Product Differentiation

- There are many industries that seems to have the features of (near) perfect competition.
- These features are many firms, apparently homogeneous goods, large number of consumers, not much market concentration, no barriers to entry, no explicit price fixing.
- One particular example is the credit card industry.
- Though this industry has features inconsistent with perfect competition.
- One is that prices do not change much with marginal costs.
- The other is that profits (rates of returns) are significantly higher than average.
There are two possible explanations for this that we’ll consider.

The first is switching costs the consumer faces when buying one good versus the other, which usually arises from having to obtain new information.

The other is that the products in the industry aren’t exactly homogeneous—usually the products vary in quality.

It will often be the case where not only are the products different, but consumers value their merits differently.

Furthermore, consumers tastes are negatively correlated.

We’ll refer to this situation as horizontal differentiation.
In contrast cases where all consumers prefer one product over another, will be referred to as a situation of vertical differentiation.

These differences will make us rethink how we model consumer demand.

The characteristics approach will assume that consumer demand will not be directed towards products but product characteristics.

The demand for each good is derived from the demand for its characteristics.

To allow for horizontal and vertical product differentiation, we will consider a discrete choice model making the assumption of rational consumer behavior.

Specifically, we will assume that each consumer chooses the product that provides the highest net utility.
Algebraically, we’ll denote utility for consumer $i$ from buying product $k$ as:

$$u_{ik} = b_{i1}c_{k1} + ... b_{i4}c_{k4} - p_k$$

where $b_{ij}$ is how much consumer $i$ values characteristic $j$, and $c_{kj}$ is how much product $k$ has of characteristic $j$.

This model will allow us to encompass both types of product differentiation.

As we consider each characteristic individually we see a case of vertical product differentiation.

That’s because each $c_{kj}$ will vary with $k$ and does not depend on $i$, so every consumer will think it is better for one product vis a vis the other.

But when we look at all characteristics, we can have horizontal product differentiation.
That’s because \( b_{ij} \) varies with \( i \), so net utilities of products can vary across consumers.

We can now explore some of the implications of product differentiation on oligopoly competition.

We’ll first consider a model of horizontal differentiation, which as we’ll see, will result in less competitive behavior.

To illustrate, consider a model with two vendors, selling an identical product at each extreme of a mile long road.

Even if the product is identical, very few consumers will be indifferent from buying from one vendor versus the other.

That’s each consumer will prefer the vendor that is closer to the consumer’s location.
So generally, consumers do not see the vendors as the same.

This is an example of a situation where sellers offer products that differ by some characteristic, and buyers differ amongst themselves by how they value that characteristic.

How do oligopolists compete in prices when products are differentiated this way?

We’ll address this with the Hotelling model.

Suppose there are a large number of buyers distributed evenly along a segment of length 1.

There are two sellers, each located at the endpoints of the segments, and compete by simultaneously setting prices (Bertrand).
Buyers choose which seller to buy from.

A buyer located at $x$ must travel a distance of $x$ to buy from Firm 1.

Travel costs $t$ per unit of distance so the cost of buying from Firm 1 at price $p'_1$ is $p'_1 + tx$.

A consumer located at Firm 2’s location ($x = 1$) would pay a cost of $p'_1 + t$.

Analogously, a buyer located at $x$ must travel $1 - x$ to buy from Firm 2.

So total costs from buying from Firm 2 at price $p'_2$ is $p'_2 + t(1 - x)$. 
Contrary to Firm 1, the cost from buying from Firm 2 is downward sloping in $x$.

To simplify analysis, assume all consumers purchase one unit, so the only decision they face is whom to buy from.

Because the goods sold by the firms are identical consumers will choose the firm that minimizes total cost plus transportation costs.

We can get an idea of what the demand curves look like by examining properties of the graph.

For example, if firms set different prices, $p_1 = p'_1$, $p_2 = p'_2$, a consumer located at a particular location, say $x'$ will be indifferent between purchasing from either of the two firms.

A consumer located to the left of $x'$ will have a strict preference to purchase from Firm 1.
Whereas a consumer located to the right of $x'$ will have a strict preference to purchase from Firm 2.

Recall we are assuming that consumers are distributed uniformly across locations, so with prices sets as $p_1', p_2'$, so Firm 1’s demand is given by $x'$ and Firm 2’s by $1 - x'$.

This is interesting because although Firm 1’s price is set higher than Firm 2, it still receives positive demand.

This is in contrast to Bertrand equilibrium we had before.