ECON2004 Macroeconomic Theory and Policy

Lecture 2: The demand side.

Reading: see Moodle

Last lecture

The permanent income hypothesis:

$$c_t = \frac{r}{1+r}\psi_t^e$$

$$\psi_t^e = (1+r)a_{t-1} + \sum_{i=0}^{\infty} \frac{1}{(1+r)^i} y_{t+i}^e$$

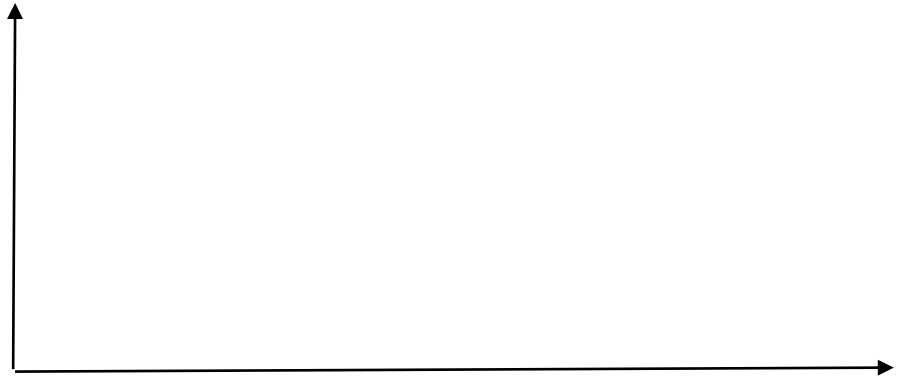
$$c_t = c_0(\Lambda_c) + c_y(\Lambda_c)y_t + c_r(\Lambda_c)r_t$$

Assumptions:

Implications:

Empirical performance:

Consumption smoothing and financial markets



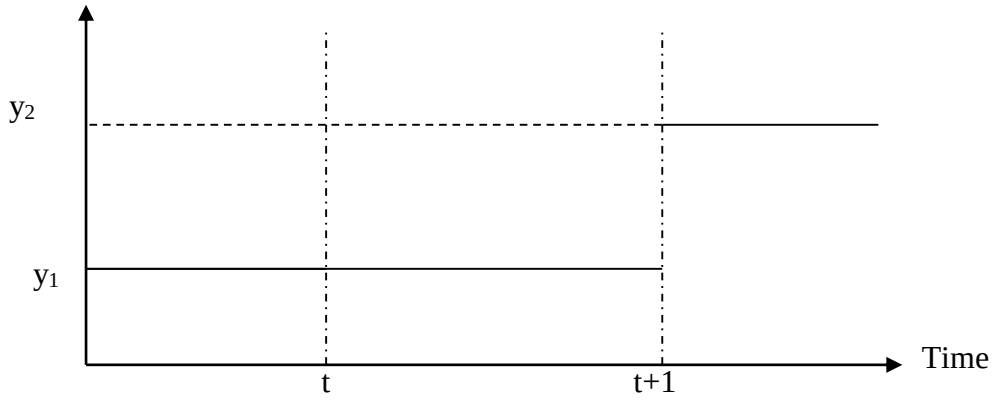
So the PIH also assumes that

In practice:

