

# Macroeconomics V: Aggregate Demand

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Hilary Term 2004

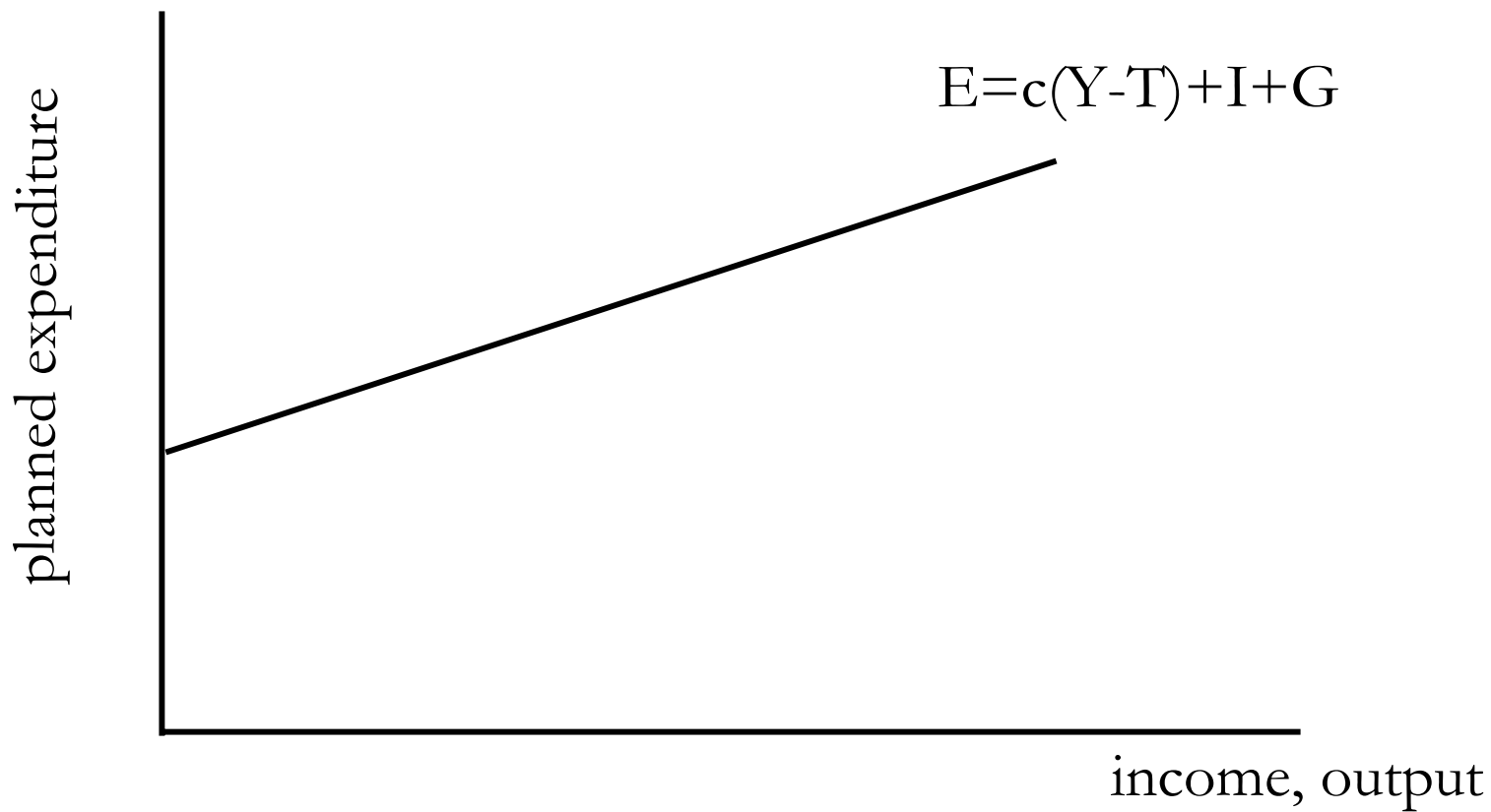
# introduction

- “A very poor man may be said in some sense to have a demand for a coach and six; he might like to have it; but his demand is not an effectual demand, as the commodity can never be brought to market in order to satisfy it”,  
Adam Smith, 1776.

