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Imperfect information, Effectiveness of Regulation and Trade: High Quality Credence Goods and Developing Exporters

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ABSTRACT

The paper provides a broad framework of analysis for the relationship between imperfect information on goods' quality, regulation and trade and presents a model on the relationship between internal regulation on quality and credence goods exports, focusing on developing exporters.

In the model expected quality is a function of consumers' beliefs about the effectiveness of regulation. Foreign consumers, who cannot observe regulation as closely as domestic ones, may partly base their expectations on the level of development of the exporting country, as a proxy for the effectiveness of its regulation of product quality. Low effectiveness and low consumers' trust may cause a failure in the market for high quality, and there may be a trap of underdevelopment and no high quality exports. The policy implications are that increasing the effectiveness of regulation improves export prospects and pursuing the harmonization of standards is a better strategy than mutual recognition, since the latter does not address the trust problem between countries with vastly different income levels. NGOs have a role, since when the standard on a credence attribute is established and monitored by separate, non national, entities the national stereotype problem may be bypassed.

Journal of Economic Literature

L15 - Information and Product Quality; Standardization and Compatibility

F13 - Trade Policy; International Trade Organizations

O12 - Microeconomic Analyses of Economic Development

INTRODUCTION

This paper addresses the issue of the likely impact of the effectiveness of regulation in the context of credence goods, for a poor country who is a potential exporter.

Although the term regulation usually refers to governmental standards, the term standards and regulation will be used here indifferently to refer to all standards, public or private, involving certification.

The term "effectiveness of regulation", unless better specified, indicates the scope of regulation i.e. to what extent standards meet consumers' demand for product quality and safety; the quality and relevance of the standards in terms of meeting the defined objectives; the efficacy of the monitoring system in ensuring that producers actually meet the standard. The latter two characteristics also indicate to what extent consumers can trust regulation, e.g. the probability that a product labeled "environmentally friendly" actually is environmentally friendly.

The information environment for different product attributes may be search, experience, or credence in nature: consumers can learn about the quality level prior to purchase ("search" goods), after purchase and use ("experience" goods), or not at all

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(“trust” or “credence” goods). Trust or credence goods have the common characteristic that consumers cannot evaluate some or all of their attributes either by inspection or after the experience of consumption (Darby and Karni, 1973), therefore standards and consumers’ trust are crucial for the development of their markets. Examples are products labeled as “green”, GMO free, location authentic or with various “ethical” characteristics (such as “fair trade” products).

If consumers cannot detect quality and producers cannot credibly signal it, the development of domestic and foreign markets for high quality credence goods crucially depends on consumers’ trust in the regulation on product quality within the producing country. For exporters this conclusion is reinforced if one considers that traditional consensus about the effects of trade liberalization has been challenged, making the case for “consumer-based protectionism” in the case of credence goods.

For several reasons developing countries’ exporters may suffer of a “trust” problem regarding the effectiveness of internal regulation, which may hamper high quality exports; however the likely impact of the effectiveness of regulation on high quality credence goods for a developing country which is an exporter, or a potential exporter, has been relatively neglected in the literature so far. The model presented here addresses this issue in the context of bilateral trade.

The paper is organized as follows: section 1 discusses the relationship between standards and trade; section 2 introduces a basic model of consumer’s choice; section 3 briefly discusses the role of regulation on quality in the context of experience goods; section 4 defines credence goods; sections 5 and 6 briefly present two models of special interest in the case of agrifood, dealing respectively with the notion of “consumers’ protectionism” and of trust in regulation. Sections 1-6 provide mainly a selected review of literature – accessible to students and non specialists – and a broad framework for the model of section 7.

The model analyzes the relationship between consumers’ trust and exports of high quality credence goods, focusing on two development implications¹. First, regulation may often be less effective in developing countries. Second, foreign consumers may partly base their expectations about product quality on the level of development of the producing country as a proxy for the effectiveness of its regulations, i.e. on general notions about the relationship between regulation on quality and income level. Hence developing country exporters may suffer from a specific “trust” problem regarding the effectiveness of internal regulation, which may hamper high quality exports.

The main conclusion is that low level of trust may have an important negative impact on the domestic and foreign demand for high quality experience or credence goods in developing countries and there may be a trap of low development and no high quality exports. In such circumstances pursuing special and differential treatment (Sdt) in international negotiations in terms of lower standards would be the wrong strategy and also mutual recognition may not be a solution, since it does not address the trust problem. The pursuit of harmonization, improving the public supply of standards and the effectiveness of regulation, and acquiring reputation also through Ngos are better strategies.

¹ For a discussion more focused on organic and fair trade agricultural products see Cuffaro and Liu (2008).

1. STANDARDS AND TRADE

Standards are increasingly important for trade for several reasons: first, in the case of agrifood, the shift from mass markets with broad commodities to markets with differentiated products and niches serving consumers with relatively high incomes, who increasingly demand high quality, safety and “credence” attributes; second, the trend towards outsourcing for cost reduction²; third, tariff barriers to trade have significantly declined and therefore differences in product and process standards gain importance for trade flows and in the trade liberalization arena (Altenburg, 2006; Baldwin, 2000; Cuffaro, 2004 and 2005; Reardon et al., 2001).

Standards may be set by governments or by the industry itself, producers, buyers or retailers. Many standards are also set by NGOs and in some cases also trade unions. Finally, governments, the private sector and NGOs may form coalitions to set standards.

In the case of agribusiness, increased public concern about food safety has increased the scope and stringency of public standards. Such stringency, the obligations placed on food companies³ and the need to simplify the management of food sourcing, have generated an explosion of collective private standards. Furthermore product differentiation based upon claims that have to do with credence characteristics has been used by producers and intermediaries in response to declining prices for agricultural commodities and increasing competition from new entrants to global food markets (Humphrey, 2006).

The privatization of standards has been more pronounced in the case of developing countries, where the effectiveness of public standards was generally low⁴.

Consumers' perception of quality is influenced by the product's intrinsic attributes as well as by extrinsic indicators and cues provided by the seller of the product. Extrinsic indicators (e.g., certification, labeling) and cues (e.g. brand name, packaging, price) convey search information to the consumer since they are available prior to purchase. An attribute can switch between the categories of search, experience, and credence. For example, a regulation such as mandatory labeling can change an a priori credence characteristic such as uses of genetically modified organisms (GMOs), into a search characteristic (Caswell, 1988; Grolleau and Caswell, 2005).

