

MARGINAL UTILITY

- Until 1871, no-one had a good theory of supply and demand. Why are essential goods like water cheap, and frivolous goods like designer dresses so expensive?
- Marginal utility explains this!
- All else being equal, the value of the last and least wanted addition to your consumption of a good is what sets its value to you
- The last cup of water you drink has little value, so (except in a desert!) sets its value to be small
- Discovered independently by Stanley Jevons and Karl Menger in 1871
- Shifted thinking away from costs of production to demand; led to synthesis by Marshall and others of 'classical economics' with interlocking models of consumption, production, labour etc in a world of free competition ('general competitive equilibrium')

CONCRETE EXAMPLE

- Suppose a local coal market in 1840 has three typical suppliers / customers

sea coal gathering 8s

blacksmith 10s

small deep mine 5s

household 5s

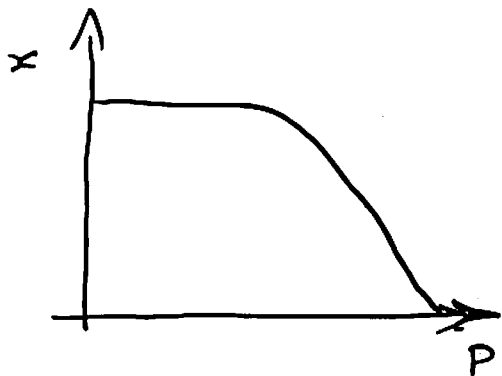
open-cast mine 2s

export 3s

- Market price determines who produces and who consumes
- It is determined by the marginal transaction
- It can fluctuate with demand (weather...)
- It can evolve over the long term with technology, infrastructure investment ...
- Modern view: prices are signals, and markets a distributed information-processing system that matches 6 billion consumers / producers and coordinates production / distribution of millions of goods and services...

DEMAND

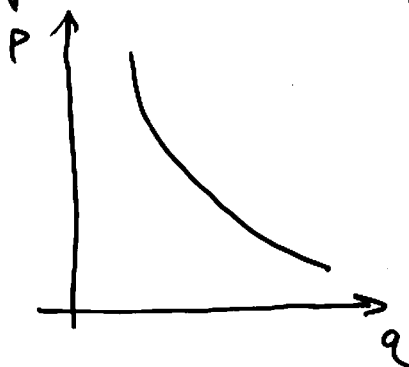
- Assuming functions well behaved, we can get a consumer's demand from their utility, or vice versa



- Market demand is the sum of demand over consumers. (Often, we can think of a single representative consumer.) There are various technical issues we skip here, e.g.
 - dealing with consumers whose demand goes to zero
 - the effect of price changes on income
- In general, a price change will have a substitution effect (if price of fish goes up, eat more meat) and an income effect (if rent goes up, you're now poorer).
- Economists talk of Marshallian demand versus Hicksian demand: the latter has constant utility (i.e., consumer compensated for changes in income)

ELASTICITY

- Given a market demand curve, elasticity measures the effect of a small change in price on the quantity demanded



- Formally, elasticity = $\frac{\% \text{ change in quantity}}{\% \text{ change in price}}$
or $\epsilon(p) = \frac{\Delta q / q}{\Delta p / p} = \frac{p \Delta q}{q \Delta p}$

- Price elasticity of 1 = there are substitutes

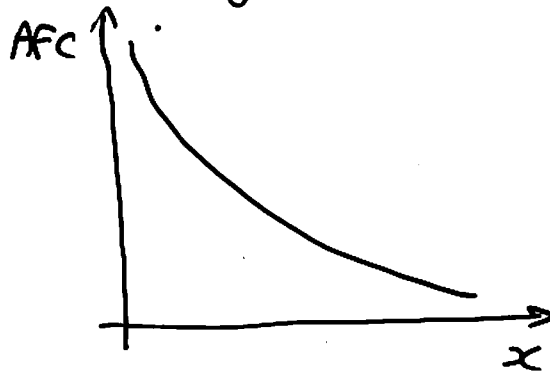
- Revenue $R = pq$, so

$$\begin{aligned}\frac{\Delta R}{\Delta p} &= q + p \frac{\Delta q}{\Delta p} \\ &= q(1 + \epsilon(p)) = q(1 - |\epsilon(p)|)\end{aligned}$$