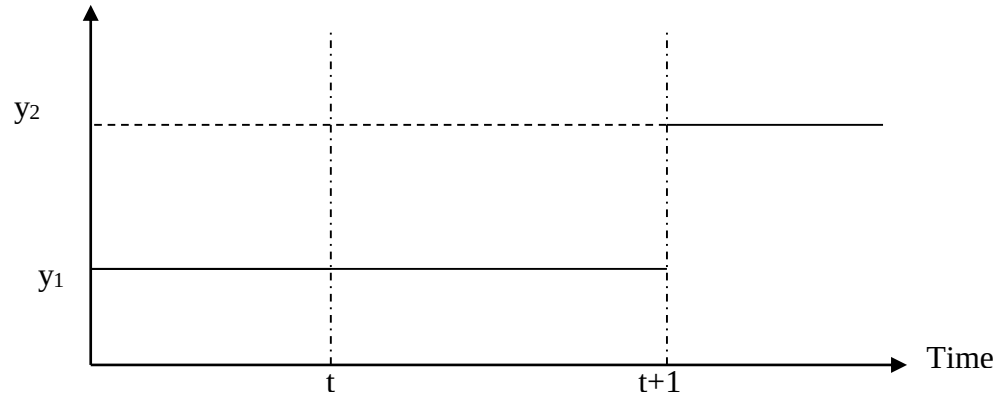
- Lending rates are higher than borrowing rates, and vary across individuals and time (CORE Unit 11)
- Some households are credit constrained i.e. the amount they can borrow is limited
- more details in lecture 8

Consumption with credit constraints

News about an increase in income from y_1 to y_2 at time t+1 is announced at time t



So if (for example) 50% of households are credit constrained and 50% credit unconstrained, aggregate consumption will be:



“Hand-to-mouth” behaviour

There is evidence that some households simply consume their current income.

$$U_t = \sum_{i=0}^{\infty} \frac{1}{(1+\rho)^i} \log c^e_{t+i}$$

Ways to think about this:

For such households, consumption will simply be equal to current income

See CORE unit 12

Aggregate consumption and current income

Consumption of "hand to mouth" households

$$c_t^{HTM} = y_t$$

Consumption of households who follow the PIH

$$c_t^{PIH} = \frac{r}{1+r}\left[(1+r)a_{t-1} + \sum_{i=1}^{\infty} \frac{1}{(1+r)^i} y_{t+i}^e\right] + \frac{r}{1+r} y_t$$

So if a proportion α of households follow the PIH, aggregate consumption is:

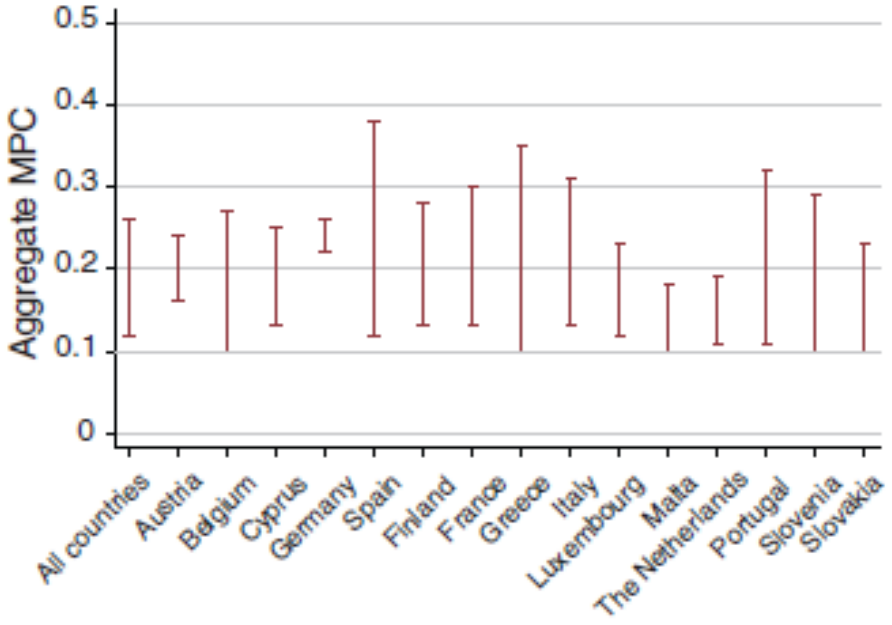
$$c_t = \alpha c_t^{PIH} + (1-\alpha) c_t^{HTM}$$

