Full Research Article

Credence goods, consumers' trust in regulation and high quality exports

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Abstract. We analyze the impact of the effectiveness of internal regulation for the development of internal and export markets for credence goods, focusing on food products, particularly for a developing country which is an exporter (or a potential exporter). In the model, since goods of actual different quality can be sold as high quality goods, expected quality is a function of consumers' beliefs about the effectiveness of regulation. Foreign consumers, who cannot observe foreign regulation as closely as domestic ones, may partly base their expectations on the level of development of the exporting country. Low effectiveness, negative stereotype 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 main policy implications are that increasing the effectiveness of regulation improves export prospects; standard setting and enforcement by external actors, such as supermarkets, or NGOs in the case of certain niche markets, is likely to be beneficial.

Keywords. Credence goods, standards, trade and development.

JEL Codes. L15, F13, O12

1. Introduction

The perception consumers have of the effectiveness of regulation on product quality and safety in a country is generally important for the development of internal and especially export markets. Such perception and trust become crucial when consumers cannot really evaluate some or all of a product's attributes, especially process attributes: it may be prohibitive to find out whether a product is actually "environmentally friendly", "organic", or simply completely safe. Therefore consumers' notion of quality and demand will be related to their trust in regulation.

The article discusses the development of the market for goods in the presence of information asymmetry and uncertainty about product quality: specifically when it would be difficult and/or costly for consumers to evaluate certain product characteristics before consumption, and there is no learning or very slow learning even after consumption.

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The classification of goods on the basis of consumers ability to evaluate their quality before consumption, or on the basis of experience, or not even after consumption as search, experience and credence (trust) goods is originally due to Darbi and Karni (1973). Ever since a large literature has developed on the functioning of the markets for credence goods and services (Dulleck *et al.,* 2011; Emons, 1997; 2001; Wolinski, 1983; 1995).The existence of the market for such goods is strongly dependent on quality guarantee by a third party, which defines the standard and/or monitors compliance.

In food markets many products can be considered experience or credence (Caswell and Mojduszka's, 1996), examples of the latter are many health/safety related attributes, process attributes such as environmental impact (environmental "friendliness") or "bio" food, use of GMOs, ethical characteristics such as various specification of "fairness" . Asymmetric information problems occur since consumers know with certainty only what the producers' quality claims are or what the label says, i.e. real product standards are unobservable to consumers.

A significant literature has developed accordingly in agricultural economics (Unnevehrk *et al.*, 2011; Costa *et al.*, 2009). Most contributions have analyzed jointly the economics of credence (or experience) goods and labelling, in general (Marette *et al.*, 1999; McCluskey, 2000; Anania and Nistico, 2004; Zago and Pick, 2004; Roe and Sheldon, 2007; McCluskey and Loureiro, 2005; Crespi and Marette, 2001) or focusing on specific mechanisms /attributes, including geographical indications (Menapace and Moschini, 2012), genetically modified organisms (Fulton and Giannakas, 2004; Moschini and Lapan, 2005), organic farming (Dabbert *et al.*, 2014) ethical products (Chang and Lusk, 2009) .

Models have concentrated on the welfare implications of different labelling schemes, often assuming fully credible certification. For example Zago and Pick (2004) consider the welfare impact of labeling policies for credence agricultural goods, assuming a fully credible certification system. Menapace and Moschini (2012) develop a model for an experience good where, as in Shapiro (1983), firm reputation offers a possible solution to the market failure identified by Akerlof (1970) and where geographical indications (GIs)[1] and trademarks are complementary means for signalling quality. They postulate a fully credible trademark system and a fully credible certification scheme for GIs (i.e. there is no counterfeit product on the market and all certified products meet the requirements established by the certification schemes). Roe and Sheldon (2007) model the market for a credence good, with costly certification and perfect monitoring to analyze how different forms of labelling impact the size and distribution of surpluses.

The trade implications of asymmetric information on quality have been less discussed, with notable exceptions (e.g. Bureau *et al.*, 1998)[2]; the issue of consumer preferences for country of origin, as Lusk *et al.* (2006) remark, has also been relatively neglected, whereas

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[1] GIs provide labels typically accessible to a large number of firms producing similar, competing, products, each with its own distinct trademark. In the EU GIs schemes are based on the notion of a quality-geography nexus, and require the definition of a code of rules. Usage rights over a GI are granted to all producers within a designated production area who comply with the product specification.