# the Keynesian cross

- In equilibrium, planned spending must equal actual spending in the economy.
- The difference between planned and actual expenditure is unplanned inventory investment. When firms sell less of their product than planned, stocks of inventories rise.
- Because of this, actual expenditure can be above or below planned expenditure.
- When the economy is closed,  $E = C + I + G$
- Consumption rises with disposable income,  $C = c(Y - T)$
- Therefore  $E = c(Y - T) + I + G$

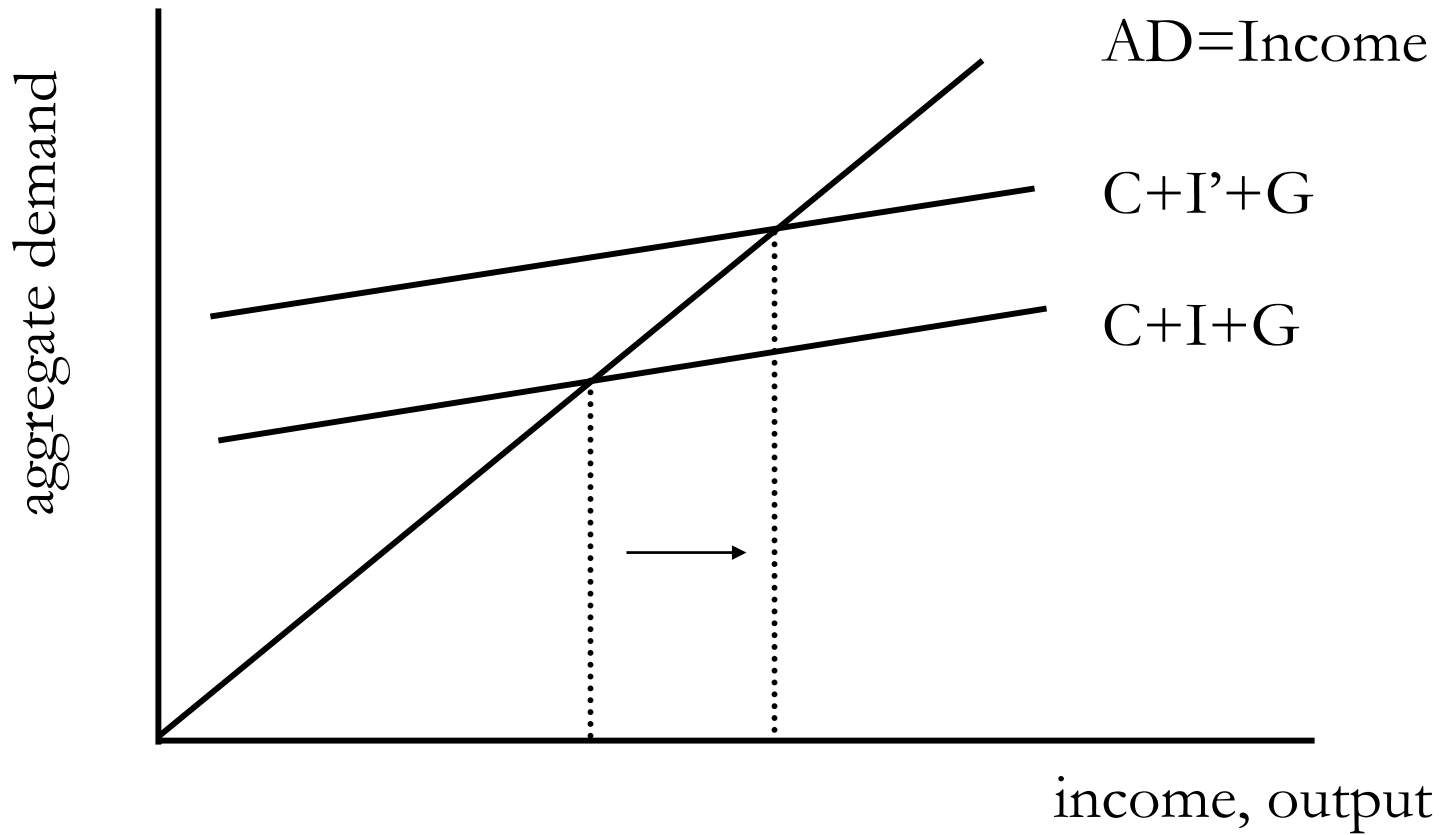
# planned expenditure as a function of income