Compare this with the "Keynesian" consumption function $c = c_o + c_y y$

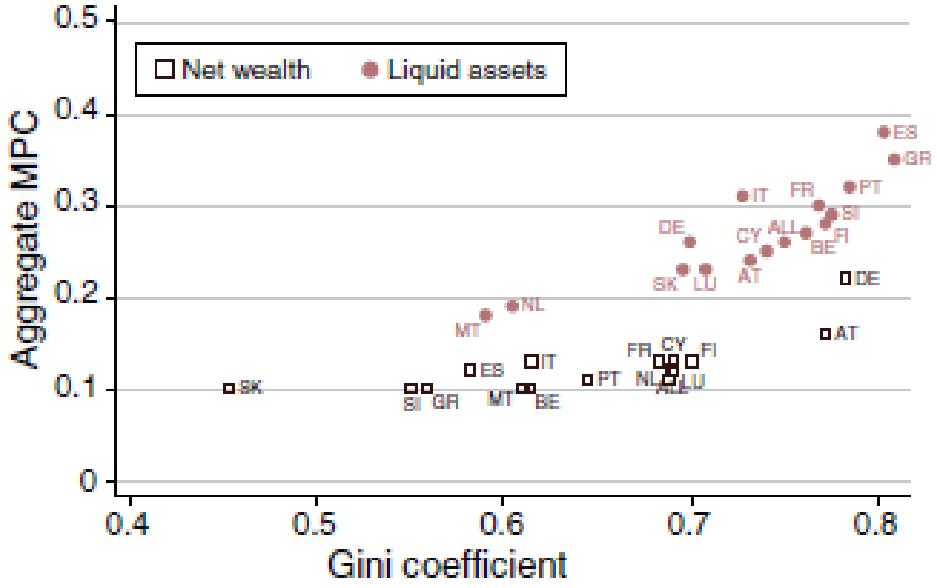
Why didn't we just assume this at the start?

So how big is c_y?

Across countries:



Relation with inequality:



Source: "The Distribution of Wealth and the MPC: Implications of New European Data," (with Christopher D. Carroll and Jiri Slacalek), American Economic Review: Papers and Proceedings,Volume 104, No. 5, pp. 107--11, May 2014.

Pre-tax and after-tax income

y represents households **disposable** income i.e. after tax

If instead y represented pre-tax income, would need to replace y in the above slides with (1-t)y where t is the proportional tax rate.

i.e. the Keynesian consumption function would be

$c = c_0 + c_y(1-t)y$

And lifetime wealth:

$$\psi_t^e = (1+r)a_{t-1} + \sum_{i=0}^{\infty} \frac{1}{(1+r)^i}\left(1-t_{t+i}^e\right)y_{t+i}^e$$

Which set of expressions to use:

- when thinking about consumption in isolation, the original expressions (and state y is after-tax income)
- when thinking about consumption in terms of the macroeconomy, the expressions on this slide

Application: the multiplier as an empirical concept

Definition:

$\Delta y/\Delta z$ where z is something exogenous

e.g. the government spending multiplier

$\Delta y/\Delta g$ "how much does output change as a result of an exogenous change in government spending"

Why does this matter?

Measuring the government spending multiplier:

- difficult to estimate because of reverse causation – government spending both reacts to and affects output…
- …and because different episodes might not be comparable
- a rough rule of thumb is the multiplier in normal times is between 0 and 1.5
- some evidence of negative multipliers "expansionary fiscal contractions"

Application: the multiplier in theory

Take the consumption function

$c = c_o(\Lambda) + c_y(\Lambda)(1-t)y$

Substitute it into the aggregate demand equation:

$ad = c + v + g =$

Assume the goods market clears so **y = ad** then

So theoretically the government spending multiplier is:

The sum to infinity of a gp:

If most agents are hand-to-mouth:

If all agents follow the PIH:

Investment

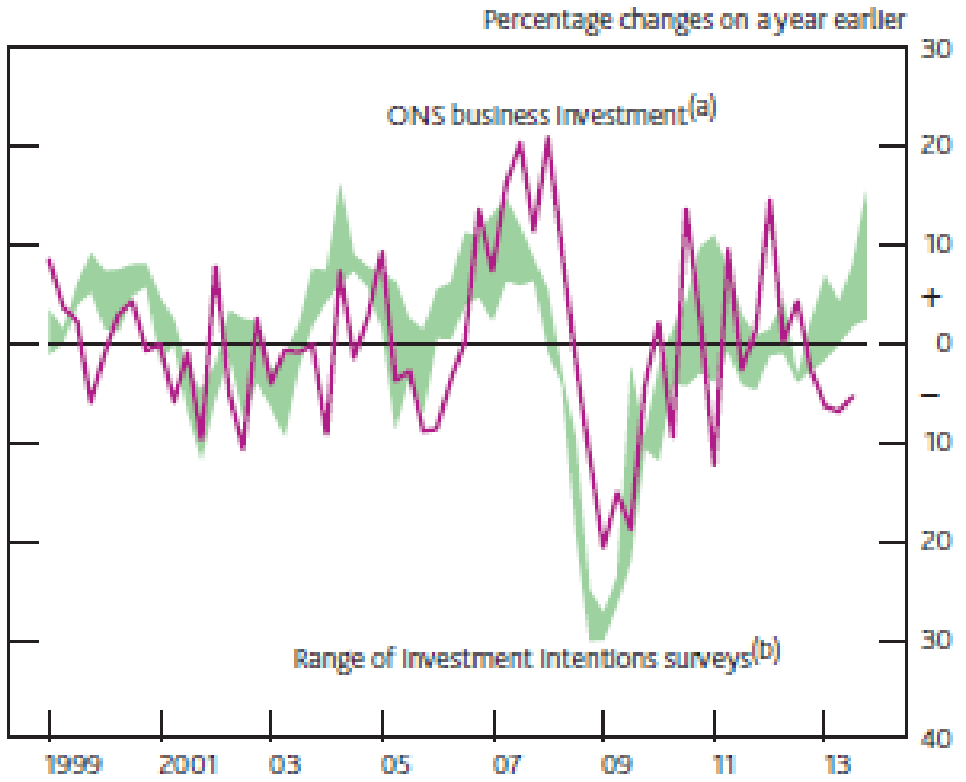
Definition: spending on goods that yield a stream of future services.

Examples:

firms:

households:

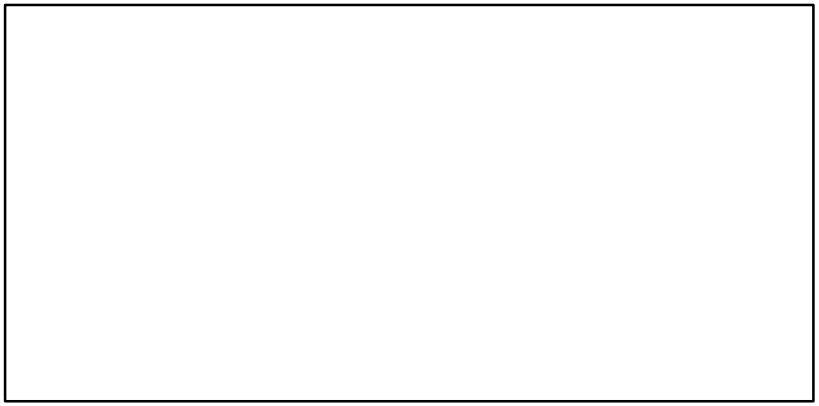
Chart 2.6 Business investment and surveys of investment intentions



Bank of England Inflation Report February 2014

The q theory of investment

Firms choose the level of their capital stock to maximise their value:



Capital depreciates over time at rate δ

The benefit of investing a unit of revenue is:

Time	MB
t	af_k
t+1	$(1- \delta) af_k$
t+2	
t+3	

The cost is:

