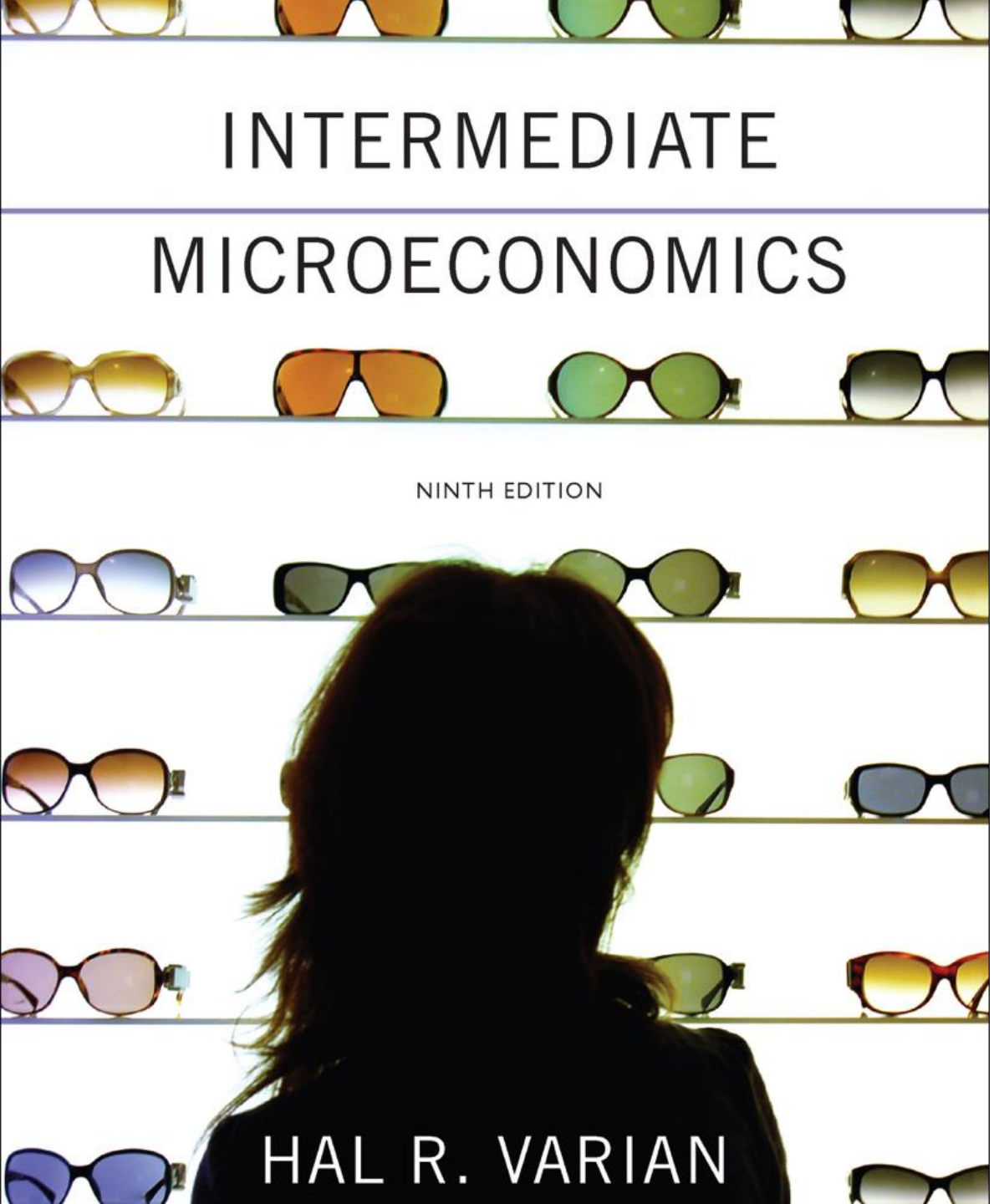


CHAPTER 36

Information Technology

Information Technologies

Of this chapter, we will only discuss Sections 36.4-36.6: Network externalities

Previously we discussed **consumption externalities**: one person's consumption directly influences another person's utility.

Network externalities are a special kind of (mostly positive) consumption externality: the *number* of people who consume a good directly influences a person's utility of consuming that good.

Network externalities

Network externalities: the *number* of people who consume a good directly influences a person's utility of consuming that good. Examples are:

- Cell phones
- Video games (online)
- Social network
    - Would you use Instagram if your friends were not on it?