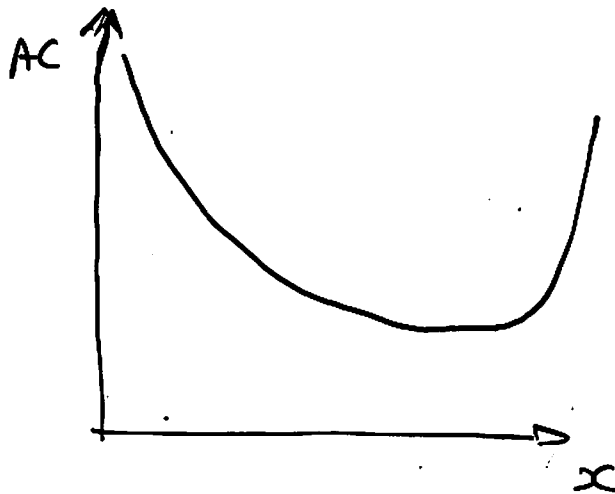
- Price increases result in revenue increases only when elasticity is less than 1 in absolute value. If $|\epsilon(p)| > 1$, then a price increase will cause demand to fall so much that revenue will fall.

SUPPLY SIDE

Firms who compete to produce goods typically have fixed costs and variable costs. The contribution of fixed costs to the average cost falls with output:



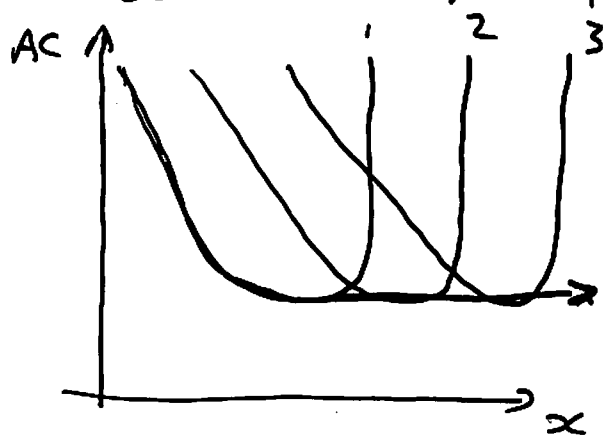
However, the variable costs typically rise at some point (overtime, etc) and eventually rise sharply due to capacity constraints. So a typical cost curve looks like:



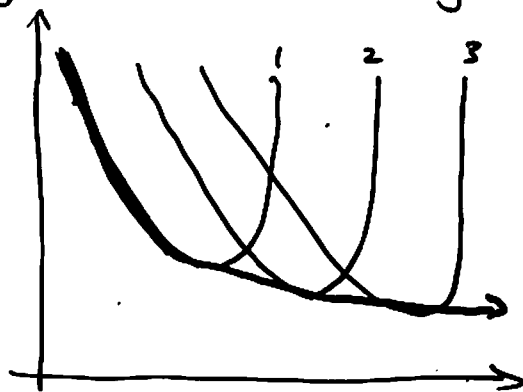
This is the case in static analysis, i.e. in the short run.

COST EVOLUTION

- In the long run, capacity constraints can be fixed by building more factories, giving nearly constant fixed costs and thus constant returns to scale as the firm (industry) expands.



- Technology may improve the process; large factories may be intrinsically better

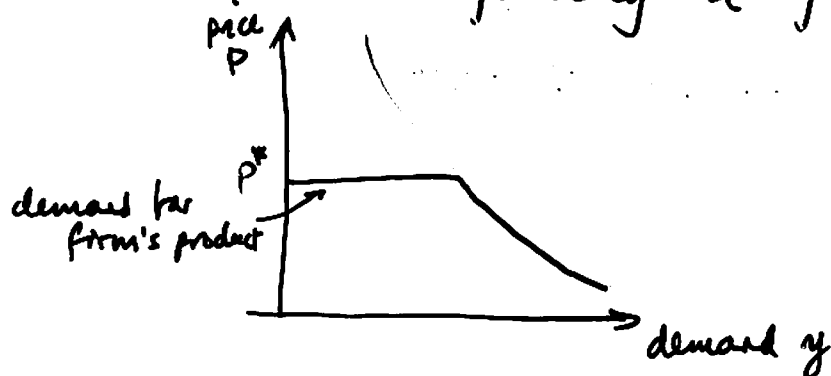


- In some industries, there are natural limits (not everyone wants to drive a Ford)
- In information goods and services industries, the marginal costs may never rise - so a vendor like Microsoft may enjoy ever-increasing returns to scale

