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NOTES ON INFLATION

Based on various textbooks (in particular, M. Parkin & R. Bade, Macroeconomics), the following approach to inflation has been developed.

Once-and-for-All Price Level Changes versus Inflation

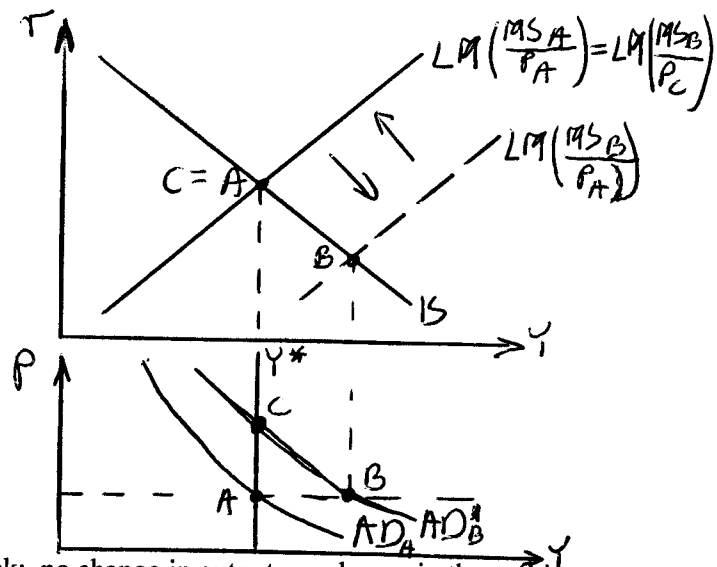
Once-and-for-all price level rise occurs when the economy experiences a generally stable price level which occasionally jumps to a new level. **Inflation** is an on-going process whereby prices keep rising year after year.
Below, assume that prices are perfectly flexible and that shocks had not been anticipated but once they happened they were immediately known and their consequences were fully understood by economic agents.

Causes of the once-and-for-all price level change:

1. **once-and-for-all increase in money supply**:

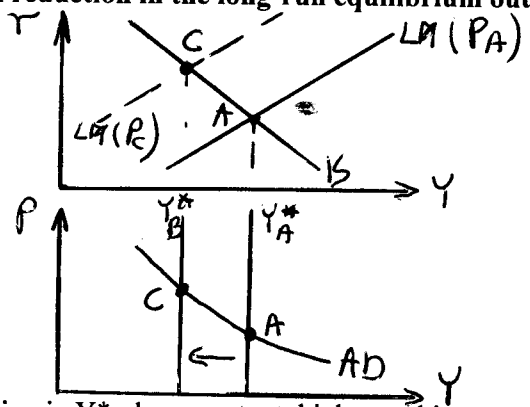
$MS_B > MS_A$

$MS \uparrow \Rightarrow LM$ shifts to the right $\Rightarrow AD$ shifts to the right $\Rightarrow P \uparrow$ from P_A to $P_C \Rightarrow LM$ shifts back



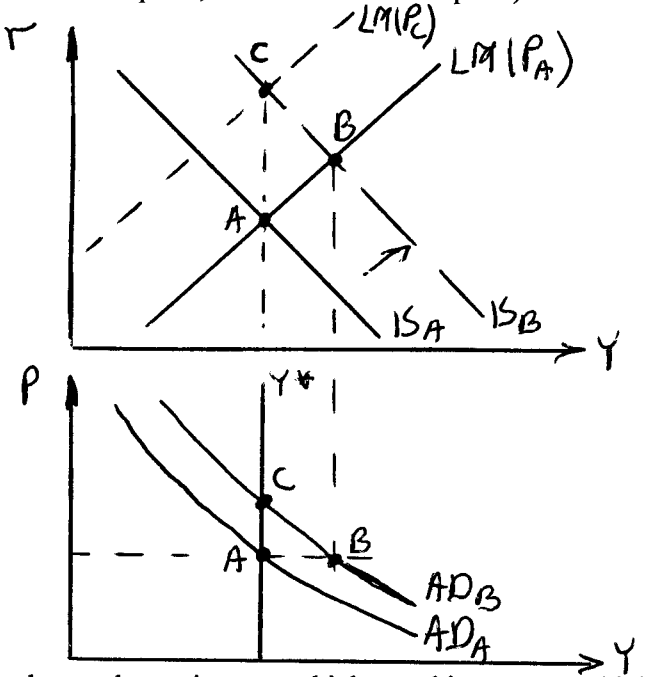
Effects of the once-and-for-all increase in money stock: no change in output, no change in the real interest rate, change in the price level in the exact proportion to the change in money supply.