Network externalities

Suppose a 1000 individuals, which are indexed by $v = 1, \ldots, 1000$.

Think of v as measuring the reservation price of a good by person v.

If the price of a good is p, then $1000-p$ individuals will buy the good (as for them $v > p$).

Hence, $1000-p$ is the standard, downwards-sloping, demand curve.

Network externalities: Demand

Suppose a 1000 individuals, which are indexed by $v = 1, \ldots, 1000$.

But lets now add a twist. Think of vn as measuring the reservation price of a good by person v, where n is the number of people buying the good.

That is, if more people n use it, consumers value the good more, and their reservation price increases. Hence, we have network externalities.

Network externalities: Demand

At a price p, what is the quantity demanded of the good?

If the price is p, there is someone indifferent between buying and not. Let's say that indifferent individual is $\hat{v}$, so that:

$$p = \hat{v}n$$

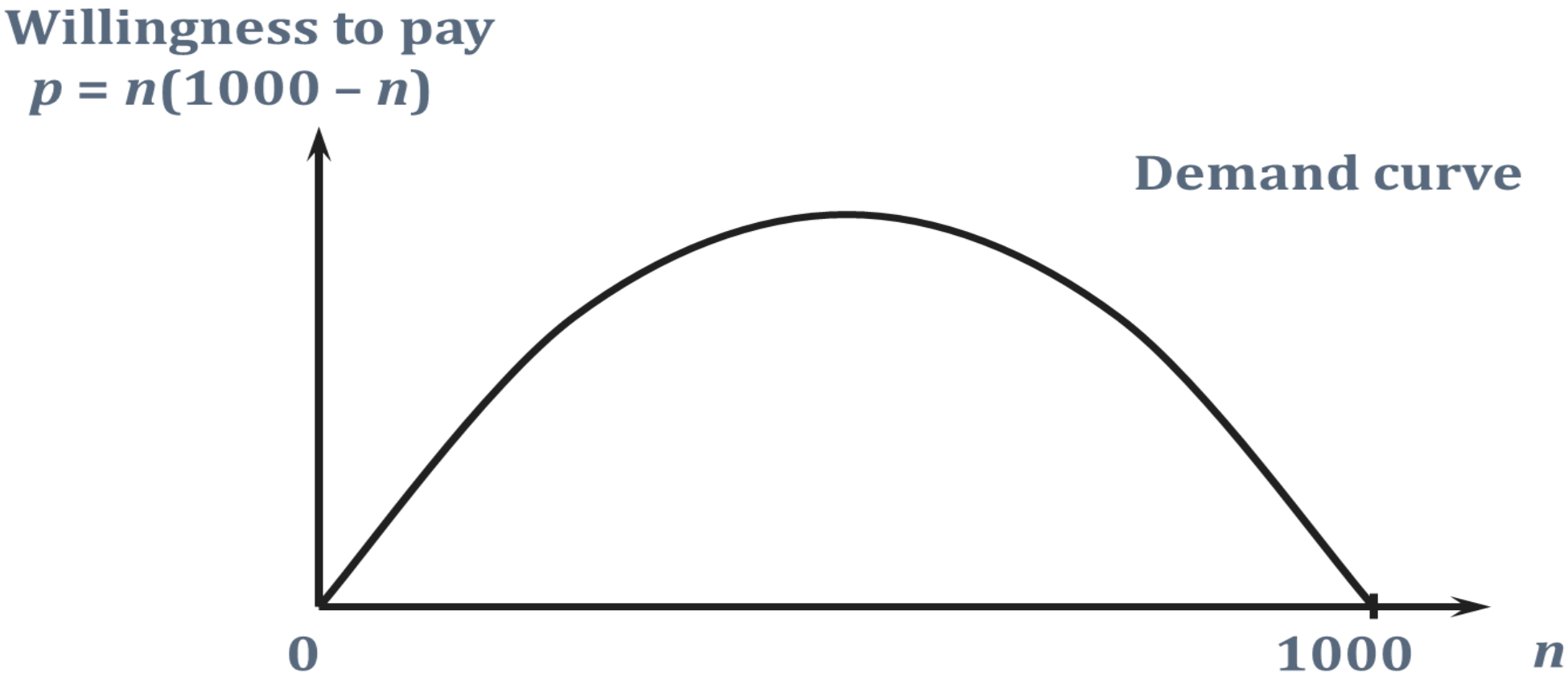
Everyone with $v > \hat{v}$ will buy the good. Number of people who buy the good is:

$$n = 1000 - \hat{v}$$

Substituting one equation into the other, we have the following demand curve:

$$p = n(1000 - n)$$

Network externalities: Demand

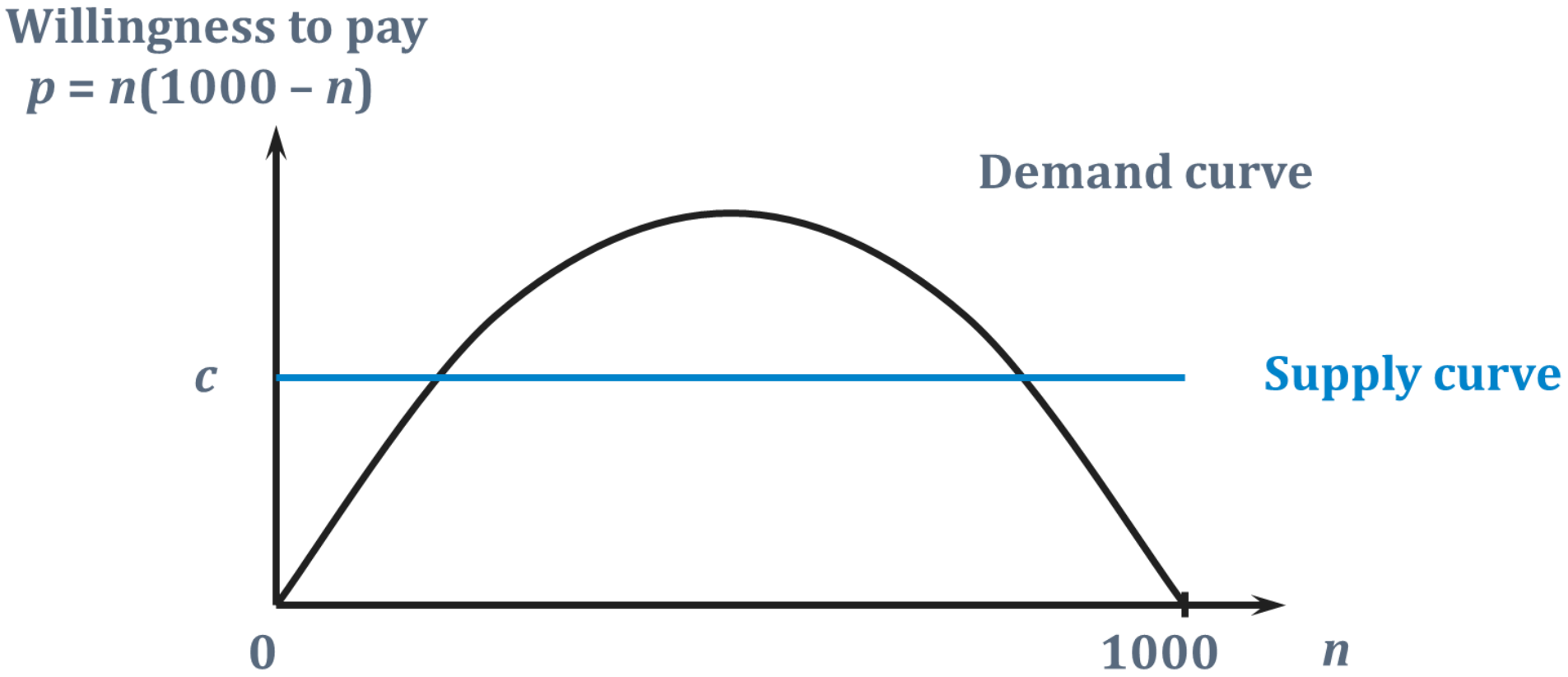


Network externalities: Demand

The intuition for the hump-shaped demand curve is as follows:

- If n is low, then the willingness to pay of the marginal buyer is low because there are not many people around in the network.
- If n is high, then the willingness to pay of the marginal buyer is also low because everyone with a high v already connected to the network.