However the role of regulation and standards in the market for experience or credence goods depends also on how much consumers “trust” regulation, i.e. to what extent consumers believe that a product marked “high quality” is actually a high quality good, a problem that will be discussed in sections 6 and 7.

² Actually the combination of branding as a strategy to add value to products, increasing standards requirements by consumers and governments and outsourcing presses forward patterns of industrial organization whereby production is coordinated across borders by a lead firm, a brand-name company that defines and enforces multiple product and process standards.

³ For example in the EU the General Food Law states that food business operators should have primary legal responsibility for ensuring food safety.

⁴ Such privatization has occurred in two distinct ways: on the one hand large agribusiness firms, mostly supermarkets and large processors and especially multinationals, created private standards generally meeting or exceeding the stringency of public standards and insured their implementation through vertical co-ordination. On the other hand, NGOs have provided the standards and the monitoring and enforcing mechanism for many credence products with “ethical” attributes, occupying a fast growing market segment of products originating in the poor countries (Reardon et al., 2001).

2. CONSUMERS

The discussion in this paper is mostly based on a simple model with vertical differentiation of products (Mussa and Rosen, 1978; Tirole, 1988). It is assumed that consumers are all identical; they agree on the order of preferences, they prefer a higher quality for a given price but have different intensity in their taste for quality, represented by a parameter θ , a real positive number. They have net utility $U=\theta k-p$ if they buy a good of quality k at price p . Willingness to pay for a quality k is given by θk , and increases with θ and k . Each consumer buys one or zero unit of a good. Quality can be high ($k=1$, unit cost $c_1>0$) or low ($k=0$, unit cost c_0), $c_1>c_0>0$.

If θ is distributed in the economy according to a cumulative distribution function $F(\theta)$, $F(\theta)$ is the fraction of consumers with a taste parameter lower than θ . If only one quality k is offered at price p , demand is equal to the number of consumers with parameter θ such that $\theta k \geq p$

$$D(p)=M [1-F(p/k)]$$

Where M is the total number of consumers

Without loss of generality, the mass of those consumers can be normalized at 1, with a uniformly distributed parameter $\theta \in [0,1]$. Derivation of the demand function uses the ‘threshold’ consumer with a parameter $\tilde{\theta}$ who is indifferent to buying or not buying a unit of product of expected quality k at price p [$\tilde{\theta}k - p = 0$], implying that $\tilde{\theta} = \frac{p}{k}$.

Demand is

$$D(p) = 1 - \frac{p}{k}$$

It should be emphasized that quality k can be any characteristic affecting consumers’ utility, including altruistic preferences. For example, if consumers are concerned about distribution or the environment $k=1$ could indicate “fair” or “environmentally friendly”.

3. EXPERIENCE GOODS, QUALITY AND REGULATION

In the context of experience goods, models using different assumptions tend to show that regulation of “good quality” increases the probability that high quality is actually offered, but imperfect regulation may create the incentive to cheat⁵.

In the first place, with moral hazard on the producer side and no repeated interaction, high quality may disappear from the market and it can be shown that raising the number of consumers informed about quality increases efficiency.

If $\theta > c_1$ high quality production is socially efficient, however, when consumers do not observe the good’s quality before buying, an equilibrium in which the monopolist sells high quality cannot exist. With the number of consumers normalized to one, the monopolist profit is $(p-c_k)$ if he sells quality k at price p , 0 if he does not sell. The monopolist would save c_1-c_0 reducing quality and this would not reduce demand.

⁵ The discussion in this section is largely based on Tirole, 1988.

If however a percentage α of consumers observe quality before buying, these consumers are willing to pay θ if quality is high (with $U=\theta k-p$, $p=\theta$ is the maximum price that a monopolist can charge uninformed consumers for products of quality $k=1$), 0 otherwise. The monopolist fixes a price p in $[0, \theta]$, informed consumers buy if quality is high, giving the monopolists profit $\alpha(p-c_1)$ and do not buy if quality is low.

In this context it can be shown⁶ that the monopolist will offer high quality only if $(p-c_1) \geq (1-\alpha)(p-c_0)$ hence if $\alpha p \geq c_1 - (1-\alpha)c_0$, i.e. high quality will be offered if the price is sufficiently high (high prices can signal high quality to non informed consumers when there are also informed consumers and the monopolist cannot offer different qualities to different types of consumers); furthermore the condition is more likely to be satisfied the higher is the fraction of informed consumers.

Here a fraction of consumers do know quality and buy only if it is high; for them the high quality good becomes a search good because they trust entirely the information they acquire.

The share of consumers who can detect high quality and are therefore willing to pay for it varies in the interval $0,1$. Both the type of regulation and its quality influence α and hence the probability that high quality will be actually offered. For instance, in the hypothesis that consumers either have total or no confidence in the information about quality, one could interpret α as the share of consumers who trust a label that indicates "high quality" such as "environmentally friendly" and the associated certification process. Such trust must be related to effectiveness.

When one introduces repeated interaction, quality can be considered fixed over time (a producer is either of high or low quality), or may be considered adjustable. In the first case, with the given demand framework, a low quality producer saves the difference between high and low quality in the first period and does not sell anything in the second. In the second case, producers may choose high quality in the first period and low quality in the second on the basis of a comparison between the cost savings from low quality and the payoff of reputation for high quality.

With quality fixed over time, the existence of a separating equilibrium for search goods (with asymmetric information) depends on the relative magnitude of two effects: a "Nelson effect" -high quality generates a repetition of purchases and therefore profit $\delta(\theta - c_1)$ ⁷ – and a "Schmalensee" effect – a given demand generates a cost differential in the first period of $(c_1 - c_0)$ in favour of the low quality producer⁸.

⁶ If uninformed consumers don't buy, the only demand is from informed consumers and the optimal choice for the monopolist is high quality (if $p \geq c_1$). Therefore uninformed consumers should expect high quality and they should buy (since the hypothesis is that $p \leq \theta$). But this is a contradiction. If instead uninformed consumers buy, the monopolist profit is $(p - c_1)$ if he offers high quality and $(1 - \alpha)(p - c_0)$ if he offers low quality.

⁷ θ is consumers surplus from consumption of the high quality good and it is the maximum price that can be charged for such good; δ is a discount factor.