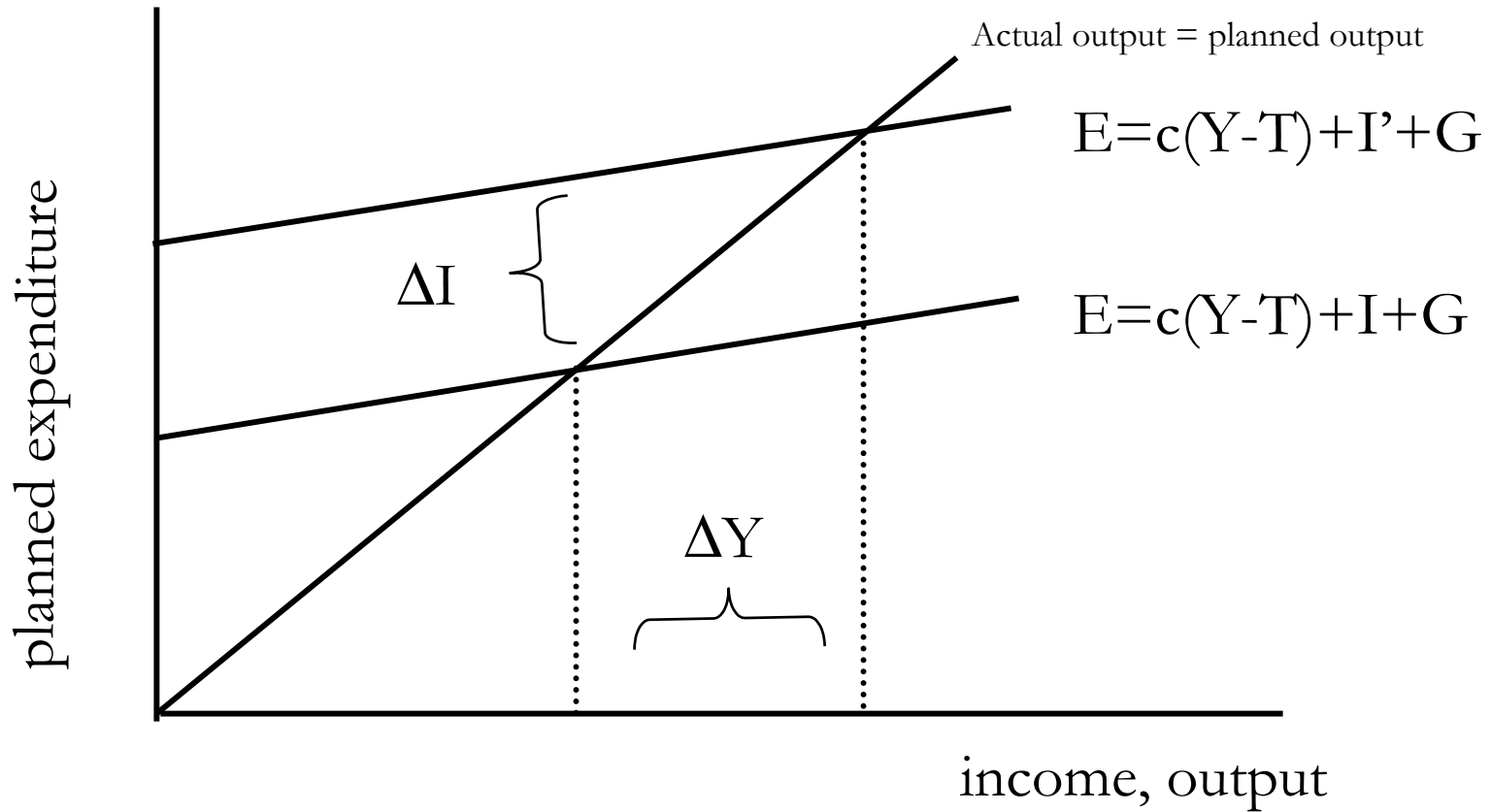
# the economy in equilibrium

- The economy is only in equilibrium when planned expenditure equals actual expenditure.
- Suppose that actual expenditure is lower than planned. Firms start to acquire excessive inventories and so they lay off workers and reduce production until their inventories are stable again.
- Suppose that actual expenditure is higher than planned. Stocks of inventories start to fall, so firms hire new workers and increase production.
- Note that we are assuming that prices and wages are fixed in the short-run (possibly because of menu costs) and there are unemployed resources.