Network externalities: Supply



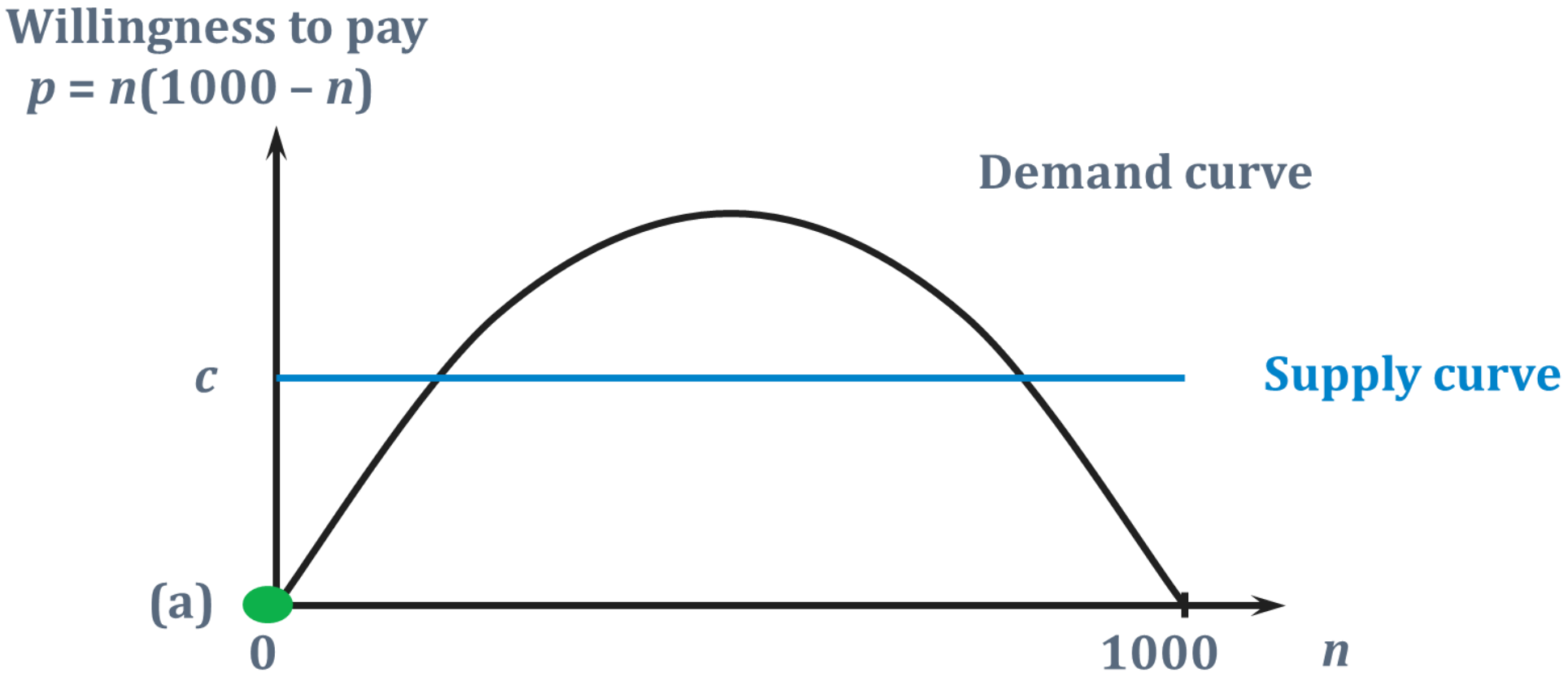
Network externalities: Equilibria

What are the market equilibria?

(a) No consumer buys, no producer supplies.

- If $n = 0$, then value $nv = 0$ for all consumers v, so no consumer buys.
- If no consumer buys, then no producer supplies.