2. **once-and-for-all reduction in the long-run equilibrium output Y*:**



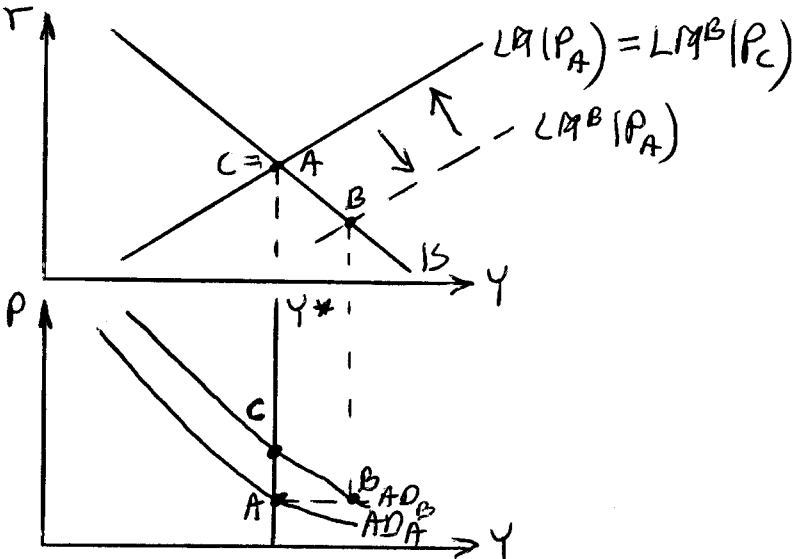
Effects of the reduction in Y*: lower output, higher real interest rate, higher price level.

3. **upward shock to the IS curve** (for example, due to a once-and-for-all change in fiscal policy and/or an autonomous change in consumption, investment or net exports).



Effects of the IS shock: no change in output, higher real interest rate, higher price level.

4. **money demand shock**: a decrease in propensity to hold money.
Note: this means that the velocity of money circulation increases.



Effects of the money demand shock: no change in output, no change in real interest rate, higher price level.

Note:
(a) In the above classical setting, it is the aggregate supply which determines the level of output. Price level adjusts IMMEDIATELY to equate aggregate demand with this aggregate supply.
(b) We could reverse the above exercises to produce once-and-for-all declines in the price level.

Causes of the Long-Run Inflation

Which one of the above shocks could be hitting the economy "forever", resulting in a continuous rise in the price level which we call "inflation"? Only shock #1: LM curve could keep shifting down and up "forever". Other shocks: The reduction in the long-run level of output has its obvious limits (once it reaches zero, the economy disappears); government-, consumer-, investment- and foreign-spending as well as tax reduction all have their limitations imposed either by the physical productive capacities of the economy or by the borrowing constraints; and once there is no cash held, money demand reaches zero and there are no "money demand shocks" (unless we re-define the variable).

We can conclude, therefore, that **in the long run, inflation is a monetary phenomenon**.
In fact, the following formula can be derived:

$$\textbf{LR inflation} = m - a*y + \textbf{changes in } v$$

where m = rate of growth of money supply
a = income elasticity of demand for real money balances
y = rate of growth of output
v = velocity.

In a stationary economy (y=0) with a constant velocity (changes in v = 0), the rate of inflation is equal to the rate of growth of money supply. By controlling the growth rate of money supply m the authority can exercise considerable control over the trend rate of inflation.