# aggregate expenditure



# a simple multiplier



# the expenditure multiplier

- When investment rises by  $\Delta I$ , income rises by  $\Delta Y$ . The ratio  $\Delta Y / \Delta I$  is the multiplier. An implication of the Keynesian Cross is that the multiplier is greater than 1.
- The reason is that higher income causes higher consumption. Because higher investment (or government spending) raises income it also raises consumption.
- How big is the multiplier?
  - $Y = c(Y - T) + I + G$
  - $Y - cY = I + G - cT$
  - $(1 - c)Y = I + G - cT$
  - $Y = (I + G - cT) / (1 - c)$
  - $\Delta Y = \Delta I / (1 - c)$
  - $\Delta Y / \Delta I = 1 / (1 - c)$
- The multiplier is equal to  $1 / (1 - c)$  where  $c$  is the marginal propensity to consume and  $(1 - c)$  is the marginal propensity to withdraw.



# the balanced-budget multiplier

- Consider an increase in government spending that is matched by an equal increase in taxation (so that the government budget remains balanced)
  - $Y = c(Y - T) + I + G$
  - $Y = (I + G - cT) / (1 - c)$
  - $\Delta Y = (\Delta G - c \Delta T) / (1 - c)$
- But since  $\Delta G = \Delta T$ 
  - $\Delta Y = (\Delta G - c \Delta G) / (1 - c)$
  - $\Delta Y = ((1 - c)\Delta G) / (1 - c)$
  - $\Delta Y / \Delta G = (1 - c) / (1 - c) = 1$
- The balanced-budget multiplier is 1 for a closed economy.

# the multiplier with proportional taxes

- Consider an economy with taxes that are proportional to income
- Now  $Y=C-T+I+G$  but  $C=c(Y-T)$  and  $T=tY$ , so
  - $Y = c(Y-tY)+I+G$
  - $Y-cY+ctY = I+G$
  - $(1-c+ct)Y = I+G$
  - $Y = (I+G)/(1-c+ct)$
  - $\Delta Y = \Delta I/(1-c+ct)$
  - $\Delta Y/\Delta I = 1/(1-c+ct) = 1/(1-c(1-t))$
- Since  $(1-c)$  is smaller than  $(1-c+ct)$  the multiplier is bigger when taxes are not proportional since the marginal propensity to withdraw is smaller. Therefore, proportional taxes help to stabilise the economy!
- Note that the larger is  $c$ , the steeper is the slope of the planned expenditure line; and the larger is  $t$ , the shallower is its slope.