The q theory of investment

Setting marginal benefit equal to marginal cost:

$$\frac{af_k}{1+r} + \frac{(1-\delta)}{(1+r)^2} af_k + ... = 1$$

Or

$$q = 1$$

where

$$q = \frac{af_k}{r+\delta}$$

The value of q determines a firm's investment decision

q=1	MB = MC	k=k*, v=
q>1		
q<1		

The determinants of investment

$$q = \frac{af_k}{r + \delta}$$

r		
δ		
a		

Also future values of these variables will have similar effects on the MB of capital and hence on q and investment

Future r		
Future δ		
Future a		

Measuring q

Is q easy to measure?

$$q = \frac{af_k}{r + \delta}$$

Instead define average Q as

Q = Stock market value of firm / Replacement cost of capital

Can show under certain conditions (perfect competition) q = Q

…or can use Q to judge whether the stock market is under or over-valued.

… simply need to calculate the ratio on the RHS of the expression for Q. If it's > 1 this means:

1.

2.

3.

See Smithers and Wright (1998) "Valuing Wall Street"

Empirical evidence on investment

Prediction of q theory:

- investment by firms is sensitive to the real interest rate

The evidence

- measurement issues
- weak negative or no effect

Prediction of q theory:

- investment by firms is (largely) independent of current cashflow
- why?

The evidence

- investment is sensitive to cashflow

Investment and animal spirits

"a large proportion of our positive activities depend on spontaneous optimism rather than on a mathematical expectation, whether moral or hedonistic or economic. Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as a result of animal spirits — of a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities. Enterprise only pretends to itself to be mainly actuated by the statements in its own prospectus, however candid and sincere. Only a little more than an expedition to the South Pole, is it based on an exact calculation of benefits to come. Thus if the animal spirits are dimmed and the spontaneous optimism falters, leaving us to depend on nothing but a mathematical expectation, enterprise will fade and die; — though fears of loss may have a basis no more reasonable than hopes of profit had before…individual initiative will only be adequate when reasonable calculation is supplemented and supported by animal spirits, so that the thought of ultimate loss which often overtakes pioneers, as experience undoubtedly tells us and them, is put aside as a healthy man puts aside the expectation of death"

(Keynes, The General Theory, Ch 12)

Investment and animal spirits

$$\frac{af_k}{1+r}+\frac{(1-\delta)}{(1+r)^2}af_k+...=1$$

- we wrote that equation as if the firm knew all the quantities on the left hand side
- is a firm able to form expectations of the long-horizon state of technology or the marginal product of capital?
- See lecture 5 for more on "deep uncertainty"

- most new firms fail; most investments lose money (though they can deliver social benefits in the process)
- given all this, investment only happens if investors have "spontaneous optimism …animal spirits —a spontaneous urge to action"… which seems quite a good characterisation of entrepreneurs.
- Schumpeterian growth (CORE Unit 2,12)
- one explanation of why investment might be only weakly dependent on interest rates

Household investment

Consumer durables:	**Housing:**
• purchase produces a stream of utility in the form of future services • often funded with debt. • easily deferred if debt is hard to obtain • negatively related to interest rates	• purchase produces a stream utility in the form of future housing services • usually funded with debt (mortgages) • negatively related to interest rates • outside option is renting • is housing wealth net worth? An increase in house prices means the value of housing services increases. A household can only realise such wealth if they consume less housing services.

Goods market equilibrium: The IS curve

ad = c + v + g

- the demand side will be summarised by the IS curve, a relation between current real interest rates and current income
- consumption is c= c(Λ_c) where Λ_c are the variables that determine non-durable consumption
- among these are real interest rates and current output so write