⁸ Nelson (1974) hypothesis is that wasteful expenditures or initial prices can signal quality because a high quality good will be purchased again and therefore the returns will be higher. Schmalensee (1978) argued that, although the future gains of a high quality monopolist will probably be higher for Nelson's argument, it is not obvious that his incentive to advertise high quality is higher than the incentive of a low quality monopolist, since $p_1 - c_0 > p_1 - c_1$. Spence's (1973) reasoning on the incentives of efficient workers in signalling their ability suggests that a high quality producer can use price or wasteful expenditures to signal quality if his cost (or his return) is lower (higher) compared to a low quality producer. The high quality producer can use a price strategy to induce consumers to try the good, or a large initial expenditure proving that the product could remain on the market for a long time.

If $\delta(\theta - c_1) \geq (c_1 - c_0)$ there exists a separating equilibrium in which the high quality monopolist fixes $p_1 = c_0$ ⁹ (or, which is equivalent for profits, spends money on some conspicuous and wasteful activity). The low quality monopolist will never set a price lower than c_0 and in this equilibrium he does not sell anything. In other words, the high quality producer sacrifices current profits because he is convinced that he will remain on the market. Low prices or wasteful expenditures can signal high quality.

If $\delta(\theta - c_1) < (c_1 - c_0)$, i.e. if the Schmalensee effect is larger than the Nelson effect, price (and wasteful expenditures) in equilibrium are independent from quality, i.e. there is no separating equilibrium.

If x is the a priori probability that quality is high, the higher price that can be charged in period 1 is $x\theta$. The high quality producer produces only if $(x\theta - c_1) + \delta(\theta - c_1) \geq 0$. Therefore the possibility that the good is of low quality may drive the high quality goods out of the market (adverse selection), as in Akerlof's lemons problem.

As for the possible roles of regulation in this context, the characteristics of regulation can definitely have an influence on the a priori probability that quality is high, i.e. on the value of x , helping to avoid adverse selection.

If however quality can change over time, there are incentives to invest in reputation, assuming that there is even a small probability that the monopolist is not the maximising type (i.e. consumers think there is the possibility that quality will not be lowered) or that high quality is actually not more expensive than low quality. In this setting it can be shown¹⁰ that if savings due to low quality are dominated by the value of reputation for honesty i.e. $c_1 - c_0 < \delta(\theta - c_0)$ the dishonest monopolist could imitate (pool with) the honest monopolist and offer high quality in the first period. I.e. even a small probability that the monopolist does not maximise profit induces the maximising type to develop a reputation, provided consumers repeat the purchase often (the horizon is sufficiently long) (Tirole, 1988; Kreps and Wilson, 1982; Milgrom and Roberts, 1982).

If both types offer high quality, observing high quality does not transmit any information. Therefore the posterior probability (the probability at time 2) for consumers that the monopolist is honest remains x_1 . Therefore consumers are willing to pay $E(\theta k_2) = \theta x_1$. The monopolist will offer high quality only if $c_1 - c_0 < \delta(\theta x_1 - c_0)$. If this condition is satisfied, the monopolist offers high quality for one period before exploiting his reputation.

⁹ The result that high quality must be signalled through a low price depends crucially on the assumption that low quality would not be profitable with perfect information. If the low quality monopolist obtains positive profit under perfect information, the first period price does not transmit any information. In general the circumstances under which high or low prices signal high quality are different. Low prices correspond to repeated purchases, where the high quality producer sacrifices current profits because he is convinced that he will remain on the market; high prices correspond to the existence of informed consumers willing to pay for quality.

¹⁰ In a model (Tirole 1988), based on Kreps and Wilson (1982) and Milgrom and Roberts (1982) a monopolist chooses between two qualities, k_0 and k_1 , in each period ($t=1,2$). High quality costs c_1 , low quality c_0 ($c_1 > c_0 > 0$). The monopolist can be of two types: "honest" with probability x_1 and "dishonest" with probability $1-x_1$. The monopolist knows his type but consumers don't. An honest monopolist offers always the high quality good, whilst a dishonest monopolist maximizes intertemporal profits. In particular he will always offer low quality in period 2 (because it costs less and there is no need to maintain reputation). If consumers buy the good, the dishonest type can save $c_1 - c_0$ offering low quality. He obtains therefore zero profits in the second period (consumers are willing to pay 0 for low quality), when consumers learn that he is of the dishonest type and will offer low quality in the second period. Offering high quality in the first period he earns at most $\delta(\theta - c_0)$ in the second period, since in the best case consumers are convinced that he is honest and are willing to pay θ . If $c_1 - c_0 > \delta(\theta - c_0)$ the dishonest monopolist has a dominant strategy: to offer low quality in the first period. However if $c_1 - c_0 < \delta(\theta - c_0)$ there is a different possibility.

Obviously he will not convince all consumers that he is honest, however they remain in doubt, and this allows him to sell in the second period at price θx_1 .

In this context, good regulation would reduce for the maximising type the incentive to invest in reputation, as the expected profit of the reputation investment $\delta(\theta x_1 - c_0)$ is reduced by the possible penalty times the probability of being caught cheating.

The notion of investment in reputation is used in Engel (1998) in a credence goods context, to explain why some firms appear to voluntarily “over comply” i.e. incur higher costs to produce a high quality good even when quality is a credence good, with focus on the “green business” firms which voluntarily reduce their negative environmental impacts. She shows that the introduction of an independent labeling agency or other forms of increased monitoring is likely to increase the incidence of voluntary over compliance.

In conclusion, on the one hand quality differentiation through standards (e.g. a label), generates the incentive to cheat in order to exploit consumers’ willingness to pay for high quality, on the other hand more effective regulation improves outcomes.

4. CREDENCE ATTRIBUTES

As remarked in the introduction, trust or credence goods have the common characteristic that consumers cannot evaluate some or all of their attributes either by inspection or after the experience of consumption. Credence attributes can obviously be of a very different nature, but there are three major classes that have received increasing attention:

(i) Many attributes that have health consequences (e.g. lead paint on toys), especially when the level of assurance “demanded” by (groups of) consumers is “higher” than the assurance provided by existing, well established regulation, based on objective, scientific assessment of risk (e.g., for food there is a demand for a “lower” level of chemical residues on fruits and vegetables or drug residues in meat). Consumers in this case generally perceive direct personal benefits. An additional dimension of this problem is the possibility that consumers’ perceptions on food and health issues differ between countries (e.g. the US-EU disputes about GMOs or growth enhancing hormones used in animal production).

(ii) consumers’ demand/(willingness to pay) for attributes that are of “altruistic” nature, i.e. related to concern for “others”, typically to the production processes (fairness of distribution, the environmental cost of production, the use of child labour, the animal welfare standards applied). An important example is the demand for “fair trade”¹¹.