[2] Bureau *et al.* (1998) consider the case of the dispute over hormone-treated beef between the EU and the United States, and conclude that the positive effect of trade liberalization on welfare may be offset by the increase in imperfect information about product quality.

a wealth of evidence on the topic has accumulated in the business and marketing literature (as discussed in section 3).

The model we present (i) considers the market for a credence good with imperfect monitoring, as in Anania and Nistico (2004) who focus on the credibility of regulation, i.e. counterfeits in these markets can be sold as high quality goods[3]; (ii) extends the analysis to trade; (iii) includes a country of origin effect.

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.

In the formal model however the regulation parameter is kept relatively simple, it is the probability λ of being caught cheating on quality, in order to make the model more tractable when the analysis is extended to trade.

The article is organized as follows: sections 2 briefly reviews credence goods and the relationship between standards and trade; section 3 introduces the assumptions on consumers' expectations about quality; section 4 presents a model on the relationship between consumers' trust and the internal and export markets for credence goods[4].

There are two development dimensions of the problem. First, regulation may often be less effective in developing countries, as discussed in section two. 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 regulation, 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: low effectiveness of internal regulation could have an heavy impact on foreign demand for high quality credence goods, in general, but more so for a developing country.

2. Credence attributes, standards and trade

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), after purchase and use (experience), or not at all (credence). Credence attributes can obviously be of a very different nature, but, restricting the discussion to goods, there are two major classes that have received increasing attention:
(i)   Attributes that have health/safety consequences;
(ii) Consumers' demand/(willingness to pay) for attributes that are of "altruistic" nature,

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[3] This topic is also extensively treated in the eco-label literature (Costa *et al.,* 2009; Engel 1998; Mason, 2006).
[4] For a discussion focused on organic and fair trade agricultural products see Cuffaro and Liu (2008).

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."

Standards are increasingly important for trade for several reasons: first, the shift from mass markets 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 reduction; third, the significant decline of tariff barriers, implying that differences in product and process standards gain importance for trade flows and in the trade liberalization arena.

As standards increasingly address process issues, the role of regulation and standards depends also on how much consumers "trust" regulation, i.e. to what extent they believe that a product marked "high quality" is actually a high quality good

Regulation may be ineffective for several reasons. 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"[5] (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 interest.[6]

Finally, enforcing a process standard may be a very difficult problem in the context of value chains coordination across borders.[7]

There are important agribusiness and development related dimensions of the standards topic.

First the tendency of standards to become a strategic instrument of competition in differentiated product markets and the shift from performance (realized or "search" characteristics of the product) to process standards has been very pronounced in agribusiness (Reardon *et al.*, 1999) and this was associated with an increase in the scope and stringency of public standards and the upsurge of initiatives on collective private standards.

Second, many strands of literature have shown that there is a relationship between the development stage and effectiveness of public standards: their scope[8], their quality and rel-

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[5] In the Mason (2006) 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.

[6] Evidence on opportunist behavior in the certification systems in the EU is reported in Jahn *et al.* (2005).

[7] An example is the safety crisis within the US toys industry in relation to production in China (BBC, 2007).

[8] The scope of standard depends on income and development related factors. Stephenson (1997) provided a description of the situation at the beginning of the 1990s, showing for example 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.

evance in terms of meeting the defined objectives and the effectiveness of the monitoring system in ensuring that producers actually meet the standard.

In agricultural economics the literature on the "privatization" of agribusiness standards in the 1990s[9] has indicated that in developing countries private standards for quality and safety of food products were a strategic response first and foremost to missing or inadequate public standards[10] (Jaffee, 2003; Henson and Reardon, 2005; Humphrey, 2008; Reardon *et al.* 2009).

Developing countries standards have been much discussed also in the agricultural economics trade literature, often with the prior that the "standards as barriers" case is more likely to apply to developing country exporters. For example Disdier *et al.* (2008) construct an inventory of SPS and TBTs measures and use a gravity model to show that they do not significantly affect bilateral trade between OECD members but significantly reduce DCs and LDCs exports to OECD[11]. In particular the spread of private standards has been investigated on the basis of the concern that they could lead to the exclusion of the least developed countries and the poorest farmers, who are unable to comply with stringent requirements due to a lack of technical and financial capacity (Graffham *et al.*, 2007; Maertens and Swinnen, 2007; Reardon *et al.*, 2001; Swinnen and Vandeplas, 2011).