$$c_t = c_0(\Lambda_c) + c_y(\Lambda_c) y_t + c_r(\Lambda_c) r_t$$

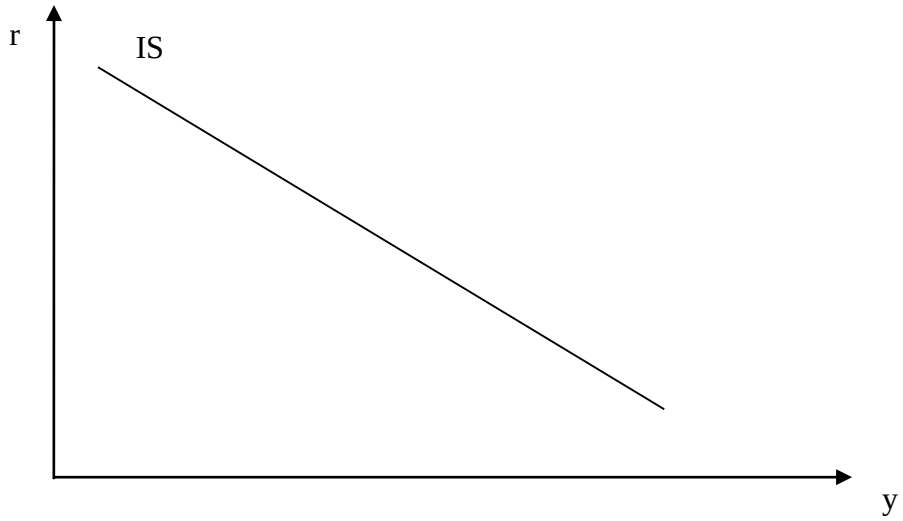
- similarly for investment by firms and households

$$v_t = v_0(\Lambda_v) + v_y(\Lambda_v) y_t + v_r(\Lambda_v) r_t$$

- assume goods market equilibrium **y = ad**

- a fall in interest rates causes interest-rate sensitive components of consumption and investment to rise so increasing output directly
- this has a multiplier effect increasing output further

The IS curve and goods market equilibrium



On the curve:

Above the curve:

Below the curve:

How does the goods market adjust when it is out of equilibrium? See problem set 1.

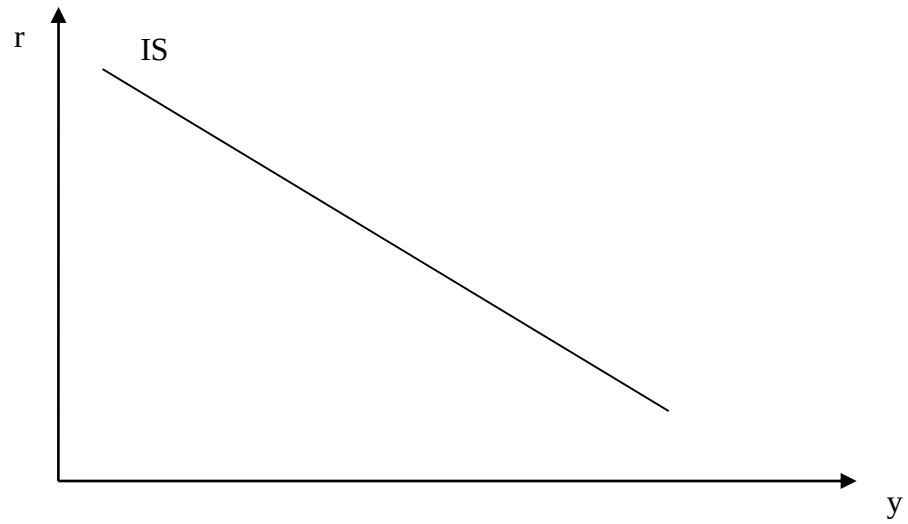
The IS curve

$$c_t = c_0(\Lambda_c) + c_y(\Lambda_c) y_t + c_r(\Lambda_c) r_t$$
$$v_t = v_0(\Lambda_v) + v_y(\Lambda_v) y_t + v_r(\Lambda_v) r_t$$

What determines the slope of the curve?	What shifts the curve?
• The interest sensitivity of non-durable and durable consumption, housing investment and investment by firms • The size of the multipliers for consumption and investment	• Changes in Λ_c, Λ_v and g (exogenous government spending) • See problem set 1 q 3 for the algebra of the IS curve

