# 1 The Competition of Product Standards

## 1.1 The Lemons Problem

Consumers and producers have asymmetric information about the quality of a product.

Consumers' lack of information implies that sellers who would have liked to offer good quality products and charge a higher price for them refrain from doing so.

The sellers who offers poor products will try to persuade consumers that these are of high quality.

So the market for good quality products will disappear.

The problem is not about justice but one of allocative efficiency.

The consumers will not be fooled because they can foresee producers behavior and pay a low price.

The problem is that they will be unable to buy high-quality products at higher prices.

It most severe when a large number of acts over a long period are required before the quality can be assessed.

To solve these problems nations use regulation.

For example, Germany has developed product standards to prevent French liquor with too little alcohol to be sold.

Swedish chocolate contains too little cacao to be sold as chocolate in some countries (even though it sometimes tastes better...).

Our concern today is that if systems competition among regulating countries does not work, then centralized actions on the EU-level may have to be considered.

So does systems competition work?

## 1.2 A Model of Private Quality Competition

- Assume there is a lemon good of quantity $x$.

- There is also a normal good of quantity $y$ that can be transformed into the lemon good by shifting factors of production between productive activities.

- Let $q$ be the quality of the lemon good, and $c(q)$ the unit production cost of the lemon good.

- Assume that $c'(q) < 0$ for $q < q^*$, $c'(q) > 0$ for $q > q^*$ and $c''(q) > 0$.

- The price of the lemon good in terms of the normal good is given by $P$.

- Consumers' utility function is given by

$$U(x)V(q) + y,$$

where $U'(x) > 0$, $U''(x) < 0$, $V'(q) > 0$,and $V''(q) < 0$.

- Note that the formulation implies that quality and quantity are complements in the sense that the marginal utility of one item increases with the consumption of the other item ($U'(x)V'(q) > 0$).

- The individuals endowment is given by $\overline{y}$ and this can consequently be spent on either $x$ or $y$.

- Importantly, buyers are less informed than sellers; they can only observe the average quality of the lemon good sold.

Now, consumers can not decide about the quality.

So taking $q$ as given, the consumer's problem is given by

$$\max_{x,y} U(x)V(q) + y$$

$$s.t\ \overline{y} = y + Px$$

When the restriction is binding the problem is given by

$$\max_{x,y} U(x)V(q) + \overline{y} - Px$$

The first-order condition with respect to $x$ is

$$U'(x)V(q) = P.$$

The producer maximizes his profits by choosing the lemon good's quantity $x$ and quality $q$, which only he can observe.

He therefore solves

$$\max_{x,q}(P - c(q))x$$

The first-order condition with respect to $x$ is equal to

$$P = c(q).$$

This condition is standard.

It says that the marginal product of the good should equal the marginal cost.

The first-order condition with respect to $q$ is equal to

$$c'(q^*) = 0.$$

It says that the producer chooses the quantity $q^*$ at which the unit cost of production is minimized.

In other words, since the price cannot be made dependent on $q$, there is no marginal benefit of increasing the quality.

Therefore $c'(q^*) = 0$.

Combining the consumers' first-order condition with respect to the quantity $x$,

$$U'(x)V(q) = P,$$

with the firms',

$$P = c(q),$$

yields the market equilibrium expression

$$U'(x)V(q) = c(q).$$

It says that the consumer's marginal willingness to pay for a unit of the lemon good is equal to the marginal cost of production.

Proposition: There is no efficiency problem with respect to the quantity $x$.

### 1.2.1 An Allocative Explanation of the State Regulation of Quality

To study whether the market is efficient or not we now look for the welfare optimum.

The social utility is the sum of consumer rent

$$U(x)V(q) + y,$$

and the producer rent

$$Px - xc(q).$$

Since $\overline{y} = y + Px$ it follows that welfare in this model is equal to

$$W = U(x)V(q) + \overline{y} - Px + Px - xc(q),$$

or

$$W = U(x)V(q) + \overline{y} - xc(q)$$

The welfare optimum follows from the following optimization problem

$$\max_{x,q} U(x)V(q) + \overline{y} - c(q)x.$$

The necessary condition for a welfare optimum includes the quantity condition

$$U'(x)V(q) = c(q).$$

This was the one we already derived and concluded was efficient.