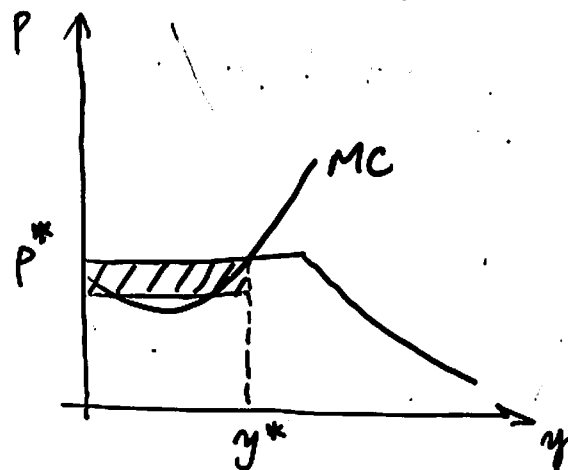
FIRM SUPPLY

- In a competitive market, the price is set by the market, not by any firm; each firm is a price taker.

The demand curve facing a firm looks like:



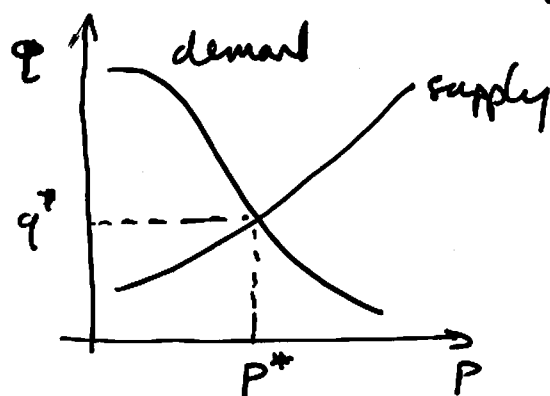
- at any price above the current market equilibrium P^* , demand is zero
 - at any price below P^* , the firm faces the entire demand
- The firm's profit is maximised when it sets output so that its marginal cost equals the price



- Hence Microsoft's strategy of licensing MS-DOS based on number of PCs manufactured - the marginal cost to manufacturers of providing MS-DOS was (near) zero

PUTTING IT ALL TOGETHER

- In the classical synthesis, prices are set where supply and demand curves intersect, in competitive markets with perfect information



- Eventually, P^* will be the marginal cost of the marginal supplier
- Similar models for markets for labour, etc
- Advantages of non-marginal suppliers, that are intrinsic (e.g., good agricultural land) become built into rental values
- All excess profits are competed away
- By early 20th century, people believed that they understood the 'invisible hand' and merely had to guard against market failures like monopoly

EQUILIBRIUM

- Studying supply and demand for one good is 'partial equilibrium analysis'. The general case deals with supply and demand for many goods and services (so must add in labour markets, financial markets etc)
- First theorem of welfare economics: market equilibrium is Pareto optimal
- Second theorem: any Pareto optimal allocation can be achieved by market forces provided preferences are convex
- Technical conditions include: property rights, complete information, no transaction costs, ...
- What remains?
 - issues of politics & justice (Pareto optimality is a weak condition)
 - macro issues, especially business cycle but also growth, trade, finance ...
 - market failures: asymmetric information externalities, bounded rationality ...

EFFICIENCY, WELFARE AND JUSTICE

- These are quite different concepts! Giving all the money to one person will typically be Pareto efficient!
- Pigou: diminishing marginal utility of money means that transferring £1 from a rich man to a poor one will usually increase welfare
- You might hope for a social welfare function composed of individual utility functions, but:

Person Preference	A	B	C
First	x	y	z
Second	y	z	x
Third	z	x	y

A majority prefers x to y , y to z , and z to x

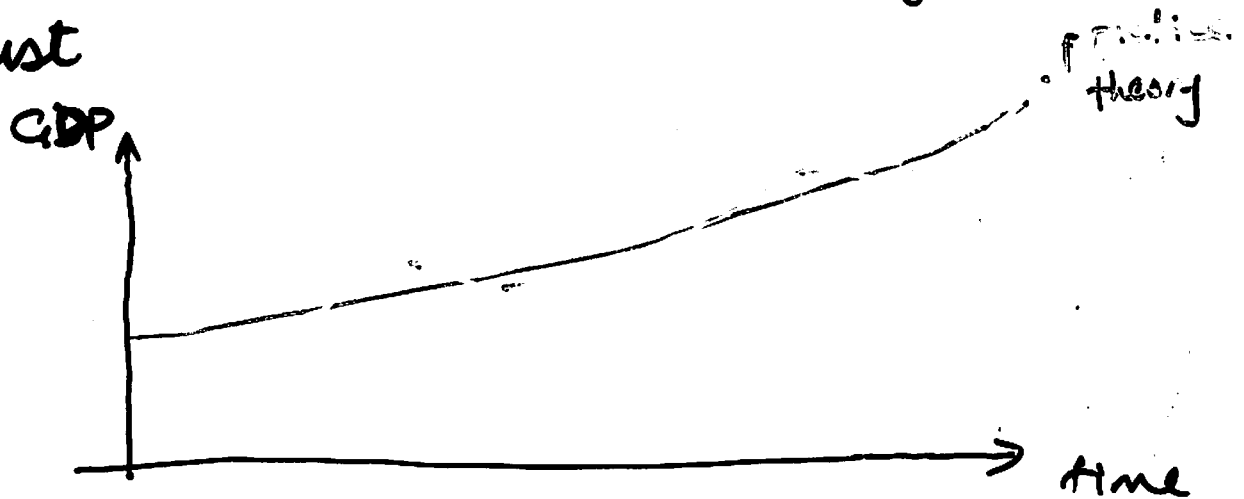
- Arrow's Impossibility Theorem says that there is no perfect way to aggregate individual preferences into one social preference that is consistent with democracy. With ≥ 3 voters, ≥ 3 choices, cycles can occur
- CS relevance - shared-control mechanisms may be open to manipulation by coordinated minorities

EFFICIENCY, WELFARE AND JUSTICE(2)

- Different theories of justice are consistent with different welfare functions
 - $W = \sum U_i$ is the classical utilitarian (Benthamite) welfare
 - $W = \min U_i$ is the Rawlsian welfare - that of the most miserable citizen
- An alternative approach is to ask why, in most societies, there are net transfers via tax and welfare from the most powerful half of the citizenry to the least powerful
- Hard to explain in the classical model, but conflict theory explains it well: the poor fight harder to get welfare than the rich fight to deny it to them
- Consider also a farm policy that brings each farmer £5000 but costs each non-farmer £50. Who will lobby harder?

THE BUSINESS CYCLE

- One of the big puzzles for classical economists was the business cycle. Instead of steady growth, real economies have for centuries followed a pattern of boom and bust



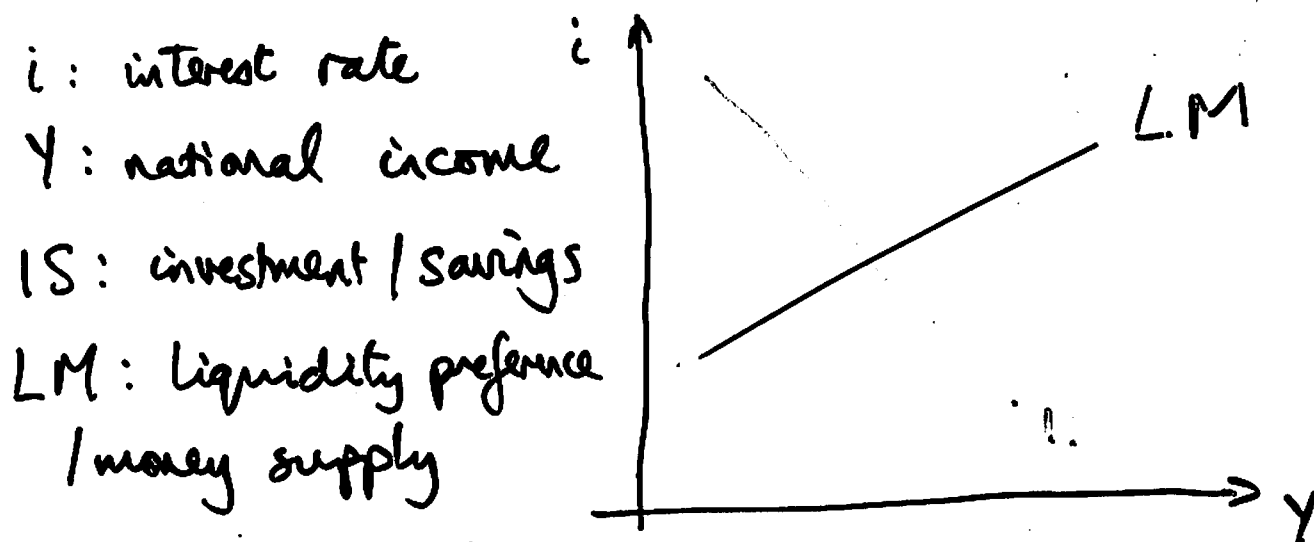
- Recessions show a vicious circle of falling demand, failing businesses, contracting credit, growing unemployment...
- In simple classical models, this should not happen! Falling wages should clear the labour market, and the money that firms spend on wages, raw materials, dividends etc should be exactly enough to buy their output! (Say's law: supply and demand in the economy should be equal)

