IMPERFECT INFORMATION

AND PRODUCT QUALITY

Professor Ian Sheldon
In the competitive model, goods have relatively simple characteristics about which consumers are perfectly informed.

In reality, most products are relatively complex bundles of characteristics from which consumers get utility, e.g. for food these might be:

- look and taste
- packaging and processing
- nutritional value
- food safety

Such food “quality” characteristics might be regarded as having a demand and a supply that intersect at a market-clearing price.

- demand for food quality is a function of consumers’ willingness to pay for it
- food producers supply quality if it is profitable for them to do so
This assumes both consumers and firms are *fully informed*, market prices transmitting all relevant information about products.

In reality, sellers tend to be better informed about quality than consumers, and, as a result, there may be a *market failure* that requires correction by the policymaker.

In order to understand such a market failure, goods can be divided into three types:

- **search goods** - consumers can determine quality prior to purchase, little need for government regulation.

- **experience goods** - consumers cannot determine quality until after purchase - main issue here is whether firms have an incentive to supply quality or to cheat consumers.

- **credence goods** - consumers cannot determine quality even after purchase - food safety and nutritional aspects of food may require government intervention to assure quality.
Focus on experience goods first:

consider case where, in each time period, consumers purchase a food product $x$ at price $p$, and the good has quality level $q$

prior to consumption, consumers are uncertain about actual quality, but they are able to ascertain that it meets some minimum quality, e.g. fruit is unblemished

many firms can supply the good with identical technology, the cost function being:

$$C(x,q) = c + f$$

c = variable costs $f =$ fixed cost

- $f^h > f^l$, i.e. fixed cost of producing high quality exceeds that for low quality

- $MC^h > MC^l$, i.e. marginal cost of producing high quality exceeds that for low quality

quality is discovered post-purchase - if firm cheated, punished by consumer boycott
PRODUCT QUALITY AND EQUILIBRIUM

\( P, C \)

\( P, C \)

\( ACh + S \)

\( MC^h \)

\( MC^l \)

\( P_3 \)

\( P_2 \)

\( P_1 \)

\( x_1 \)

\( x_2 \)

\( x_4 \)

\( x_2^* \)

\( x_3 \)

\( x \)
What are the possible equilibria in this market?

$(p_1, x_1)$ and $(p_2, x_2)$ are the competitive market prices/quantities for low and high-quality goods - no excess profits made by firms in either case.

As consumers cannot observe quality, firms could cheat by selling low-quality at a high-quality price - i.e. sell $x_2^*$ at the high-quality price $p_2$ - this is known as moral hazard.

Rational consumers will realize firms have an incentive to do this, and will only be willing to pay the low price $p_1$, so only low-quality goods are produced - i.e. a “lemons” market.

There may be a price $p_3$ above the competitive price $p_2$ where firms are willing to supply $x_4$ of high-quality.
with a competitive market, there will be entry, competing down the price below $p_3$, so how do firms supply high-quality without attracting entry?

if firms invest in specific-assets such as brand names, logos and advertising, they incur sunk costs $S$ - this shifts up the curve $AC^h$ to $(AC^h + S)$, and ensures there are no excess profits in equilibrium

firms will not cheat at the high price $p_3$ as they stand to lose future sales and incur a capital loss

investment in specific assets also acts as a signal of quality assurance to consumers
So in the case of experience goods, the problem of market failure can be resolved through the market - US processing firms certainly do invest in specific assets such as brand names.

Problem is that food products contain elements of search, experience and credence goods.

Food safety and nutrition are experience attributes in some respects - if you experience a food-borne illness, the consumer gains some knowledge of product quality.

Most consumers, however, cannot make the link between food safety and health if there is a substantial time-lag between consumption and illness; the same is true of poor nutrition and health.

Market reputation models do not work well in the case of credence goods, and it is not practical for consumers to assess quality - i.e. there is a market failure.
Due to the failure of the market’s ability to supply high quality credence goods, government has to step in and play a role in aiding consumers to assess food quality:

**Nutrition Labeling and Education Act, 1990**

- nutrition labeling is mandatory in the form of a standardized information panel on food products

- voluntary nutrient content claims such as “low fat” and “high fiber” are set within guidelines of the law, i.e. a claim about low fat means the same thing from one product to another

- nutrition labeling has the effect of turning the product from an experience/credence good to a search good - i.e. a government supplied reputation signal
# Nutrition Facts

