Individual behaviour and aggregate outcomes

- Consider a macro level observation of MM where in the lecture room the first rows are empty.

x	x	x	x	x	x
x	x	x	x	x	x
x	x	x	x	x	x
x	x	x	x	x	x
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

What might be the individual behaviours that could result in this configuration?

1. Be as far away from the front as possible measured by rows. Now it is not necessary to have any expectation about the magnitude of the audience.
2. Minimise the walking distance to the seat measured by the rows; this presupposes that the entrances are in the back of the lecture room.
3. Choose a seat by someone already in the room; if not possible choose a seat by the corridor as close to entrance as possible.

- What might be the individual behaviours that result in this configuration?

$$
\begin{array}{cccccc}
0 & x & 0 & x & 0 & x \\
x & 0 & x & 0 & x & 0 \\
0 & x & 0 & x & 0 & x \\
x & 0 & x & 0 & x & 0 \\
0 & x & 0 & x & 0 & x \\
x & 0 & x & 0 & x & 0 \\
x & x & x & x & x & x
\end{array}
$$

- The most important thing is not sit by anyone else.
- The second most important thing is to have as few people in the same column in front of oneself.
- The third most important thing is to sit as front as possible.

Example

Money.

The macro phenomenon is the observation that people accept an intrinsically useless object in exchange for commodities.

How fragile is this institution?

Assume that everyone accepts money as long as it has been accepted; otherwise they cease to accept it.

Assume that there are 10 agents who meet pairwise each period.

In one period, for some reason perhaps by mistake, one agent does not accept another's money.

Next period there are two agents who do not accept money.

Example

(continued) With probability 44/45 these agents do not meet and there will be two more agents who do not accept money in the following period.
With probability 15/45 these four agents who do not accept money are paired with one of the remaining four money-accepting agents, each. Thus, with probability 44/135 all but two of the agents do not accept money in two periods from the first incidence of non-acceptance.

Example

Employment.
Assume that employers do not want to recruit just graduated students younger than 26 years for responsible tasks unless they are married.
Assume that students do not want to get married until they are 26.
Studies take about years five, and students get out of high-school around 19-20 years old.
Then they work for one year or do something else before going to university.
Assume that the social planner does not look upon this as a desirable outcome.
The planner wants the students to start the studies earlier and to graduate earlier, too.

Example

(continued) To implement this, early enrollment into university is encouraged by a substantial grant.
What are the consequences?
Depending on the details any of the following can happen.
Students stay in the university 1-2 years longer.
Students get out earlier but lose an important marriage market and marriage age goes up.
Thus, there will be more unmarried people in responsible tasks.

Example

Traffic safety.
One can think that in traffic people choose a particular level of risk that suits them.
This is manifested in the way traffic functions as well as in accidents and casualties.
Assume that the social planner is worried about casualties, in particular.
For this reason the planner mandates the use of safety belts.
What will be the consequences?