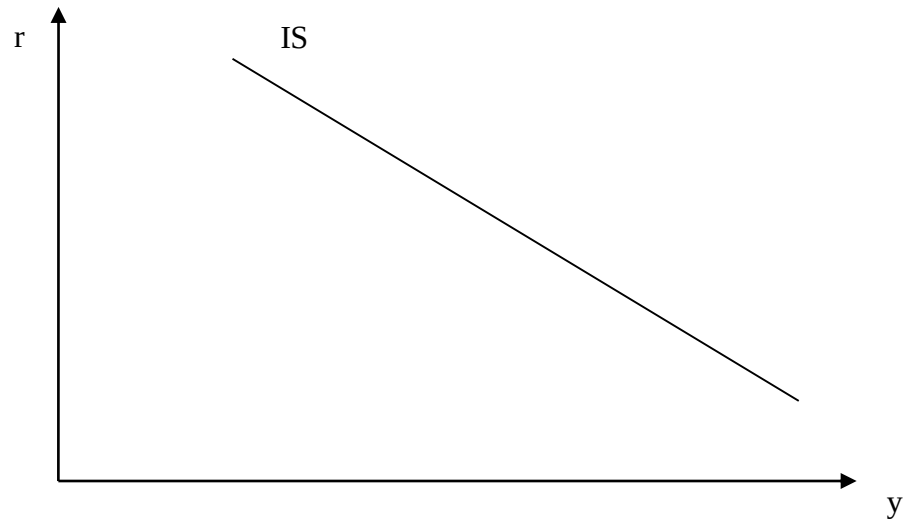
The IS curve and an increase in asset prices

- an increase in asset prices will tend to increase consumption and investment
- mechanisms?
- there will then be a multiplier effect on output
- more in lecture 8



The IS curve and monetary policy

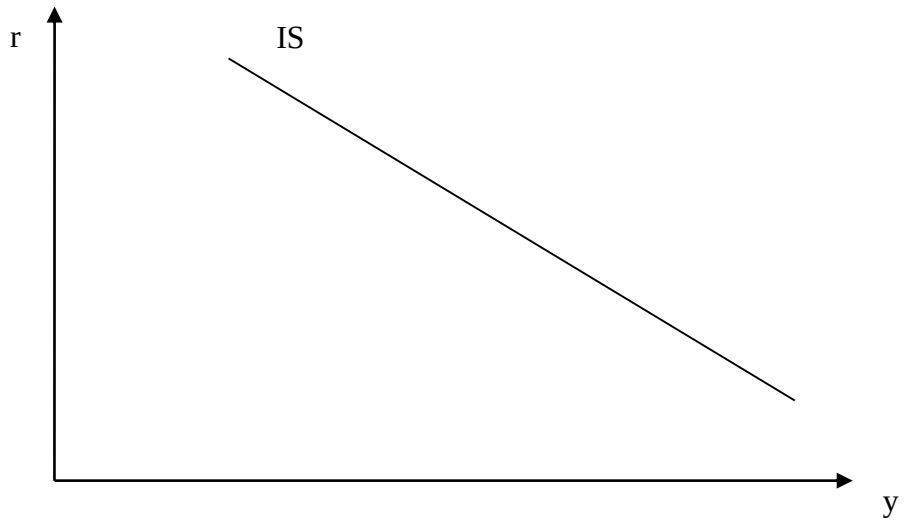
- one way monetary policy works is by changing real interest rates i.e. be moving the economy along the IS curve
- the effectiveness of monetary policy will depend on the slope of the IS curve
- more in lecture 6



The IS curve and fiscal policy

Fiscal policy

- changes in government spending shift the IS curve
- the effect on output will depend on the size of the multiplier…
- … but it's much more complicated than that.
- more in lecture 7



Summary

This lecture:	Next lecture:
• consumption with credit constraints and hand-to-mouth behaviour • the multiplier • investment • the IS curve	• the supply side • perfect competition • imperfect competition – wage setting and price setting • the Phillips curve