Network externalities: Equilibria



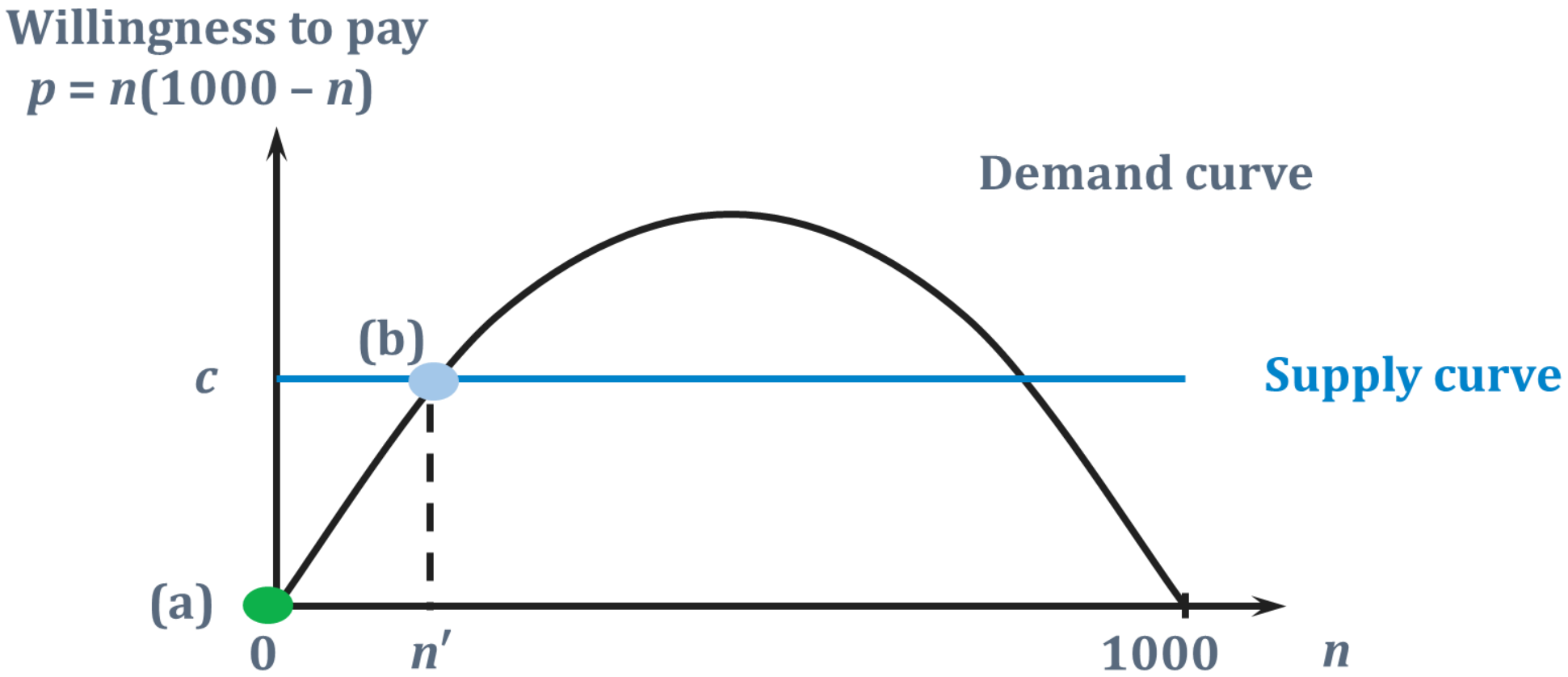
Network externalities: Equilibria

What are the market equilibria?

(b) A small number, n', of consumers buy.

- Small n' implies a small network externality value.
- Good is bought only by consumers with $n'v \geq c$. Hence, only consumers with large reservation price $v \geq c/n'$ buy.