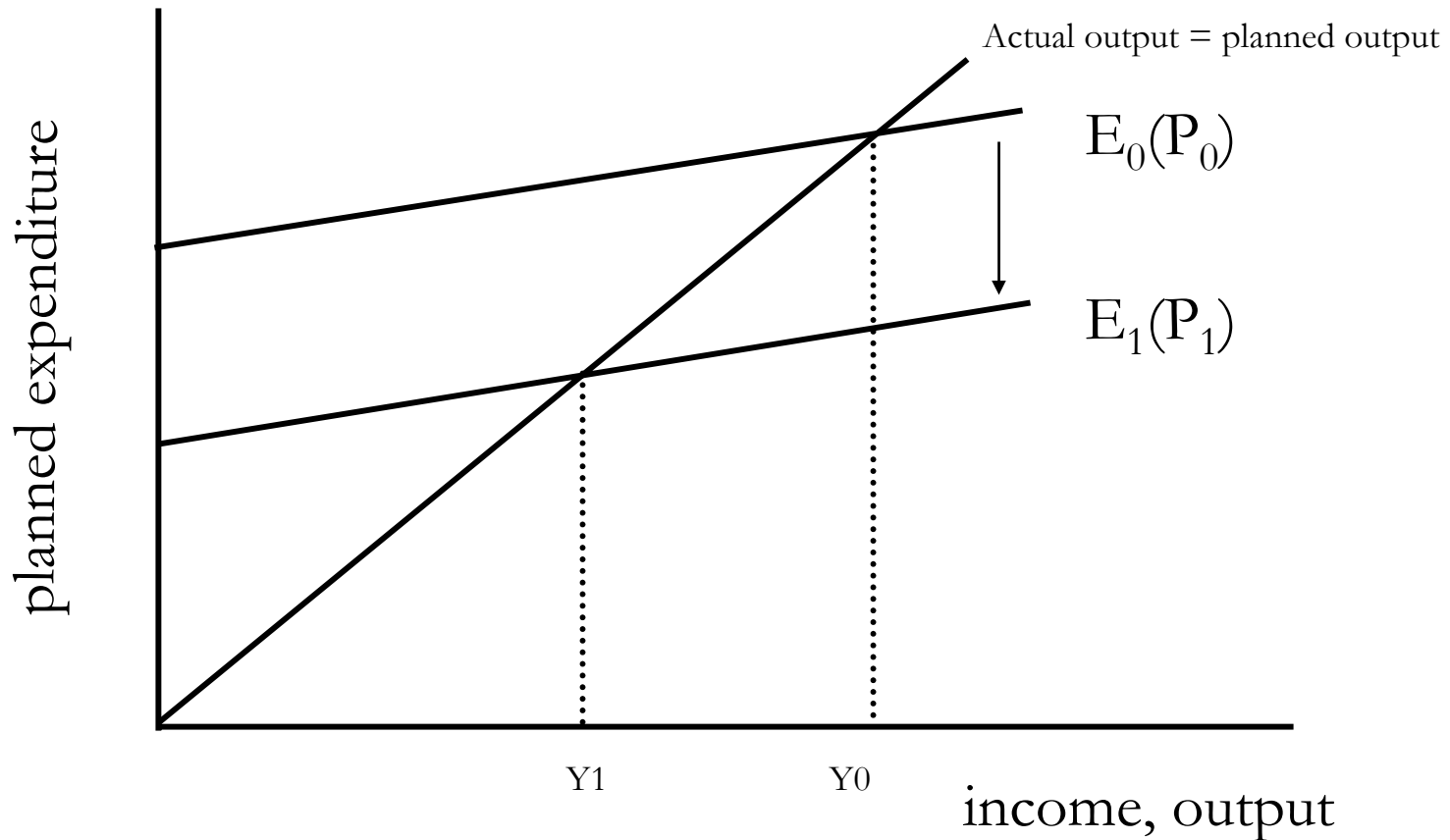
# the open-economy multiplier

- Now consider an open economy
- $Y=C-T+I+G+X-M$
- but  $C=c(Y-T)$ ,  $T=tY$  &  $M=m(Y-T)$ , so
  - $Y = c(Y-tY)+I+G+X-m(Y-tY)$
  - $Y-cY+ctY+mY-mtY= I+G+X$
  - $(1-c+ct+m-mt)Y= I+G+X$
  - $Y = (I+G+X)/(1-c+ct+m-mt)$
  - $\Delta Y= \Delta I/(1-c+ct+m-mt)$
  - $\Delta Y/ \Delta I = 1/(1-c+ct+m-mt)=1/(1-c(1-t)+m(1-t))$
- Imports provide another possible source of withdrawals, and so reduce the multiplier further.