Finally an indirect indication that standards are lower is provided by a vast literature on value chains coordination by multinationals, pointing out that one of the main advantages for developing countries is the upgrading of standards (Cuffaro and Liu, 2008). For example a Madagascar case study (Bart *et al.*, 2009) shows the benefits, even for very poor farmers, of the integration in global value chains, through a monopsonistic marketing company, controlling and enforcing the standards imposed in private protocols by the clients –mainly European supermarkets- related to search and credence characteristics.

3. Consumers' expectations about quality

We formulate three main assumptions regarding consumers' expectations about quality.

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 know the effectiveness of internal regulation and the incidence of cheaters and base their expectations on such incidence. Foreign consumers base their expectations on

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[9] In agribusiness privatization has occurred in two distinct ways: on the one hand large 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.*, 1999).

[10] Although developing country situations are heterogeneous, public infrastructure, governance structures, and institutions are generally poorer, which translates into a relative lack of public standards especially for non tradable and traditional products (Perez-Aleman, 2011; Reardon *et al.*, 1999). Also, in general (Piore, 2003; Amsden, 1989; Lall, 2000) and in agribusiness international standards are strongly based on ideas and practices developed in advanced countries and their adoption in developing countries occurs in a context that can be far from the technological frontier and/or traditional local customs.

[11] Although findings on trade effects can be more complex (Sheperd and Wilson, 2013).

the percentage of imports from the country which failed border quality inspection, which is in turn linked to the effectiveness of internal regulation in the exporting country, but they 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.

The second assumption is based on the idea that since foreign consumers cannot observe regulation in each country of origin of their imports as closely as domestic consumers, they may partly base their expectations about product quality on general notions about the relationship between regulation on quality and income level.

In general what foreign consumers can observe about the effectiveness of regulation in exporting countries 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% 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% of the more than six million consignments of food and cosmetic products imported each year. Regulatory oversight for certain products and markets is more stringent on domestic, rather than imported supplies (World Bank, 2005).

Although the dramatic transformation of the world economy within the last decade (global outsourcing and "hybrid" products) has made the issue more complex, marketing and business research shows that consumers do use country of origin as a quality signal especially when information about quality is ambiguous (reviews of this literature include: Bilkey and Nes, 1982; Verlegh and Steenkamp, 1999; Pharr, 2005; Rosenbloom and Haefner, 2009; Papadopoulos and Heslop, 2014) and more specifically this research has also shown that negative evaluations by consumers on the basis of country images constitute significant market barriers for firms from less developed countries (Baughn and Yaprak, 2014).

Country of origin is regarded as a cognitive cue, viz., an informational stimulus about or relating to a product that is used by consumers to infer beliefs regarding product attributes such as quality, and since it can be manipulated without changing the physical product, it is an extrinsic cue like price, brand name and retailer reputation.

The cognitive processes underlying the effects of country-of-origin on product evaluation may be explained through different hypothesis, some of which are especially relevant for credence attributes. For example research on the role of stereotypes suggests that these may be used as a heuristic basis for judgements especially when the amount of attribute information is large and difficult to integrate or when other information is lacking. Thus, subjects who learn that a product is originating in a country with a reputation for high quality may use this knowledge as a basis for evaluation without considering information about the product's specific attributes, especially if evaluating the information is difficult (Hong and Wyer, 1989); Maheswaran (1994) examines consumer expertise and attribute information as moderating the effects of country of origin, and shows that all types of consumers use country of origin evaluations when attribute information is ambiguous. In the agricultural economics literature most studies – surveys, choice experiments, and experimental auctions- find that consumers prefer and are willing to pay a premium for many foods with country of origin labels, although the premium varies substantially across studies, products, countries, and experimental method (Grebitus *et al.*, 2010)

Product/country images contain widely shared cultural stereotypes. For example, consumers recognize that the production of high-quality technical products requires a highly trained and educated workforce; hence, they perceive that such products are of better quality when produced in developed countries (Verlegh and Steenkamp, 1999). 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 were rated inferior to those with an industrial country-of-origin label and Head (1993) reports that a 'Made in Germany' label evokes the concepts of reliability, precision and punctuality. Liu *et al.* (2001) provide empirical evidence of a 'level of development' factor in the market for organic foods.