(iii) Another important class of trust products is medical and legal services and a variety of repair services. The peculiarity here is that it is very difficult for consumers not only to discover quality but also to determine the extent of the service that was needed and how much was actually performed, even when the success of performing the service is observable. This information asymmetry creates obvious incentives for opportunistic behaviour by the sellers. Models here tend predict that either experts over treat consumers, or search and diagnosis costs are excessive, or there is fraud in the form of

¹¹ The Fairtrade Mark offers a product bundle, the acquisition of the conventional product is linked with a small donation for social or ecological methods of production. In such a “low-cost” situation ethical behaviour becomes more likely, plus, the progressive integration and reduction of virtual distances leads a share of consumers to care about distant people (Becchetti and Rosati, 2007; Kirchgassner, 1992; Steinruchen and Janichen, 2006).

overcharging consumers, or experts have inefficient capacity levels (Emons, 1997 and 2001; Wolinsky, 1983)¹².

5. CREDENCE GOODS AND FOOD IMPORTS: CONSUMERS' PROTECTIONISM?

In the agrifood sector the tenet of the Wto Agreement on Sanitary and Phytosanitary Measures (Sps) that trade restrictions are not allowed when there is no evidence of risk has been questioned on the basis of the notion that consumers beliefs on what constitutes quality may differ among countries and from scientific concepts.

Bureau, Marette and Schiavina (1998) focus on the credence attributes of food products and on the possibility that, although imported goods are safe according to scientific standards, consumers either still see them as inferior to domestically produced goods or think that they may be unsafe (consumers may be distrustful of science, irrational etc...).

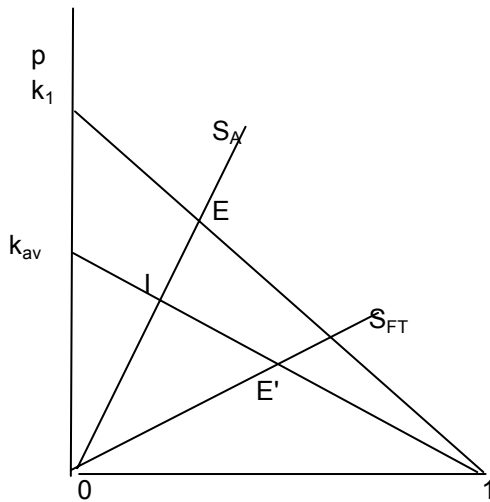
They argue that if consumers have genuine preferences for some characteristics of the products that are not based on science, i.e. if these characteristics affect their utility, there is no particular reason for restricting the many dimensions of quality to a single attribute i.e. the Codex Alimentarius standards on food safety. In an analysis of the EU-US trade dispute on hormone-treated beef, the authors show that when internal production of the high quality type competes with imported products whose quality is perceived as low, and buyers are unable to determine the actual quality of the products, trade liberalization may lead to market inefficiencies.

The demand framework is the same as described in section 2 with the following specifications

- (i) There are two product types (e.g. meat treated or not treated with hormones; product containing or not containing GMOs) that are perceived by consumers as being of different quality, k_1 and k_0 , with $k_1 > k_0$, i.e. If consumers knew for a fact which product contains GMOs and which one is GMO free they would perceive the former as having a quality k_0 and the latter a quality k_1 .
- (ii) $k_1 - k_0 = (1 - \beta)\Delta$, where Δ is a maximum perceived quality difference and $\beta \in [0, 1]$. β is common to all domestic consumers but may differ between countries. Indeed, there is evidence of differences in consumer preferences among countries on food safety issues. For instance Lusk et al. (2006), in a large-scale cross-Atlantic study to analyze consumer demand for genetically modified food, found that the median level of compensation demanded by English and French consumers for genetically modified food was more than twice that in any of the selected United States locations.
- (iii) Since there is imperfect information on the actual quality of the good, expected quality is related to the probability of a presence of quality 0 or 1 on the market.

¹² According to evidence quoted in Emons (1997), in the US a large fraction of current health care spending goes on irrelevant tests, unproven procedures, and unnecessarily priced drugs and devices; fee-for-service doctors tend to over prescribe while salaried doctors tend to shirk. In Switzerland for patients with the minimum level of schooling the probability to be subjected to a range of surgical operations was found 2 to 3 times higher than for patients with a university degree. Ordinary children were 80% more likely to have their tonsils out than children of medical doctors.

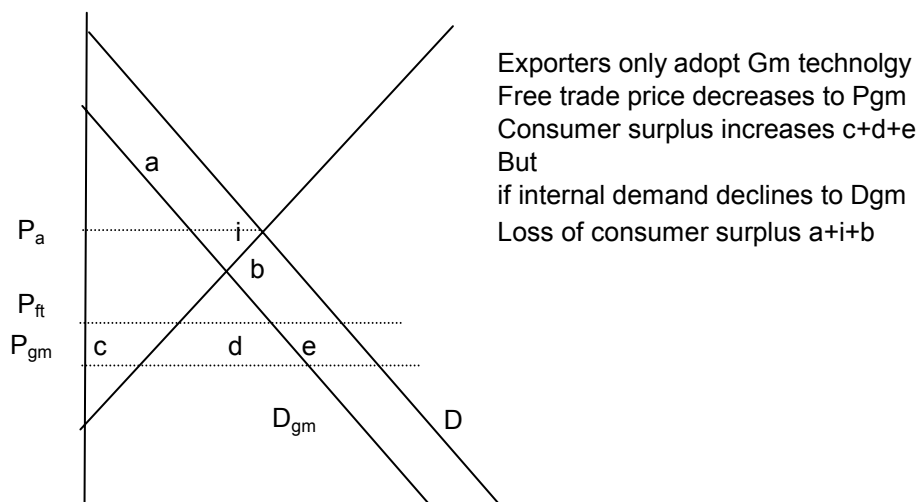
Figure 1 Low perceived quality of imports



Given a baseline situation where in the home country, because of internal regulation, only quality k_1 is supplied, the autarky equilibrium is E. When trade is liberalised with a country where regulation allows k_0 and only quality 0 is offered ¹³, consumers, being unable to determine the actual quality of the product, expect an average quality $k_{av} < k_1$. Therefore the demand curve shifts and the equilibrium point becomes I. Increased supply shifts overall supply to S_{FT} , determining a final, free trade, and equilibrium at E'. If trade liberalisation involves a large decrease in the quality expected by consumers and if the difference in production costs of imported products relative to domestic production is small, trade liberalization may result in welfare losses for the domestic country.