Serving Size ½ cup (114g)
Servings Per Container 4

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>% Daily Value*</th>
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</thead>
<tbody>
<tr>
<td><strong>Calories</strong> 90</td>
<td>Calories from Fat 30</td>
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<tr>
<td><strong>Total Fat</strong> 3g</td>
<td>5%</td>
</tr>
<tr>
<td>Saturated Fat 0g</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Cholesterol</strong> 0mg</td>
<td>0%</td>
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<tr>
<td><strong>Sodium</strong> 300mg</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Total Carbohydrate</strong> 13g</td>
<td>4%</td>
</tr>
<tr>
<td>Dietary Fiber 3g</td>
<td>12%</td>
</tr>
<tr>
<td>Sugars 3g</td>
<td></td>
</tr>
<tr>
<td><strong>Protein</strong> 3g</td>
<td></td>
</tr>
</tbody>
</table>

Vitamin A 80% • Vitamin C 60%
Calcium 4% • Iron 4%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

<table>
<thead>
<tr>
<th>Calories: 2,000</th>
<th>Calories: 2,500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat Less than 65g</td>
<td>80g</td>
</tr>
<tr>
<td>Sat Fat Less than 20g</td>
<td>25g</td>
</tr>
<tr>
<td>Cholesterol Less than 300mg</td>
<td>300mg</td>
</tr>
<tr>
<td>Sodium Less than 2,400mg</td>
<td>2,400mg</td>
</tr>
<tr>
<td>Total Carbohydrate 300g</td>
<td>375g</td>
</tr>
<tr>
<td>Dietary Fiber 25g</td>
<td>30g</td>
</tr>
</tbody>
</table>

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4
In the case of food safety labeling, this is at an early stage of development; major regulation passed relates to food handling practices

- following the *E. coli* outbreak in 1993 on the West coast, the US Department of Agriculture requires all fresh meat and poultry products to carry safe handling labels

- the main problem with food-borne pathogens is that their levels can change considerably after leaving a processing plant, which raises questions as to when and where food safety should be measured and labeled

Government (and industry) often has to take drastic action in the case of product safety, i.e. mandated/voluntary withdrawal of product from the market, e.g.

- “mad-cow” disease in the UK - all beef sold on the bone withdrawn from the market

- “Perrier” water was withdrawn from the market at one point when benzene was discovered in batches of the product
Packed in Vermont for Sugar Mountain Farm
252 Riddle Pond Road
West Topsham, VT 05086
SugarMtnFarm.com
(802) 439-6462

Pastured Pigs Bred, Born & Raised on our Vermont Farm
Grass-Fed
Humanely
Free-Ranged
Outdoors

NET WT.

Healthy food from our family farm to your family’s table

US INSPECTED AND PASSED BY DEPARTMENT OF AGRICULTURE EST. 32158

NoNAIS.org
Buy Local

Safe Handling Instructions
This product was prepared from inspected and passed meat and/or poultry. Some food products may contain bacteria that could cause illness if the product is mishandled or cooked improperly. For your protection, follow these safe handling instructions.

- Keep refrigerated or frozen.
- Thaw in refrigerator or microwave.
- Keep raw meat and poultry separate from other foods.
- Wash working surfaces (including cutting boards), utensils, and hands after touching raw meat or poultry.
- Cook thoroughly.
- Keep hot foods hot. Refrigerate leftovers immediately or discard.

www.fsis.usda.gov/Food_Safety_Education
Case of “mad-cow disease”, is a good example of the difficulties in establishing public policy in this area.

In March 1996, British government announce a potential link between Bovine Spongiform Encephalopathy (“mad-cow disease”) and a disease affecting humans called Creutzfeldt-Jakob disease.

Within two days, the British beef market fell by 30%; given 20 people were known to have been affected by the disease, and perhaps many more may eventually exhibit the symptoms, the media and public felt more should have been done earlier by the government.

Problem facing the government was when to act on slowly accumulating and incomplete scientific information, which highlights a difficult problem for public policy:

- should government regulations enforce intensive precautions without regard for cost?
- should government be more lenient, while keeping up firms’ profits and prices down?

- In 1989, the British government supposed that the infectious agent responsible for BSE was the same as “scrapie” in sheep, which had been around for at least 200 years.

- UK beef industry was worth roughly $6.5 billion per year, with 136,000 jobs - did the disease represent such a threat that any drastic policy action taken would have a serious economic impact?

- Government at the time believed that the species barrier between cows and humans would protect the latter from infection - a judgement that subsequently proved incorrect.

- A simple change in the food chain caused the disease, cows which are ruminants, were fed dietary supplements containing the rendered body parts of other cows and sheep.

- The dietary supplements provided additional protein to cows encouraging faster growth, but allowed BSE to sweep through the cattle herd.
Typically, conservative judgements of the type made by the British government are the rule rather than the exception - it takes time for scientists to establish a clear link between something such as disease in cows and disease in humans.

The concept of a Pareto improvement then is extremely difficult to implement in such circumstances where the science is uncertain, and there is a potential for large economic loss if the government incorrectly chooses a radical policy.