Verlegh and Steenkamp (1999) evaluated the findings of past country-of-origin studies within the marketing and business literature for the period 1980-1996 and found that the country-of-origin effect is strong especially for perceived quality and that one factor closely related to the evaluation of products in general is the level of development: the country-of-origin effects are significantly larger when products from more developed countries are compared with products from less developed countries. This finding supports the notion that consumers believe that products from LDCs are lower in quality, and associated with a larger risk of bad performance and dissatisfaction (Cordell, 1992).[12]

Roth and Romeo (1992) argue that consumers' evaluations are based on the match between product and country: consumers prefer a country as an origin for specific products when they believe that there is a match between its perceived "strengths" and the skills that are needed for manufacturing the product under consideration: a strong positive match would exist when the country is perceived as being very strong in an area that was also an important feature for a product category.

Actually in the case of credence goods an important issue is the effectiveness of regulation, which in turn depends on good general and dedicated institutions. This is the "skill" required and consumers may establish a positive association with the level of development just as for the case of high quality technical products.

4. Credence goods, trust and the market for high quality

4.1 The model

The model we formulate analyses the impact of the effectiveness of regulation on the development of the market for high quality credence goods, i.e. a market where goods of actual different quality can be sold as high quality goods (examples are goods labeled environmentally friendly, or bio, or safe for children).

The effectiveness of regulation is measured by the probability λ of being caught cheating on quality, internal consumer know that measure, and expected quality depends on it. Figure 1 shows the domestic market before trade. With perfect regulation only high qual-

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[12] Also, there is anecdotal evidence that in some poor countries some producers unlawfully package their products with a country of origin label different from their own, a "better" country of origin.

ity producers participate in the market and the supply function is S_0^D. The demand function is D_0^D with the equilibrium price P_E^D.

If $\lambda < 1$, the supply function shifts to S_1^D which represents 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 (the analytical form of the demand function is such that its vertical intercept is equal expected quality), the equilibrium price decreases and consumers surplus is reduced.

Figure 1. Domestic market.
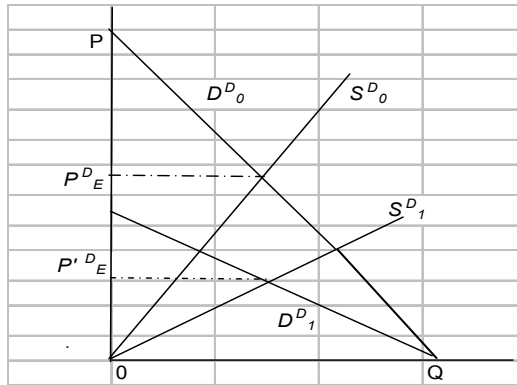
The analytical results presented in this section show that the equilibrium price is increasing in expected quality, and therefore in λ: better regulation on quality, here intended as the ability of regulators to exclude cheaters from the market, results in higher prices for high quality credence products. Furthermore both consumer and producer surplus are strictly increasing in expected quality and therefore in λ.

Extending the basic idea of Figure 1 to trade, let's assume that country/area A is a large exporter (country A has a comparative advantage based on factor endowment) and world price is formed on the internal market of A as a result of the interaction between internal demand D^D plus the demand for imports from the rest of the world D^I and supply in A, S^D (the same result could be obtained summing the excess function of this large country to the market of rest of the world).

With perfect regulation (λ=1) the internal supply and demand functions are S_0^D and D_0^D and the demand for imports from the rest of the world is D_0^I, in country A total demand is D_0^T and the equilibrium is E^0. A lower λ would reduce the expectations of internal and foreign consumers about quality in country A. Internal supply, internal demand, the demand for imports and total demand for the high quality product rotate (dotted lines in Figure 2a) and the new equilibrium is E^1. A negative country of origin stereotype, linked to the level of development of the exporter would instead only rotate D_0^I.

The model's results show that the equilibrium price is strictly increasing in λ and also strictly increasing in the level of development parameter.