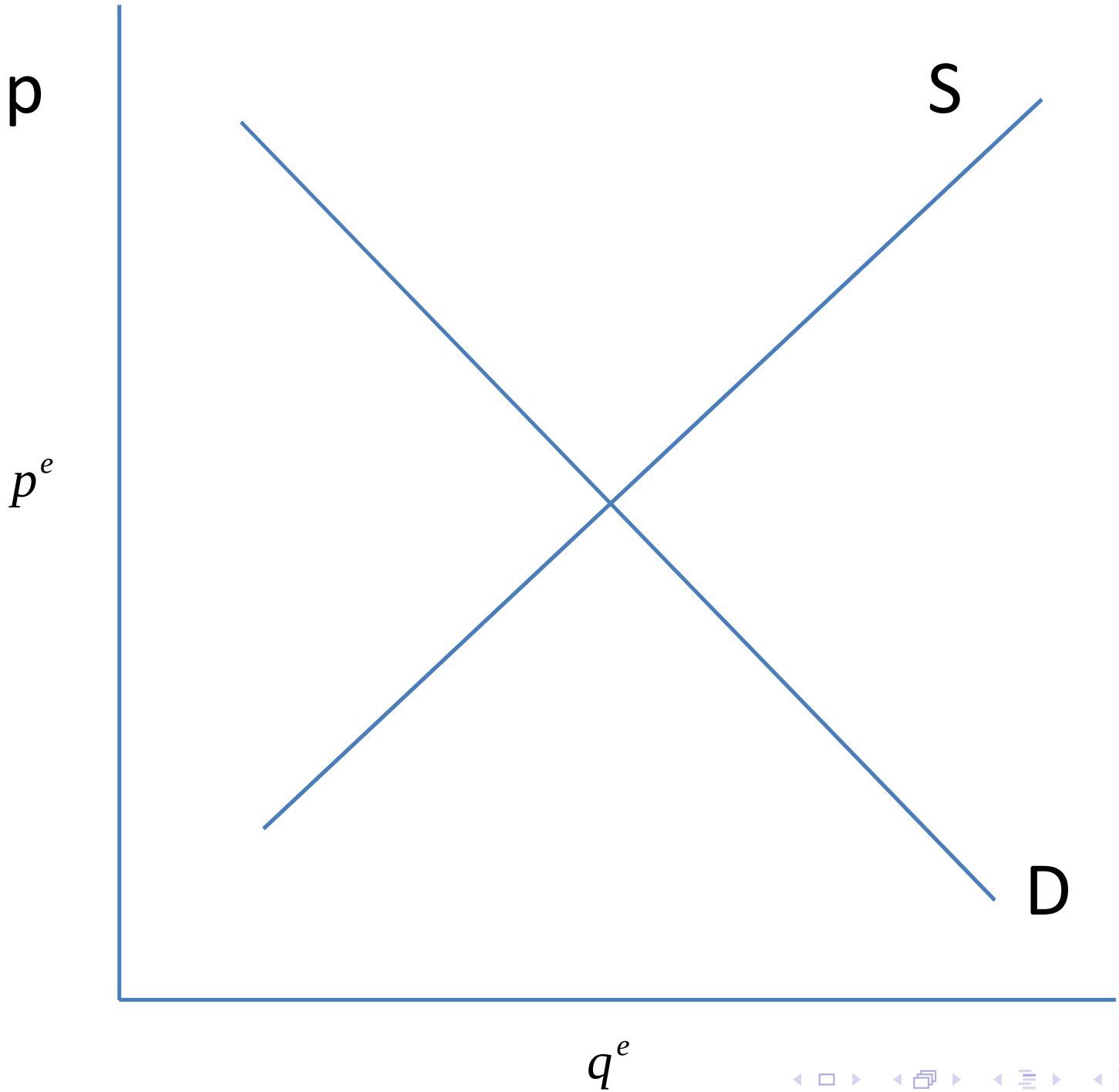
Example

(continued) If nothing else changes people are more secure in the cars, or their risk level is lower than before.
That is, it is disoptimally low.
Consequently, the people behave in ways that raise the risk level to the optimum; in practice they drive faster and more carelessly.
The number of driver casualties remains as it was, but most likely pedestrians will be killed more than previously; they have no added security devices.