Network externalities: Equilibria



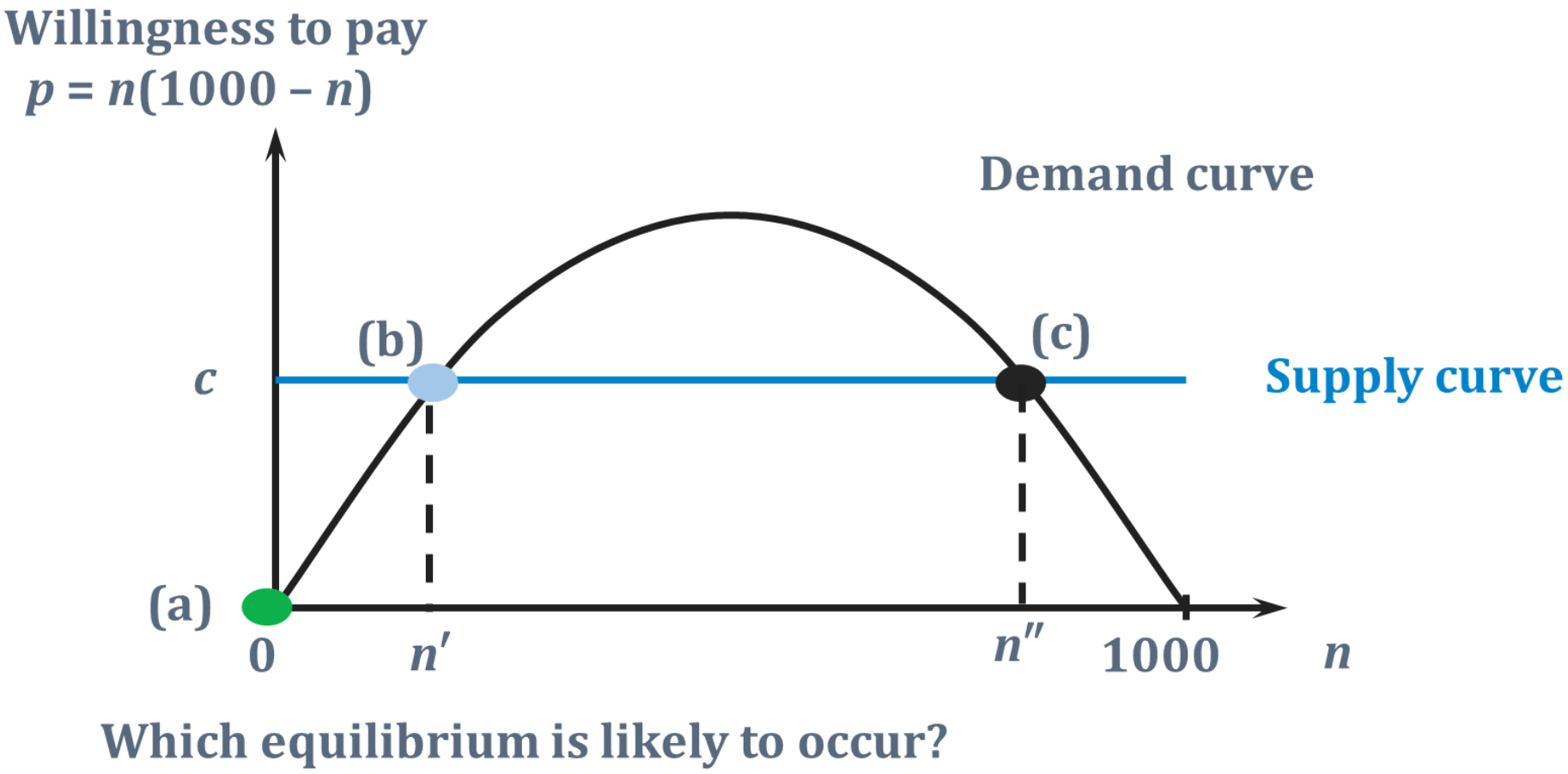
Network externalities: Equilibria

What are the market equilibria?

(c) A large number, n'', of consumers buy.

- Large n'' implies a large network externality value.
- Good is bought by consumers with $n''v \geq c$. Hence, even consumers with a small reservation price $v \geq c/n''$ buy.

Network externalities: Equilibria



Which equilibrium is likely to occur?