Figure 2. Trade of credence goods.

(a) Country/Region A

(b) Rest of world
Import demand
export supply
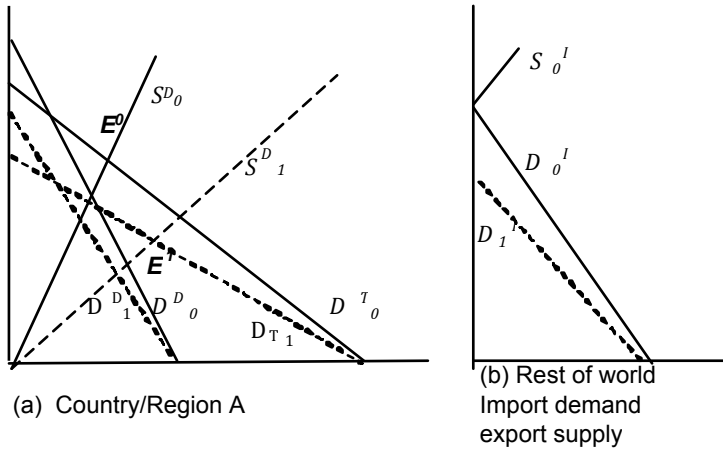
In both cases if there were a minimum price of high quality, known to consumers, below that price there would be no supply and no demand (as consumers know that the good cannot be high quality) i.e. there may be no high quality production and export.

Analytically, in analogy with the model of Anania and Nisticò (2004), we assume that markets are competitive and there are high quality producers and low quality producers who try to cheat.

There are n_H identical high quality producers and n_L identical low quality producers, with marginal cost functions

$$c_H = \beta_H q_H$$

$$c_L = \beta_L q_L$$

with $\beta_H > \beta_L$.

Each high quality producer produces a quantity such that

$$P = \beta_H q_H$$

Depending on the probability λ of being caught cheating, a fraction $\left(1 - \lambda\right)$ of low quality products is sold on the H market, therefore the expected marginal revenue of cheaters is $P\left(1 - \lambda\right)$ Hence each low quality producer offers on the H market a quantity such that

$$P(1 - \lambda) = \beta_L q_L$$

The aggregate supply in the high quality market is:

$$S(P) = n_H \frac{P}{\beta_H} + (1-\lambda)n_L \frac{(1-\lambda)P}{\beta_L} \qquad (1)$$

Assuming for simplicity that there is a continuum of mass 1 of producers of each type, $n_H = n_L = 1$, equation (1) becomes:

$$S(P) = \frac{P}{\beta_H} + (1-\lambda)^2 \frac{P}{\beta_L} \qquad (1bis)$$

The first term in the right hand side of equation (1bis) reflects the supply from high quality producers and the second term that from low quality producers that cheat.

On the demand side[13] it is assumed (Mussa and Rosen, 1978; Tirole, 1988) that consumers 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=θE(k)-P if they buy a good of expected quality E(k), where k is a random variable which can take two possible values, associated respectively to high or low quality, at price P.

Although this framework implies a tradeoff between quality and price, it can be applied also to a context in which consumers are only interested in high quality –in the sense of a product with the specified standard, e.g. "bio"- but quality is probabilistic and there is a tradeoff between the likelihood of getting the unwanted "attribute" and price.

Willingness to pay for a quality E(k) is given by θE(k), and increases with θ and E(k). Demand is equal to the number of consumers with parameter θ such that θE(k)≥P Derivation of the demand function[14] uses the 'threshold' consumer with a taste parameter $\tilde{\theta}$ is indifferent to buying or not buying a unit of product of expected quality E(k) at price P,

$\tilde{\theta}E(k) - P = 0$ implying that $\tilde{\theta} = \dfrac{P}{E(k)}$ Demand is

$$D(P) = M\left(1 - \frac{P}{E(k)}\right) \qquad (2)$$

where M is the total number of consumers.

Domestic consumers are aware of the measure of the effectiveness of regulation λ and know also the other parameters of the supply function. They expect high quality with probability

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[13] The discussion of demand is mostly based on a simple model with vertical differentiation of products (Mussa and Rosen, 1978; Tirole, 1988). This demand function has been extensively used in the literature Marette, Crespi, and Schiavina (1999); Crespi and Marette (2001); Moschini and Lapan (2005); Zago and Pick (2004).