THE BUSINESS CYCLE (2)

- 19th century: Ricardo and Mill argued that demand for goods + savings = supply of goods + investment, and savings = investment, so demand = supply
- Malthus and Simondini argued that savings had to equal investment in the long run, but could diverge in the short run
- Falling consumer confidence $\rightarrow$ people hoard cash $\rightarrow$ not enough demand
- 1930s: Keynes elaborated this with 'liquidity preference'. People want a certain amount of savings - perhaps 3 months' salary, or 6 months', depending on risk aversion. In a recession, liquidity preference rises.
- There are many other dynamic effects, as things work on very different timescales. Trading securities takes milliseconds, while retraining redundant workers takes years...

THE BUSINESS CYCLE (3)

- In the 1930s the world stayed stuck in recession, with millions unemployed. Why?
- Keynes' 'General Theory of Employment, Interest and Money' set out in 1936 to explain why demand could be insufficient and employment stay too low
- A common telegraphic summary is the IS-LM diagram invented by John Hicks



- Idea: when effects of savings, investment and money supply are modeled in enough detail, the equilibrium isn't necessarily full-employment
- fiscal policy (spending and taxes): a government that spends more can move IS to the right
- monetary policy: increasing money supply moves LM to the right

THE BUSINESS CYCLE (4)

- Credit introduces instabilities at many levels. During a boom, people and firms have strong incentives to borrow to buy assets that appreciate faster than interest costs. (Myopic) bankers are keen to lend
- But the worst instabilities are in the financial system itself!
- A bank that takes in £100 in savings might lend out £94; in other words, £6 of bank capital underwrites £94 of lending, a multiplier of $94/6 = 15\frac{2}{3}$
- Come the recession, many things happen at once:
 - some loans go bad, eating into capital
 - the bank's share price falls, eroding its capital (and its ability to raise more capital)
 - the regulator might think it prudent to raise the capital requirement, say from 6% to 8%
- So the amount of available credit contracts and with it the money supply - unless the government / central bank pumps in more money

THE CURRENT RECESSION

- Kicked off by the US subprime crisis of 2007 which led to collapse of confidence in money markets - no bank knew which other banks were sound any more
- This is a common pattern with recessions! See Reinhart & Rogoff for a historical account
- Big question - will the recession be
 - small (2 y duration, peak-to-trough asset price fall of 30%)
 - medium (4 y duration, fall of 50%)
 - large (8 y duration, fall of 80%) ?
- We have a couple of large ones in the history books (USA, 1930s ; Japan, 1990s), lots of medium sized ones, and very many small ones
- I certainly hope we'll get away with no worse than a medium recession!
- What are the likely effects for the IT industry?

RECESSION AND TECH

- Recessions may often be triggered by financial markets but often are structurally tied up with technological change
- A boom - railways 1844-7, tech 1996-2001 - creates a lot of capacity, and the following bust drives down prices. Schumpeter: 'creative destruction' of legacy firms leaves space for new ones to grow
- The tech industry was hit in 2001 - down 6% versus 16% growth in 2000 - but in 2008-9 it's doing much better, with small growth (3% forecast by Forester)
- One or two firms suffering (Sun, Motorola) but most making progress
- IT is now a thoroughly global industry; if Europe does better than the USA, or if people shift spending from cars to consumer electronics, we get our share either way
- But we're missing usual growth - Microsoft announced Jan 09 that profits for Q2 FY0809 were up 2%, vs one-third increase in FY0708

RECESSION AND TECH (2)

- Some sectors hit worse - capital goods are always hit early in recessions. E.g., new car sales down 30-50%; layoffs in auto electronics
- Services are fairly stable, as there are lots of long-term FM contracts. Academia also tends to have many 3-5 year research contracts
- Outsourcing companies seem to be doing well as firms struggle to cut costs
- Financial-sector IT is struggling - it's an early target when bankers hit tough times (why I moved to academia in 1991!)
- Government systems people are confident that spending will be maintained (though the Conservatives want to axe wasteful systems)
- Hardware is always cyclical - semiconductor fab equipment sales are down, but firms know they will need new products post-recession
- When will Moore's Law run out?
- What other industries will be revolutionised by IT (after bookselling, advertising, ...)?
- What do you think?