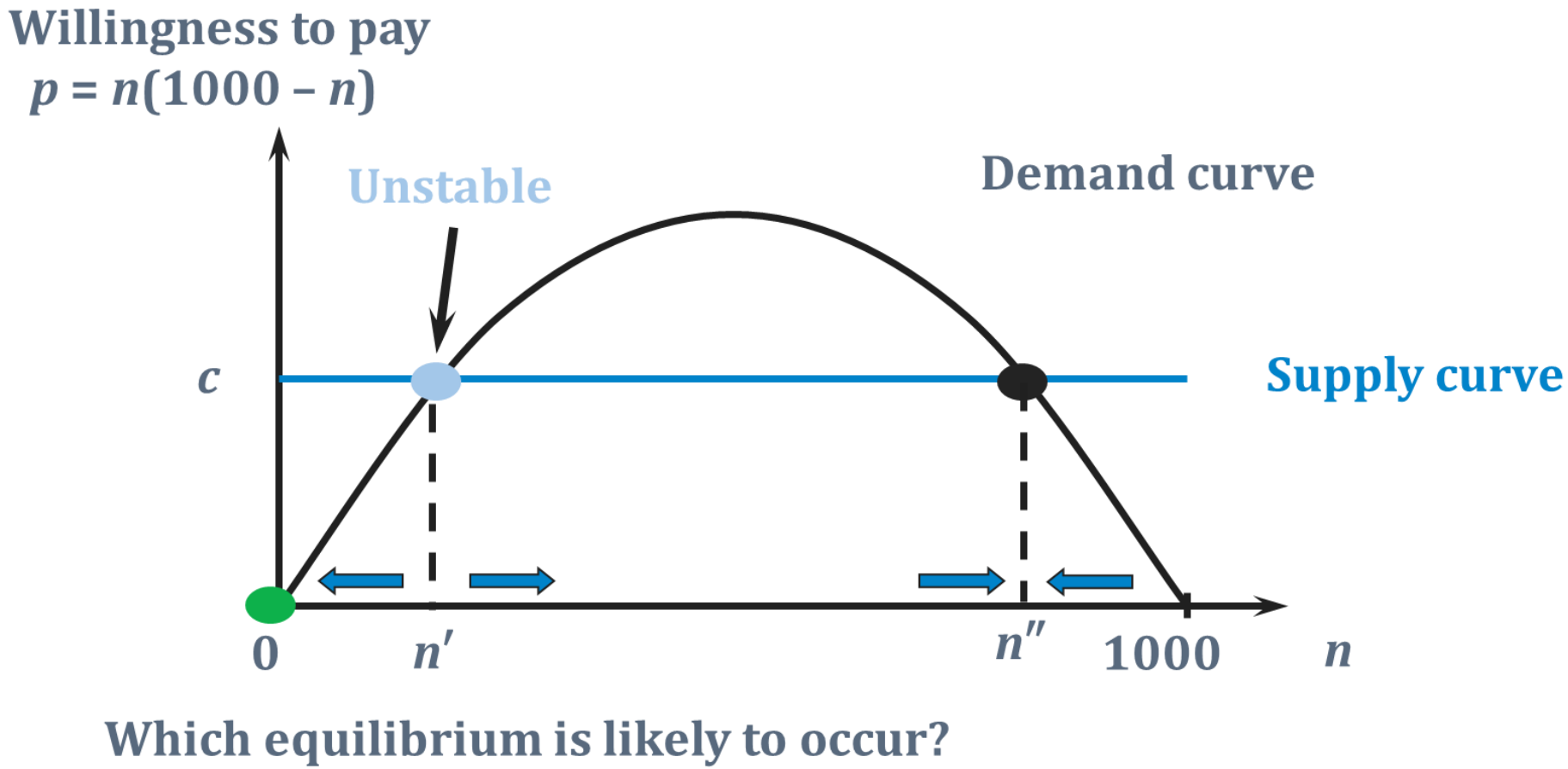
Network externalities: Market dynamics

There are three equilibria. But which one is more likely?

It seems plausible that when people are willing to pay more than the costs of the good, the size of the market expands and, when they are willing to pay less, the market contracts.

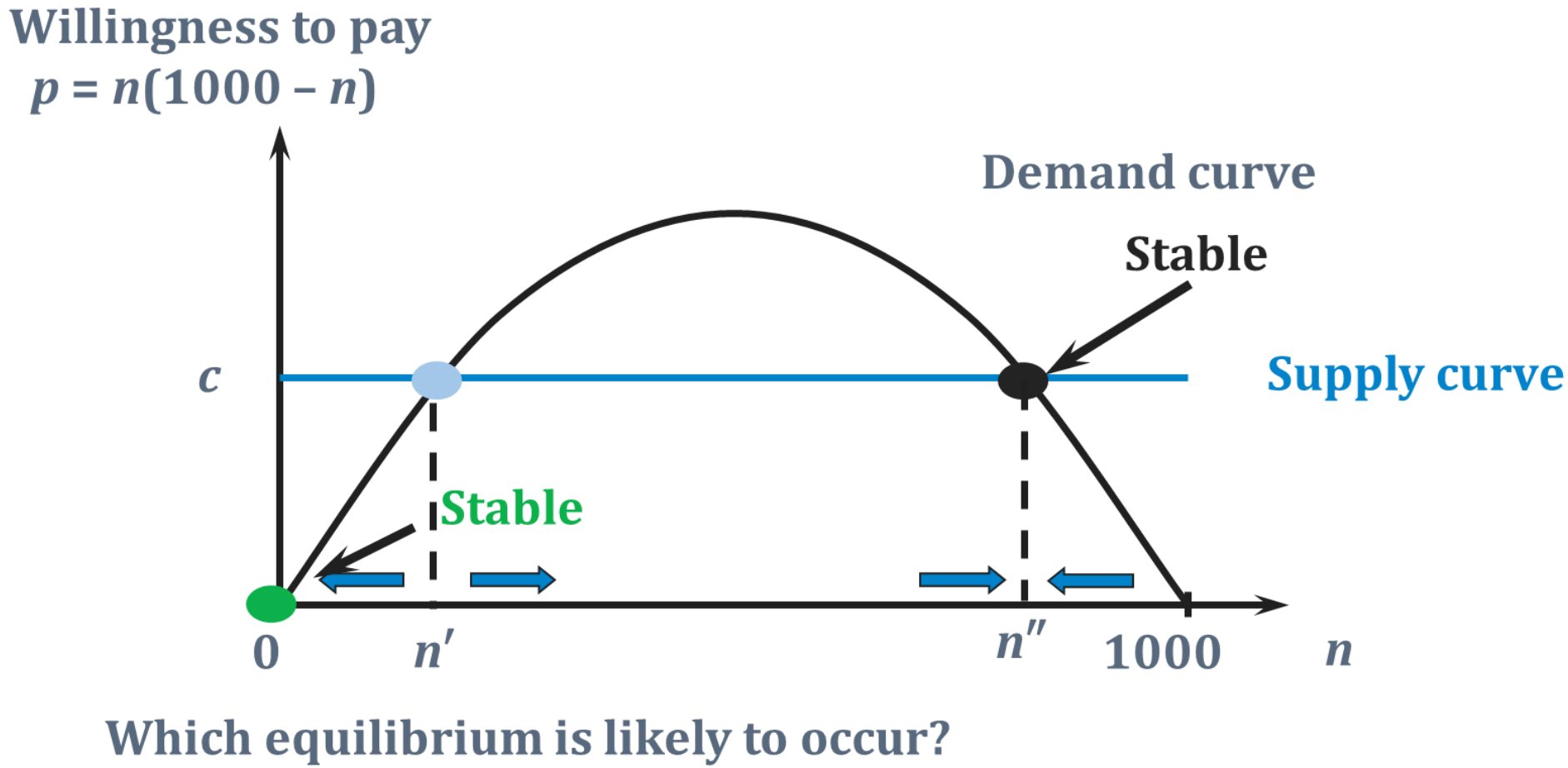
Geometrically, when demand>supply the quantity goes up and when demand<supply the quantity goes down.