On a similar vein, Hobbs and Kerr (2006) argue that if exporters only adopt GMO technology and in a pooled market solution there is a decline in consumers' willingness to pay, like in figure 2, there may be a case for "consumer-based protectionism".

Figure 2 GMOs, Free Trade and Consumer Surplus



¹³ Assuming that foreign producers would not be able to signal that their product is of higher quality and have therefore no incentive to produce high quality.

6. CREDENCE GOODS AND CREDIBILITY OF REGULATION

Regulation however may not be perfectly credible. The issue of trust in regulation for credence goods is empirically relevant.

For example, in many countries firms apply to independent labeling agencies for a license to use a particular label stating that their product is environmentally friendly, socially responsible or safe. These ecolabeling programs are often applied to products where consumers would generally be individually unable to determine the actual environmental friendliness (e.g. the biodegradability of a product) and the firm's compliance is gauged by random monitoring. But when monitoring is random, certification must be viewed as noisy. Furthermore, the certifying party cannot be certain that the firm always uses an environmentally friendly technique, nor that the monitoring scheme is able to perfectly detect any violations. Even if the certifying process is perfectly able to evaluate a product's compliance with the test's standards, standards may not be perfectly correlated with "environmental friendliness"¹⁴ (Engel 1998; Mason, 2006).

In addition, certifiers have mixed incentives: the incentive to maximize the number of clients, the incentive to maintain their reputation. In other words, third party verification does not automatically guarantee impartiality or absence of conflicts of interest¹⁵. Furthermore it should be noted that enforcing a process standard may be a very difficult problem in the context of value chains coordination across borders, as illustrated by the recent safety crisis within the US toys industry in relation to production in China¹⁶.

Anania and Nisticò (2004) develop a model where regulation providing information on the quality of a credence good divides the market into two markets: one for a good that, according to the regulation, can be labeled as high quality (H market), the other for a low quality good (the L market). Markets are perfectly competitive and a percentage of L producers sell on the H market (cheaters). L producers decide whether or not to cheat on the basis of a comparison between U_{nc} (the non stochastic utility from selling product for what they are) and $U_c^i[E(\pi_c), \rho^i]$, the expected utility from cheating, a function of expected profit and of the individual attitude toward risk.

The measure of the credibility of regulation is NC =percentage of L producers who

sell their products for what they are= $\frac{n_L^{nc}}{n_L}$ hence $1 - NC = \frac{n_L^c}{n_L}$. Credibility is an

increasing function of controls and penalties. Consumers are willing to pay a higher price for H products, know NC and know the minimum price below which goods can only be low quality i.e. expected quality is a function of price¹⁷.

¹⁴ In the Mason (2005) model of ecolabeling, the certifying test is subject to two types of errors: there are some green sellers that would fail the test and some brown sellers that would pass the test.

¹⁵ Evidence on opportunist behaviour in the certification systems in the EU is reported in Jahn, Schramm and Spiller (2005).

¹⁶ In the summer of 2007 RC2, a company which operates in China through coordination of a local network of contract manufacturers, without owning factories, recalled 1.5 million trains and accessories because a supplier had coated them in lead paint. The same summer lead paint prompted Mattel – which outsources to up to 50 manufacturers in China - to recall 967,000 toys, according to company sources because either a contract manufacturer used paint from a non certified supplier or a certified supplier cheated (BBC, 2007).

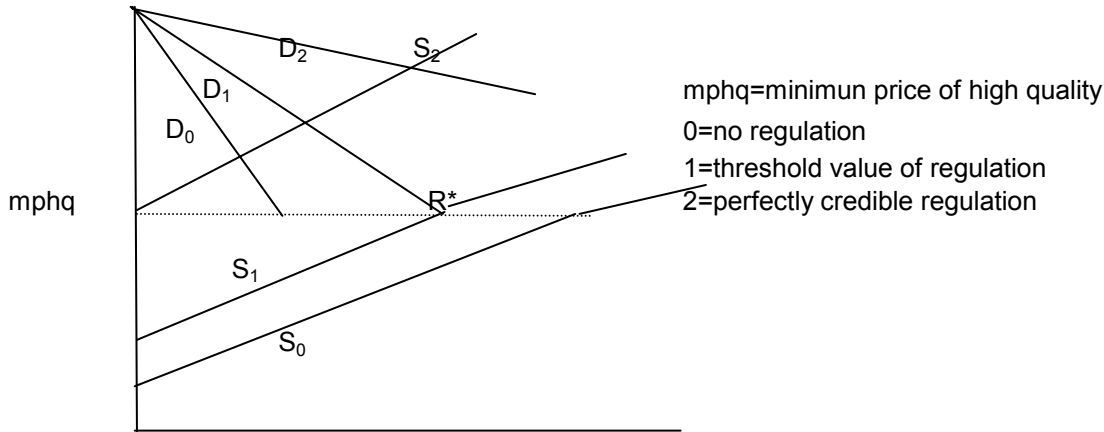
¹⁷ As in Akerlov, with asymmetric information expected quality may be a function of price. With two agents, 1(seller), 2 (buyer) 1 has surplus $\theta_1 k$ if she does not sell, p if she sells; 2 has surplus $\theta_2 k$ if she buys, 0 if she does not buy. The seller knows k ; the buyer knows that k is

The inverse demand function in the H market is $P_H = \alpha - \left[\frac{n_H + (1 - NC)n_L}{n_H} \right] bQ_H$

where n_H and n_L are respectively the number of high and low quality producers - i.e. quality is fixed, low cost producers are only able to produce low quality goods – and the term in square brackets is the ratio between the number of producers offering their product on the H market and H producers.

$NC < 1$ reduces the price consumers are willing to pay for every given quantity of H product.

Figure 3 Market equilibria for the high quality good with different credibility of regulation



In this model (figure 3) the inverse demand function on the H market expands as NC increases since consumers' expectations about the quality of the products offered on the H market increase and they partially revert their demand from the L market to the H market. The inverse supply on the H market expands when the credibility of the regulation declines, as an increasing number of L producers offer their products on that market.

For NC comprised between 0 and 1 there is no market for the high quality good. Producers of low quality goods, being unable to collude, offer their product on the H market at a price below $mphq$, but consumers don't buy goods offered to them as being of high quality at a price below $mphq$.