In addition, we have the quality condition

$$U(x)V^{'}(q) = c'(q)x.$$

This equation requires equality between the marginal benefit and the marginal cost of an increase in quality $q$, given the quantity $x$.

Now, we know that

$$U(x)V'(q) > 0$$

and therefore

$$c'(q)x > 0.$$

Since

$$c'(q^*) = 0$$

and

$$c''(q^*) > 0$$

it follows that

$$q > q^*.$$

Proposition: From a welfare perspective it is optimal to choose a higher quality than the one determined by the market.

Consider how the firms' problem under symmetric information differ from the one under asymmetric information.

Under symmetric information the quality depends on the price.

So the firms' problem is

$$\max_q (Pq - c(q))x.$$

The first-order condition to this is given by

$$P = c'(q).$$

Note that the higher quality the larger are the incomes.

This implies that the level of quality is higher under symmetric information.

Let's do a simple example where

$$c(q) = q(q - a).$$

This is a convex function as

$$c'(q) = 2q - a$$

and

$$c''(q) = 2.$$

Under asymmetric information the firms solve

$$\max_q (P - q(q - a))x$$

The first-order condition is

$$-2q + a = 0.$$

So we get

$$q^A = \frac{a}{2}.$$

Under symmetric information the firm solves

$$\max_q (Pq - q(q-a))x.$$

The first-order condition is

$$P - 2q + a = 0.$$

The optimal level of quality is

$$q^S = \frac{P+a}{2}.$$

So the quality is higher by the term $\frac{P}{2}$.

### 1.2.2 The Competition of Laxity

What happens when the borders are opened and unrestricted trade is allowed?

Consider first the optimistic assumption that consumers in all countries know, and can judge, the national standards.

In this case, $P(\widetilde{q})$ would emerge in the market.

Given this, consumers solve

$$\max_{x,q} U(x)U(\widetilde{q}) + \overline{y} - P(\widetilde{q})x$$

(Note that $y = \overline{y} - P(\widetilde{q})x$.)

Consumers optimally choose the quality at which their marginal willingness to pay for an improvement in quality is equal to the expenditure increase the market requires

$$U(x)V^{'}(\widetilde{q}) = P'(\widetilde{q})x$$

The national regulatory agencies would solve

$$\max_{\widetilde{q}}(P(\widetilde{q}) - c(\widetilde{q}))x$$

The standard $\widetilde{q}$ is set such that

$$P'(\widetilde{q})x = c'(\widetilde{q})x$$

Combining the two conditions yields

$$U(x)V^{'}(\widetilde{q}) = c'(\widetilde{q})x.$$

Recall that this is the condition for efficiency, which of course is not surprising since the price is dependent on the quality.

However, consumers can probably not judge national standards.

The consumers' confusion in the national context probably carry over to the international choice problem.

As a matter of fact, the problem is probably larger on the international level.

I.e. more products may be subject to asymmetric information.

"A normal consumer will hardly be able to judge the amount of dioxin contained in shampoos, lysozyme in cheese, sorbic acid in conserves or quillaia extract and polyvinyl-pyrrolidone in drinks."

So consider the following more plausible version of the model.

Since the product price cannot be made dependent on the state's minimum standards, a profit maximizing national regulatory authority selects its standard $\widetilde{q}$ such that the production costs of the domestic firms are minimized.

That is

$$c'(\widetilde{q}) = 0.$$

This implies $\widetilde{q} = q^*$.

Proposition: It cannot be assumed that the consumers will be able to distinguish between state-regulated national quality standards. An equilibrium in the competition between regulatory authorities is thus characterized by too lax standards. Systems competition results in a lemons equilibrium.

Intuition: Consumer protection benefits the foreigners because the quality of the goods consumed by foreigners increases without their having to pay more to cover the additional costs. And for the same reason, it harms the domestic firms.

So a supra-national regulator is necessary!