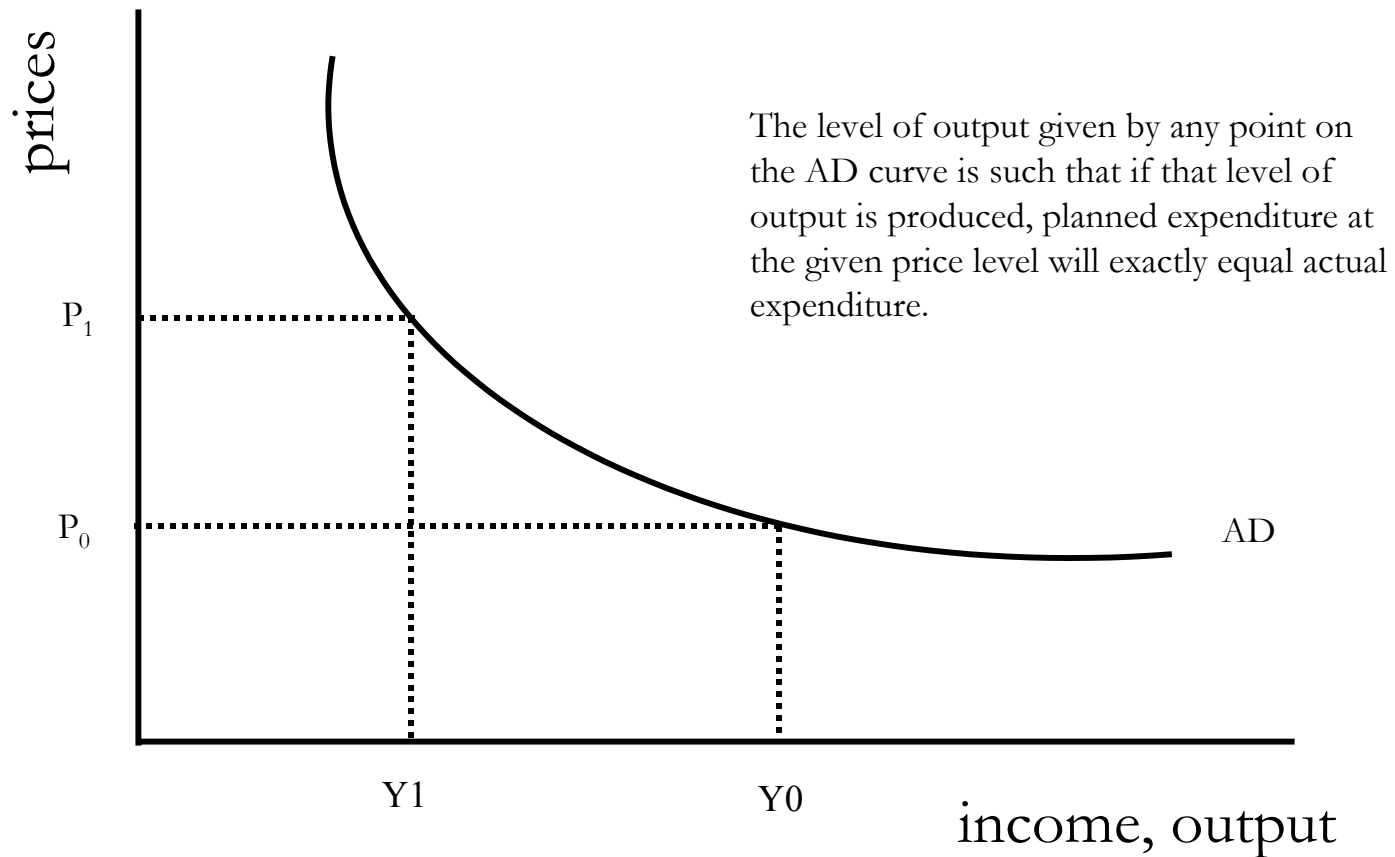
## the Keynesian cross when prices change

- What would happen to equilibrium income if prices were exogenously higher. That is, what happens to the components of  $Y=C+I+G+X-M$ ?
- Consumption depends on real income, so there is no direct effect, but also depends on wealth. An unexpected rise in prices leads to lower real wealth, so lower consumption.
- When prices rise unexpectedly, for a given nominal exchange rate, the real exchange rate is higher and hence it is more difficult to export and easier to import. Therefore the primary current account is lower (net exports fall).
- Therefore, when prices are higher, equilibrium real income should be lower.