Whilst the Bureau et al. (1998) framework highlights the possible divergence between consumers' perception of quality and the associated potential losses from trade liberalization in the context of imperfect information, Anania and Nisticò stress the consequences of weak regulation on quality and the possible interest of low quality producers in expanding weak regulation, i.e. a regulation that will allow some of them to label their products as being of high quality, also in the context of international negotiations¹⁸.

uniformly distributed in the interval $[0, k_{\max}]$. The buyer is risk neutral, maximises $\theta_2 k_a - p$, expects that 1 will sell only if $p > \theta_1 k \rightarrow k > p/\theta_1$, therefore since k is uniformly distributed in $[0, p/\theta_1]$, $k_{av} = 1/2 (p/\theta_1)$. The buyer buys only if $\theta_2 k_{av} > p \rightarrow \theta_2 1/2 (p/\theta_1) > p \rightarrow \theta_2 > 2\theta_1$. Therefore if preferences are not very different, there is not a price for which 1 sells and 2 buys. A market may disappear because if the price is high its reduction does not lead to equilibrium since it reduces also demand (Tirole, 1988).

¹⁸ The authors use as an example of weak regulation of this type that accorded by the EU with the introduction of "Protected Designation of Origin" (PDO) and "Protected Geographic Indication" (PGI) denominations, with a product list including products easily recognized by consumers, which in most cases were already protected by national regulations, and products not as well recognized and often not previously protected.

7. CREDENCE GOODS, TRUST AND EXPORTS

The likely impact of the effectiveness of regulation on high quality credence goods for a developing country which is an exporter, or a potential exporter, has been so far relatively neglected in the literature. The model focuses on such an impact in the context of bilateral trade for a final good.

The hypotheses introduced here are three. First, expected quality is a function of consumers' beliefs about the effectiveness of regulation. Second, domestic and foreign consumers may hold different beliefs. Domestic consumers base their expectations on a measure of the effectiveness of regulation. Foreign consumers base their expectations on the percentage of exports from the country which failed border quality inspection, but are also influenced by a country of origin stereotype. Their trust in the regulation of product quality increases with the level of development of the exporting country. Finally, consumers know the minimum price below which goods can only be of low quality.

The second assumption is based on the idea that since foreign consumers cannot observe regulation as closely as domestic consumers, they may partly base their expectations about product quality on the level of development as a proxy for the effectiveness of regulation, i.e. on the general notions about the relationship between regulation on quality and income level.

What foreign consumers may observe about the effectiveness of regulation in the exporting country is a very loose indicator of such effectiveness. For example Jaffee and Henson (2004) report that over a typical three year period the US Food and Drug Administration (FDA) undertakes inspections of all domestic firms that produce low-acid canned foods, yet the same inspections are undertaken on just 3 percent of foreign facilities exporting such products to the United States. Even after substantially increasing resources for the inspection of food imports, the FDA still inspects only 1 to 2 percent of the more than six million consignments of food and cosmetic products imported each year. Regulatory oversight for many products and markets is more stringent on domestic, rather than imported supplies (World Bank, 2005).

A 'level of development' effect on trust is not unfounded on theoretical¹⁹ as well as empirical grounds. There is empirical evidence both on the lower effectiveness of regulation in developing countries and on a level of development factor in consumers' beliefs about quality. Stephenson (1997) provides a description of the situation at the beginning of the 1990s, showing that the number of national standards in developing countries, including large Latin American countries, for which data were available, was at least ten times lower than the corresponding number in the US and also the proportion of mandatory standards was comparatively low. Furthermore most countries had not established national accreditation programs for laboratories that perform product testing.

As for consumers, in a review of country- of-origin effects on product evaluation, Bilkey and Nes (1982) point out that several studies found a hierarchy of biases, including a seemingly positive relationship between product evaluation and degree of economic development. Han and Terpstra (1988) show specifically that products with a country-of-origin label from a developing country are rated inferior to those with an industrial country-of-origin label and Head (1993) reports that a 'Made in Germany' label evokes the

¹⁹ Casella (2006) argues that standards can be seen as a good fulfilling a specific function and which is excludable but not rival for the group who shares the standard (the whole community for a public standard, a smaller group for a private standards). Since in general the rules imposed by the standards cost resources (e.g. the higher cost of clean technologies) they could be modelled as taxes collecting from producers the resources that are then transformed into the public good, thus suggesting a direct relationship between standards and income.

concepts of reliability, precision and punctuality. There appears to be also a specific negative prejudice against exports from former centrally planned countries, based on the notion of the generally low quality of production under central planning. Liu et al. (2001) provide empirical evidence of a 'level of development' factor in the market for organic foods .

More generally, trust requires the presumption that national standards and regulations are merely different means of implementing equivalent regulatory goals and that national institutions do enforce the standards. Such trust is unlikely to emerge among countries with vastly different levels of development (Baldwin, 2000; OECD, 2001).

Therefore, if consumers cannot detect quality and producers cannot credibly signal it, their trust in domestic and foreign regulation is the problem to be addressed.

Consumers have net utility $U = \theta E(k) - p$ if they buy a good of expected quality $E(k)$ at price p . Willingness to pay for a quality $E(k)$ is given by $\theta E(k)$, and increases with θ and $E(k)$. Each consumer consumes one or zero unit of a good.

Demand is :

$$D(P) = M \left(1 - \frac{P}{E(k)} \right) \quad (1)$$

For $P \geq \alpha_H$ 0 for $P < \alpha_H$

Where M denotes the population, P is product price and there is no demand for prices below α_H as consumers know that this is the minimum price of high quality. Quality k can take values k_H and k_L that reflect high and low quality respectively. However consumers cannot possibly know quality k even after consumption and thus base their decision on expected quality $E(k)$.

As in Anania and Nisticó (2004) markets are competitive and there are N producers of the same size in the market, of which n_L are low quality and n_H are high quality. The marginal cost function of each of the L producers is:

$$c_L = \alpha_L + \beta_L q_L \quad (2)$$

Where c_L and q_L denote the low quality producers' marginal cost and quantity produced. The aggregate inverse supply function of the high quality producers is:

$$P_H = \alpha_H + \beta_H Q_H \quad (3)$$

Where P_H and Q_H denote the price and quantity of high quality product, while the intercept α_H represents the minimum price of the high quality product. Some low quality producers choose to sell on the high quality market, depending on individual attitude toward risk and the probability λ of being caught cheating, a fraction $(1 - \lambda)$ of them succeeds and each produces a quantity such that marginal cost is equal to expected marginal revenue $P_H (1 - \lambda)$. Given this, the aggregate supply in the high quality market is as follows (Anania and Nisticó 2004):

$$S(P) = \mu \frac{(P_H - \alpha_H)}{\beta_H} + \left[n_{LC} \frac{(1 - \lambda)P_H - \alpha_L}{\beta_L} \right] \quad (4)$$

$\mu=1 \quad \forall \quad P_H \geq a_H$ and 0 elsewhere, indicating that there will be no high quality supply for prices below α_H .