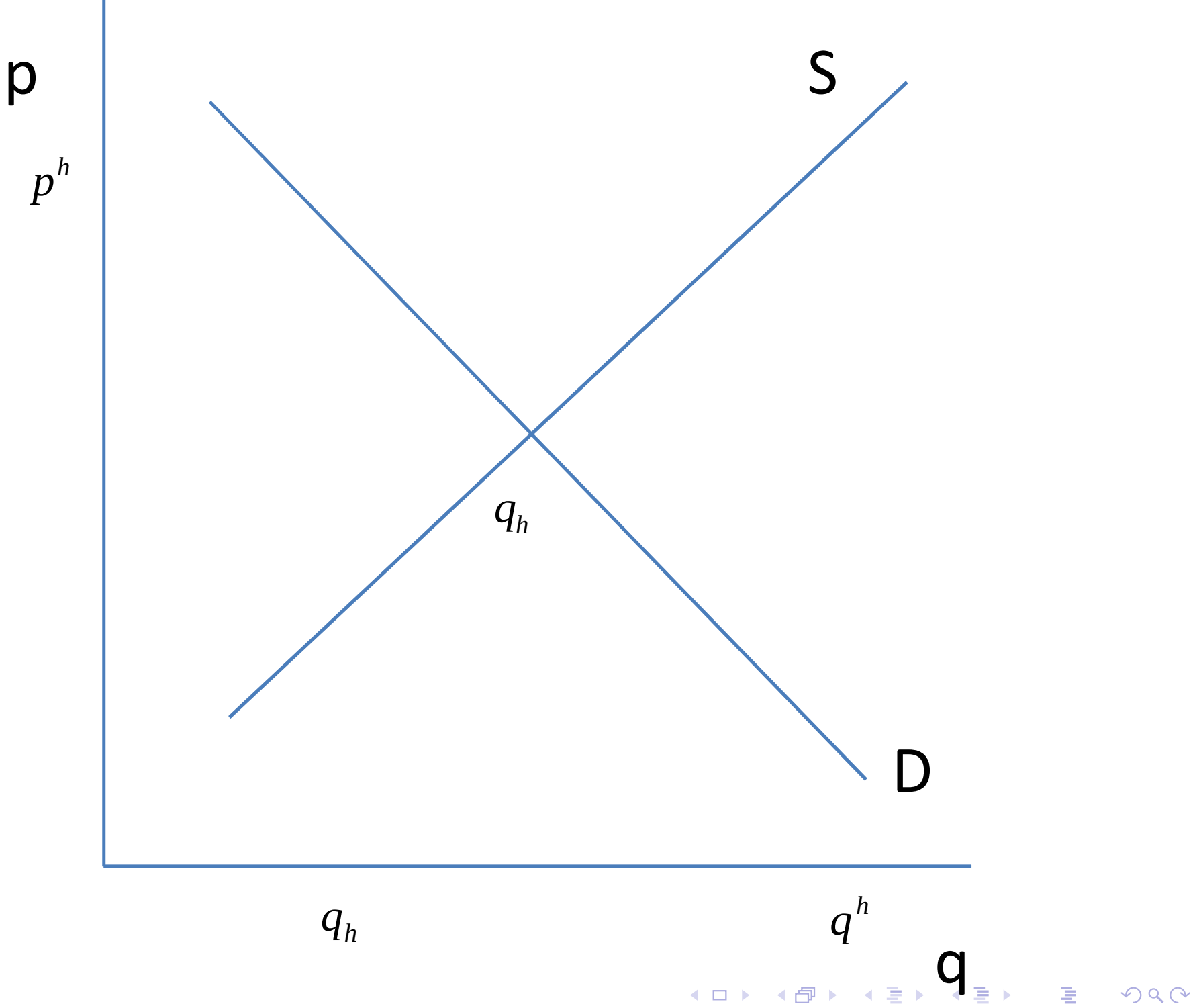
- One of the points Schelling tries to convey, albeit somewhat indirectly, is that studying equilibria, or interpreting phenomena through the concept of equilibrium, is pretty much the same thing as making observations on macroscopic level.
- Focusing on equilibria we bypass the dynamics.
- If we do not know the individuals' motives we may also attribute the wrong individual, or micro, behaviour to them.
- Equilibrium is just a rest-point of some dynamic system, and being in equilibrium does not imply that the situation is desirable.
- In economics a lot of attention is given to markets where prices mediate the intentions, capabilities and desires of the agents.
- In this particular setting equilibrium is many times the best possible, i.e., it is efficient.

- Without prices there is no reason to assume good properties of equilibrium.
- Most activities/institutions called markets are about voluntary exchange.
- That the activity is voluntary means that it cannot be very bad, at least not to the parties that participate in it.
- Why do markets work so well?
- Exchange is voluntary, contracts are enforced, people are protected from extortion, people know what is available and at what price.
- In this setting price is a sufficient piece of knowledge to allow mutually favourable exchange.

- In market equilibrium price is p^e and quantity q^e.