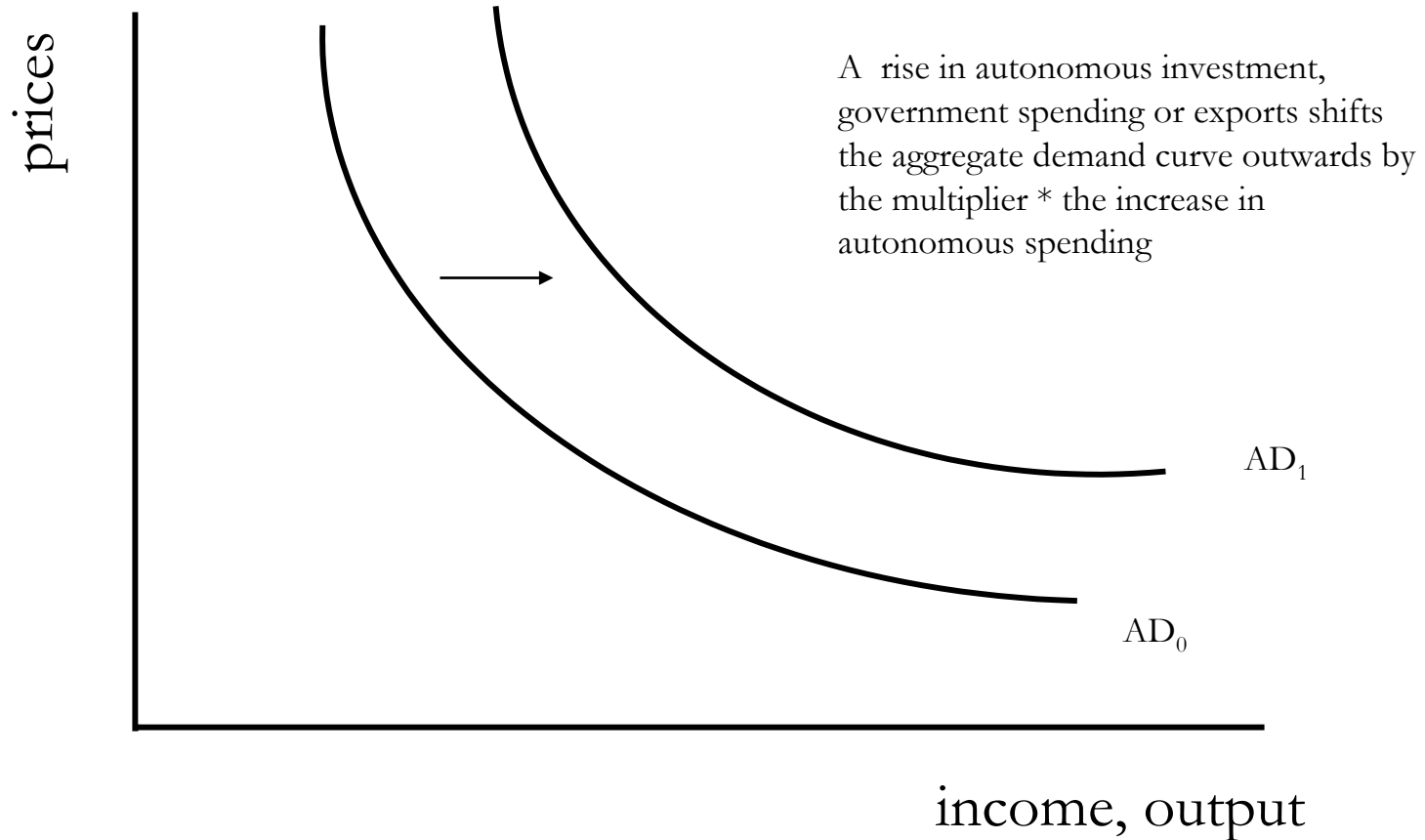
a rise in prices reduces output



# the aggregate demand curve



# a rise in autonomous spending



# looking ahead...

- We know how aggregate demand (where planned expenditure equals actual expenditure) changes when prices change.
- But what determines prices? The next three lectures tell us.
- The first discusses equilibrium in the labour market and hence the setting of nominal and real wages.
- The second discusses the determination of aggregate supply.
- The third brings together aggregate demand and supply.



# looking further ahead...

- So far we have two reasons why aggregate demand rises when the price level falls unexpectedly.
- The first is the Real Balance Effect. When prices fall unexpectedly, the real value of assets whose prices are fixed in nominal terms (such as some government bonds, money, and gold) rises. This leads to more consumer spending.
- The second is the real exchange rate effect. When prices fall unexpectedly, the real exchange rate falls (if the nominal exchange rate is fixed). This leads to an improvement in the primary current account.
- But there is also the Keynes effect. When prices fall unexpectedly people need less money for day to day transactions and so switch their money balances into bonds and shares. This reduces the interest rate and hence increases interest-sensitive spending, such as investment.

# summary

- If prices are sticky, higher aggregate demand raises production, and this raises incomes. Higher incomes further raise consumption, and this raises aggregate demand a little more.
- A change in any component of aggregate demand therefore leads to a multiplied shift in aggregate income.
- The size of this shift is a function of the size of leaks from the circular flow of income (into saving, taxation, and imports). The larger the leaks, the smaller the multiplier. Proportional taxation helps to stabilise the economy.
- Aggregate demand in the economy also depends upon prices (or more formally, upon prices today relative to their previous level plus expected inflation). If prices are higher than expected, aggregate demand will tend to be low.