The first term in the right hand side of equation (4) reflects the supply from high quality producers and the second term that from n_{LC} low quality producers that cheat.

Domestic consumers are aware of the measure of the effectiveness of regulation λ and expect high quality with a probability g increasing in λ . Thus, expected quality becomes $g(\lambda)k_H + [1 - g(\lambda)]k_L$ and abiding by the general functional form of equation (1) domestic demand can be specified as follows:

$$D^D = M^D \left[1 - \frac{P}{g(\lambda)k_H + (1 - g(\lambda))k_L} \right] \quad (5)$$

Where M^D denotes the population.

Consumers in the importing country form expectations on quality on the basis of two variables, the percentage of importers who failed border quality inspection σ and an indicator of the economic distance of the exporting country from developed countries in terms of per capita income y_r . They form expectations on quality in line with probability $f(\sigma, y_r)$ that is decreasing in σ and y_r . The $f(\sigma, y_r)$ function is likely to be complex, as the negative effect of σ may be amplified by y_r , like it happens when a real episode reinforces a prejudice, and increases of σ will probably have a more than proportional short run effect on expectations.

Thus the expected quality becomes $f(\sigma, y_r)k_H + (1 - f(\sigma, y_r))k_L$ and import demand can be expressed as follows:

$$D^I = M^I \left[1 - \frac{P}{f(\sigma, y_r)k_H + (1 - f(\sigma, y_r))k_L} \right] \quad (6)$$

Where M^I denotes the population in the importing country.

Figure 4 shows the domestic market before trade. With $\lambda = 1$ and $P_H > \alpha_H$ only high quality producers participate in the market and the supply function is S_0^D , while there is no supply below α_H , the minimum price of high quality product. The demand function is D_0^D and for prices below α_H there is no demand, as consumers expect low quality. Therefore the only relevant section of the demand curve is above this minimum high quality price with the equilibrium price being P_E^D .

If $\lambda < 1$, the supply function shifts to S_1^D . For prices below α_H , S_1^D represents quantities supplied by cheaters (low quality producers who offer their product on the high quality market), while for prices above α_H , it is the sum of product offered by cheaters and high quality producers. As consumers are aware that $\lambda < 1$, the demand curve rotates towards D_1^D and the equilibrium price decreases. Relatively low values of λ may result in

significant rotation in the demand schedule, as shown in figure 4, and in a missing market for the high quality good.

Figure 4 - Domestic market

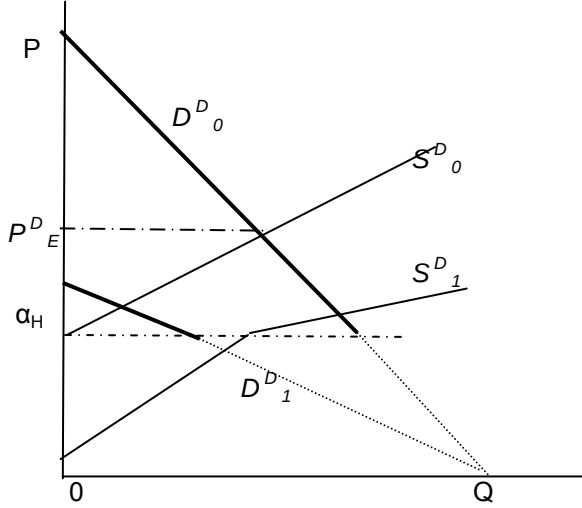


Figure 5 – Trade of credence goods

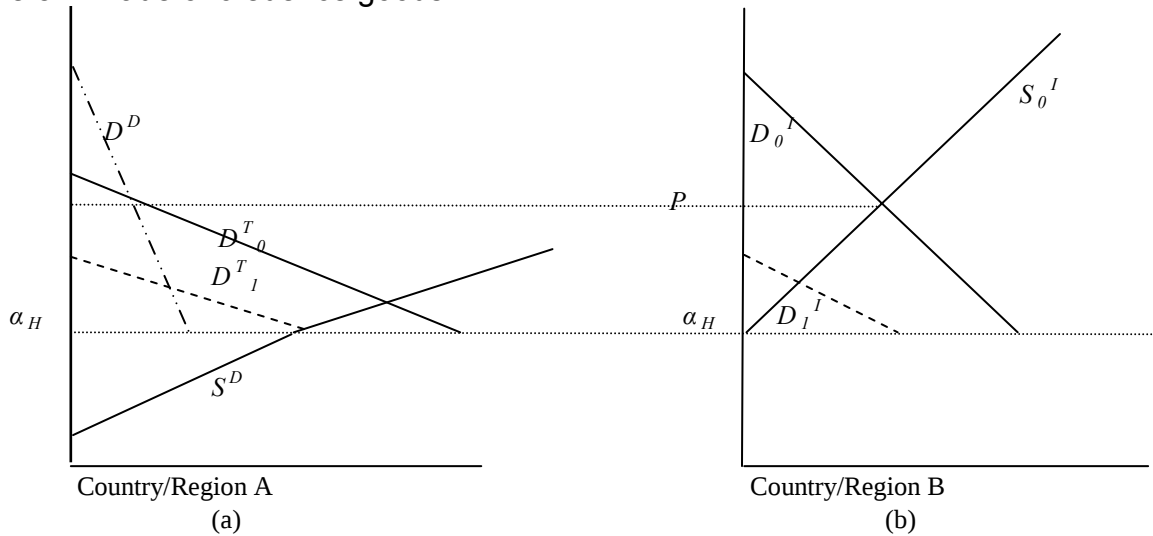


Figure 5 shows the trade relationship between two countries or regions, with region A being the exporting region and region B being the importing region. As portrayed in the figure, the conditions of supply in region B are such that there are no cheaters. Moreover, the vertical intercept of the import demand schedule in region B, D^I_0 , is initially the same as that of the demand schedule of the exporting region A, D^D , as it is assumed that domestic and foreign consumers have the same expectations about quality across regions. In panel (a) of figure 5, the demand schedule D^T_0 represents total demand for the domestically consumed and exported good. Export supply is equal to import demand at price P . For prices lower than P , import demand exceeds export supply and region A exports to region B. Decreasing quality of exports or a shock, such as a food safety event in region A, could bring about an increase in σ and will also reinforce an unfavourable “level of development” stereotype y_r , resulting in the import demand schedule in region B

rotating from D_0^I to D_1^I . Similarly the total demand schedule will rotate from D_0^T to D_1^T , decreasing export price and quantity.