[14] If θ is distributed in the economy according to a cumulative distribution function F(θ), F(θ) 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 θ(E)k≥p . D(p)=M [1-F(p/E(k))] Where M is the total number of consumers.

$$\pi_H = \frac{P / \beta_H}{\dfrac{P}{\beta_H} + (1-\lambda)^2 \dfrac{P}{\beta_L}} \tag{3}$$

this probability is one if regulation is perfectly enforced ($\lambda=1$)

and expect low quality with probability

$$\pi_L = \frac{(1-\lambda)^2 P / \beta_L}{\dfrac{P}{\beta_H} + (1-\lambda)^2 \dfrac{P}{\beta_L}} \tag{4}$$

This probability is zero if regulation is perfectly enforced ($\lambda=1$).

Assuming that there is no learning or very slow learning on the part of consumers because of the credence nature of the attributes considered, in these type of markets in equilibrium products of different qualities can be sold as high quality products, in the sense of products that respect the specified standard.

k is a random variable which can take only two possible values, k_H and k_L, with probabilities π_H and π_L. Assuming $k_H = 1$ and $k_L = 0$ expected quality E(k) is equal π_H

$$E(k) = \frac{P / \beta_H}{\dfrac{P}{\beta_H} + (1-\lambda)^2 \dfrac{P}{\beta_L}} = \frac{\beta_L}{\beta_L + (1-\lambda)^2 \beta_H}$$

Expected quality E(k) is increasing in λ and it is equal 1 with $\lambda=1$.

Abiding by the general functional form of equation (2), and setting the mass of consumers M=1 domestic demand can be specified as follows:

$$D(P) = 1 - P \Big/ \frac{\beta_L}{\beta_L + (1-\lambda)^2 \beta_H} \tag{5}$$

4.2 Results

Analytically the equilibrium price satisfies

$$\frac{P}{\beta_H} + (1-\lambda)^2 \frac{P}{\beta_L} = 1 - P \Big/ \frac{\beta_L}{\beta_L + (1-\lambda)^2 \beta_H} \tag{6}$$

Solving equation (6) for P we obtain the following equilibrium price:

$$P^\star = \frac{\beta_H \beta_L}{\beta_L + \beta_L \beta_H + (1-\lambda)^2 \beta_H + (1-\lambda)^2 \beta^2_H} = \frac{\beta_H \beta_L}{(1+\beta_H)\left[\beta_L + (1-\lambda)^2 \beta_H\right]} = E(k)\frac{\beta_H}{1+\beta_H} \quad (7)$$

The equilibrium price is increasing in E(k) and therefore in λ: better regulation on quality , here intended as the ability of regulators to exclude cheaters from the market, results in higher prices for high quality credence products.

The equilibrium quantity is

$$q^\star = 1 - \frac{P}{E(k)} = \frac{1}{1+\beta_H}$$

Consumer surplus is $\dfrac{E(k)}{2(1+\beta_H)^2}$; producer surplus is $\dfrac{E(k)\beta_H}{2(1+\beta_H)^2}$ and they are both strictly increasing in E(k) and therefore in λ.

The model described by equations (1)-(6) may also give insight on trade in two distinct cases. Considering a world with two regions, A and B, where A is "developing" and B is "developed", the first case is when there is no internal production in region B; in the case of food this could be because of climate, and therefore it is not an irrelevant case. Supply in A is described by equation (1bis), demand is the sum of demand in A and B. The latter depends also on how foreign consumers' expectations are formed.

The second is a specific category of credence goods: some credence "ethical" products such as "fair trade" products, which by definition are exported only by developing countries. In this case there would be no internal production in region B. Supply in A could be described by equation (1bis), demand in A is solely the demand for imports and it depends on how consumers in region B form expectations about regulation and quality in region A. Generally speaking foreign consumers have less information than internal ones, but in this case they will likely assume that the incentive and/or ability of national regulators in any developing exporter to "exclude" part of the supply from the market is low. Therefore, without alternative mechanisms of regulation, the situation is the same as in Figure 1 with λ "low", and the demand for imports would be "low" like in the case of D_1^D. The development of these markets requires alternative forms of regulation: indeed for ethical products such as "fair trade" regulation is provided by supranational non profit organizations.