Inflation in the Short-Run

Fact: there is no close link between the rate of monetary growth and inflation in the short run.
Why?
It can be explained on the basis of short-run models of aggregate supply (such as imperfect information, wage rigidity) or you can make different assumptions regarding the way in which shocks are introduced (e.g. an anticipation of higher government spending which is known to result ultimately in a higher price level will cause a short-lived inflation between the anticipation period and the time at which the shock actually occurs)

In the short-run therefore ANY of the shocks that in the classical model would cause a once-and-for-all price increase could trigger a short-lived inflation as the adjustment to the new price level may take place only gradually (due to imperfect information and / or staggered wage contracts). Moreover, expectations of inflation can trigger a short-lived inflation.

Inflation as a Tax

Everybody who holds money loses part of the value of that money when inflation occurs. Hence, **inflation is a tax** on holdings of real money balances, with the tax rate equal to the inflation rate. The value of the inflation tax is given by the amount which has to be added to cash balances every year to keep the real value of cash balances constant. The tax is collected by the government or whoever has control over money issue (seigniorage levy). The government collects the tax by buying goods and services from the private sector with the money that, the moment it is exchanged, loses its purchasing power due to the price increases. So, while the exchange was "fair" at the time it took place, the private sector is unable to purchase now, with the same money, the same amount of goods and services that it sold to the government. The government has thus collected more, in real terms, than what it has given in exchange, in real terms, thus helping to finance its

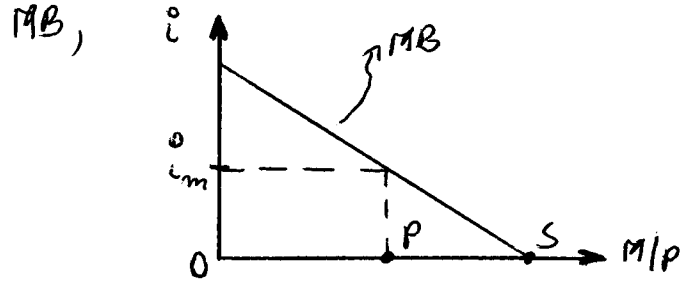
budget. This budgetary aspect of the inflation (i.e. the fact that inflation is a source of government revenue just as taxes are) completes the reason why inflation can be thought of as a tax collected from money holders and accruing to government.

When inflation is rising, it becomes costly to keep money balances (their purchasing power erodes so quickly!), and hence the quantity demanded of real money balances decreases. It follows that although the government may try to tax people at a higher rate by creating a higher inflation rate, the tax basis shrinks as real money balances are falling. Hence, there is a maximum inflation tax revenue that can be raised.

Optimal Rate of Inflation

What is the optimal inflation rate, i.e. the optimal growth of money supply?

Assume below for simplicity that the real interest rate r = 0.
Recall: r = nominal (market) interest rate i - expected inflation.
Assume: expected inflation = actual inflation (i.e. perfect foresight).
It follows therefore that in our model market interest rate = inflation.
Assume that the demand-for-real-money balances function represents a marginal benefit of holding the money balances, and that this marginal benefit (utility) is a decreasing function of real money balances.



Social marginal cost of providing money is approximately zero (assume that printing costs are so insignificant at the margin that they can be neglected). Hence, to maximize social benefits provided by money, real money balances should be accumulated until their marginal benefit = marginal cost = zero (the socially optimal level of real money balances is given by the distance OS above).
Private (individual) marginal cost of holding money balances is given by the nominal (market) interest rate i. Individuals will therefore keep money balances until their marginal benefit is equal to their private marginal cost as given by the nominal interest rate i which in our model is the same as the inflation rate (the privately optimal level of real money balances is given by the distance OP above). Inflation introduces thus the divergence between the social and private optimum. To restore the equality between the two, the optimal inflation rate should be zero, i.e. private marginal cost of holding money should be made equal to the social marginal cost of holding it.

Once we release the assumption of real interest rate r being zero, it follows from the above argument that the optimal inflation rate should be equal to the opposite of the real interest rate r in order to keep the nominal interest rate i at zero: optimal inflation rate = -r.
The optimal rate of growth of money supply should ensure that the above equality holds.

Qualifications: inflation is a way of financing budget deficits. Unless deficits can be financed by lump-sum taxes, any other way of financing will create distortions in the economy. The cost of these distortions must be compared with the inflation costs, and on THIS basis the optimal inflation rate is to be chosen.