Network externalities: Market dynamics



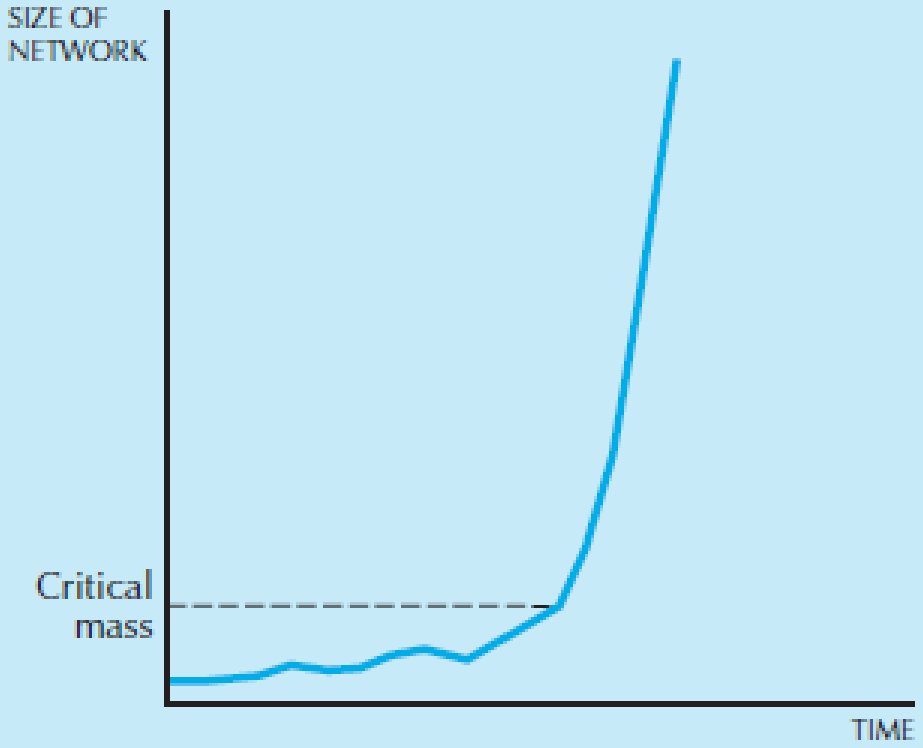
Which equilibrium is likely to occur?

Network externalities: Market dynamics



Which equilibrium is likely to occur?

Network externalities: Market dynamics



Possible adjustment to equilibrium. The number of users connected to the network is initially small, and increases only gradually as costs fall. When a critical mass is reached, the network growth takes off dramatically.