 25% to 15%. This shows that with decrease of downpayment rate the house prices increases.

(b) Determine the change in the house-price, in case of an increase in the expected annual growth rate of the house-price from 8 to 10 percent, given ddwnpayment rate is at 25 percent. What do you infer regarding the cause of housing price bubble from this change in house-price. 4+1

Ans. The house prices changes from 7578947 to 13090909 in case of an increase of expected annual growth rate of house-price from 8% to 10% given the downpayment rate at 25%. It can be uinferred that the price of house increases vary sharply with the increase of only by 2% of expected annual growth rate of the house price.

□□□