It is also possible that a strong perception of low quality formed through the developing country stereotype could result in a wide rotation in total demand and no exports, creating for the market a trap of low development and no high quality. Besides, a change in λ or σ may cause a sudden and more than proportional drop in consumers' confidence, depending on the nature of the problem, causing severe damage to the sector involved, as illustrated by several major food safety crises during the last decades.

In such crises the adverse effects on health and on consumers' confidence were often amplified by a combination of poor communication about risks, mismanagement of crisis responses on the part of governments and private companies and by the media. Each new event, at least in the EU, accelerated consumers' reactions, including an intensified search for alternative sources of information, usually from consumer and environmental groups, and for alternative foods (World Bank, 2005).

An illustration of the possible impact on a small exporter is given by the cyclospora crisis and the change in the US import demand for raspberry from Guatemala to Mexico, a case in which the industry never recovered²⁰. A similar sequence is quoted in Chisik (1996) for Colombia's garment industry²¹. The World Bank (2005) remarks that international buyers and consumers are likely to be more tolerant and patient with core and long-standing suppliers that have established a national image in which they have confidence, and conversely, that small countries and niche products are probably far more vulnerable to loss of markets and reputation in the face of food safety problems.

Consumers' trust is also crucial in vertical coordination. Demand may fall because of healthy or safety scares for products produced by contractors in specific countries. The chief example of a problem of trust in internal regulation of a developing exporter is China, where apparently the speed of expansion into the global export market has not been matched by the growth of a countrywide regulatory infrastructure²². China however is not

20 In the late 1980s, several firms exported raspberries from Guatemala to the US. Cases of food-borne illness associated with the parasite *Cyclospora* in the US and Canada led to a US import ban on Guatemalan raspberries in 1997. In spite of a successful collaborative effort between the US, Canada and Guatemala to solve the problem, in 2000 two further *Cyclospora* outbreaks, which were traced back to a single Guatemalan farm, led to a drop of consumers' confidence, several US supermarkets sought alternative sources of supply and a number of leading firms in the industry shifted their operations to Mexico. The Guatemalan raspberry industry never recovered (World Bank, 2005).

21 Chisik (1996) develops a model where the country stereotype can determine the number of high quality firms. The stereotype is self-fulfilling. The author uses Colombia's garment industry as an example of a self-fulfilling unfavourable quality reputation in international trade. Although expanding at a rapid rate throughout the early 1970s, Colombia's deteriorating reputation became a determining factor in the contraction of this industry, essentially because of a single garment firm that took a large contract beyond its capability. High-quality importers became wary of Colombian-sewn garments. With the payoff to high-quality production reduced, Colombian garment firms then concentrated on low-quality markets.

22 Recent "Chinese product scares" include pet food tainted with chemical melamine; toothpaste tainted with chemical diethylene glycol and bacteria; farmed fish with traces of banned drugs and pesticides; tyres with fault that may cause blow-outs; toys containing lead or posing choking hazard; children's jewellery containing lead; ceramic heaters posing fire safety risk (BBC, 2007).

an exporter that can be easily “abandoned” by importers; a national stereotype problem can be much more harmful for smaller exporters²³.

CONCLUSIONS

There are several policy implications of the literature discussed in this paper and specifically of the hypothesis on the mechanism of trust in regulation from the point of view of a potential exporter.

First, the “effectiveness” of regulation is crucial to avoid failures in the market for high quality products. Any means, such as improving legislation and monitoring, increasing an objective measure of the effectiveness of regulation should improve export prospects. An important challenge is to increase the supply of public standards and the associated monitoring mechanism.

Second, the pursuit of “mutual recognition” may be a good approach for an experience good, where consumers may verify quality when the good is allowed into the export market, but less so for a credence good. Mutual recognition requires considerable mutual trust, since it involves the presumption that national standards and regulations are merely different means of implementing equivalent regulatory goals and national institutions do enforce the standards. Such trust is unlikely to emerge among countries with vastly different levels of development (Baldwin, 2000; OECD, 2001). Harmonization, although it may be to some extent “hegemonic”²⁴, is a better road.

Third, if the standard on a credence attribute is established and monitored by separate, non national entities such as Ngos, there obviously is no divergence between domestic and foreign consumers’ expectations about quality and the national prejudice problem is bypassed. Trust will be based on the Ngo reputation and the perceptions consumers have about Ngos incentives and efficiency in monitoring compliance with standards.

Furthermore there are additional grounds for not defending the notion that the “poor” should be entitled to “lesser” standards and for pursuing harmonization. In the first place, a number of contributions have challenged traditional conclusions about the effects of trade liberalisation, making the case for “consumer-based protectionism” when there are imperfect information problems. Also, with conversion costs, countries - especially the largest ones - have an incentive to form standardization unions that imply trade diversion²⁵. Finally there is a cost of multiplicity²⁶, linked also increasingly to standards

²³ In the case of the toy industry the Mattel scandal alone caused the end of a company in southern China, with the loss of about 5000 jobs (BBC, 2007). However there are over 10,000 toy factories in China, almost all working for export, producing some 80% of the world's toys .

²⁴ Baldwin (2000) has argued that liberalisation of regulatory protection between countries at different levels of development is likely to take the form of "hegemonic" harmonisation.

²⁵ In an analysis of government standardization policies in the presence of conversion costs and network effects, Gandal and Shy (2001) show that, when there are conversion costs but no network effects - which is the relevant case for food products but also for many services- it is profitable for two of the countries to form a standardization union. This will cause some consumers in member countries to switch from the third country's brand to a brand produced by a member country, hence trade between member countries will increase, whereas trade between members and the non members will decrease. Interestingly, the model implies that the union with the two largest countries leads to the biggest increase in members' surplus relative to the case of no union formation, and the authors observe that "...it is not surprising then that the U.S. and the European Union (two large blocks) recently reached a pact in which they will 'accept each other's industrial and regulatory standards for sectors as varied as telecommunications equipment and pharmaceutical" (Gandal and Shy, 2001).

established by private organizations based in the developed countries with strong impact on consumer's beliefs

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²⁶ Standards may be set by multiple actors - governments, the producers themselves, the buyers or retailers, NGOs – mostly based in the richer countries. Multiplicity as such may impose higher costs to less developed exporters if choosing the right alternative requires skills that are relatively scarce.

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