- If prices were something else like p^h then the quantity that sellers want to sell q^h would be less than the quantity the buyers want to buy q_h.
- There would be adjustment; sellers who find that they would be rationed would bid the price down, or if there were equilibrium prices in some other location sellers would transport goods to that location.


p
p^h
S
q_h
D
q_h
q^h
q

- In equilibrium everybody who wants to trade at that price does so.
- Of course, not everybody who would be capable trades; the terms of trade, i.e., the price is such that non-traders voluntarily keep from trading.
- When do markets or market like settings work badly?
- Schelling has an example about sending Christmas cards.

- One can also think about large cocktail parties.
- Typically, people wander from one group to another.
- They greet and talk to people they know.
- How vigorous this activity is depends on what other people do.
- If everyone sticks only to the people s/he likes to hang around and does not go to chat about nothing with acquintances they have nothing to say to then there is quite a little activity and everyone is satisfied.
- If, however, the norm is to greet every person one has sometimes met and to demonstrate that their names are remembered there will be plenty of activity.

- Some people will not contact some others because they do not remember their names.
- To avoid the embarrasment they pretend not to notice these people.
- But it is a bad signal not to greet others if one is not clearly engaged in an interesting discussion.
- People also wander around meeting less attractive people than their closest companions, and this reduces their welfare compared to the situation where everyone sticks to his/her own little group of friends.
- This is, of course, not a market because people's optimal behaviour depends on other people's behaviour, and one does not know it.
- And even if one knows it there is no way to change the outcome by behaving differently; especially if staying away from the party is regarded as a bad signal.

Example

Insurance.
A market which works really badly sometimes is that for insurance.
Consider bike insurance.
People have bikes the worth of which goes from 100 to 1000 euros.
If they exert effort to be careful the bikes are not stolen so easily.
Assume that effort $i > 0$ results in the theft probability of e^{-i}, and the cost of effort is $A(1 - e^{i})$.
A person with bike worth x gets utility $u(x)$ from it and optimally exerts effort determined by

$$max_i(1 - e^{-i})u(x) - A(e^{i} - 1)$$

assuming that $u(0) = 0$.

Example

(continued) The first order condition is

$$e^{-i}u(x) - Ae^{i} = 0$$

from which the optimal effort is given by

$$i = ln\sqrt{\frac{x}{A}}$$

Full insurance $a(x)$ is such that the agent has same utility in the case his/her bike is stolen and in the case it is not stolen, or

$$e^{-i}u(x - p(x)) + (1 - e^{-i})u(x - p(x)) - A(e^{i(x)} - 1)$$

where $p(x)$ is the price of insurance, and $i(x)$ is the optimal effort.

Example

(continued) The FOC determining $i(x)$ is given by

$$-e^{-i}u(x-p(x))+e^{-i}u(x-p(x))-Ae^{i(x)}<0$$

Consequently, the bike owners choose effort level $i(x)=0$, and bikes will be stolen with probability one.
But, of course, insurance companies can see this and do not provide insurance at a price that would be attractive to buyers.

- In all the above examples where markets do not function well or where the outcome of some situation is not desirable there are either external effects, externalities, or private information.
- The latter is quite problematic but the former can many times taken care of; by a market mechanism.

Example

Congestion.
Consider a town where people can spend their free time in two ways.
They can go to a park with practically unlimited capacity.
They can go to beach which becomes less attractive the more people come there.
Going to the park provides utility (in money units) of 20.
Going to the beach provides utility according to the table

Persons	*Utility*
1	100
2	180
3	240
4	280
5	300
6	300
7	280
8	240
9	180

It is necessary to figure out the marginal utilities an additional person experiences

Persons	*Utility*	*MU*
1	100	100
2	180	90
3	240	80
4	280	70
5	300	60
6	300	50
7	280	40
8	240	30
9	180	20

We see that in equilibrium nine people go to the beach.

In the town everyone's utility is then 20.
Assume an entrance fee of size p must be paid to go to the beach.
The last person who goes to the beach is such that his/her $MU = 20 + p$.
If $p = 20$ 7 persons will come, and 140 units of entrance fee is collected.
If $p = 30$ 6 persons will come, and 180 units of entrance fee is collected.
If $p = 40$ 5 persons will come, and 200 units of entrance fee is collected.
If $p = 50$ 4 persons will come, and 200 units of entrance fee is collected.
Social optimum would be when 5 persons come to the beach.