For trade in the general circumstances – there is internal supply in both countries – it is assumed that consumers are aware of the country of origin of the product and the traded product is a perfect substitute for the domestic one, except for consumers' expectations about quality. Supply reflects factor endowment and regulation, country A (developing) has a comparative advantage based on factor endowment.

The values of k_L and k_H are the same for foreign and internal consumers; in country B the supply function is

$$S(P) = \frac{P}{c} \tag{8}$$

If consumers in B cannot distinguish between domestic production and imports, with trade expected quality becomes some average of the expectations about quality in B and A (as in Bureau *et al.*, 1998). Low expectations about quality of imports from A will shift downward internal demand for a credence good in B, reducing consumer surplus and the demand for imports.

Lets' consider instead the case where there is a country of origin label.

For prices below the autarchy equilibrium price in B import demand from country B is

$$D^I = 1 - \frac{P}{E^B(k)} - \frac{P}{c} \tag{9}$$

where E^B is now depending on the expectations of consumers of country B about quality in region A.

$$D^I = 1 - P \frac{E^B(k) + c}{E^B(k)c} \tag{10}$$

and the inverse function is

$$P = \frac{cE^B(k)}{E^B(k) + c} - \frac{cE^B(k)}{E^B(k) + c} Q \tag{11}$$

$\frac{cE^B(k)}{E^B(k) + c}$ is increasing in $E^B(k)$ (its first derivative in $E^B(k)$ is strictly positive for positive values of c).

Consumers in the importing country are likely to form expectations on the quality of imports on the basis of several factors. They may observe that there are imports which fail border quality inspection: the simplifying hypothesis adopted here is that the rate of failure is the same as the value of π_L in equation (4). However, consumers in any importing country will probably be very uncertain about the conditions of supply for every exporting country and about the technology of border quality inspections (which can be limited and/or variable). Therefore consumers in B may, as implied by the literature discussed in paragraph 3, be influenced by a country of origin stereotype linked to the level of development.

Foreign consumers expect high quality imports from A in line with probability

$$\pi_H^I = \delta \pi_H \tag{12}$$
$$0 \leq \delta \leq 1$$

and low quality imports from A in line with probability π_L^I

$$\pi_L^I = 1 - \pi_H{}^I = \pi_L + (1 - \delta)\pi_H \tag{13}$$

Here δ is increasing in the level of development – it is an index of reliability or positive country stereotype – hence (1–δ) is the negative stereotype, which amplifies the perception of low quality formed through the incidence of import control failures.

Hence both the actual effectiveness of internal regulation in A and the country stereotype influence expectations.

Equating import demand(10) and export supply (1bis minus 5) the equilibrium price is

$$P^\star = \frac{2\beta_H \beta_L c\delta}{c\left[\beta_L + \beta_H(1-\lambda)^2\right]\left[\beta_H + \delta(1+\beta_H)\right] + \beta_L\beta_H\delta} \tag{14}$$

It is immediate to see that the equilibrium price P^* strictly increasing in λ. Moreover, an easy computation proves that the first derivative of P^* with respect to δ is strictly positive, i.e. the equilibrium price P^* is strictly increasing in δ, too.

Moreover, if a credence attribute is related to safety a change in λ 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 (World Bank, 2005).

The developing exporter whose internal regulation on product quality has recently been most scrutinized is undoubtedly China. China however is not an exporter that can be easily "abandoned" by importers. Smaller countries could be much more damaged by a national stereotype problem[15]. Indeed 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 safety or other quality problems.

5. Conclusions

There are several important implications of the trust and stereotype problem as represented here for an exporter, especially a developing country.

First, low effectiveness of regulation causes failures in the market for high quality credence goods.

Second, there may be a trap of low levels of development/effectiveness of regulation and failure in high quality exports.

Therefore, strategies to increase the effectiveness of regulation, such as improving legislation and monitoring are crucial to improve export prospects. An important challenge

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[15] 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 recovered (World Bank, 2005); a similar sequence is quoted in Chisik (2003) for Colombia's garment industry.

is to increase the supply and quality of public standards and their associated monitoring mechanism.

However, the literature discussed and the model suggest that if a developing country is not well prepared to achieve high levels of effectiveness of regulation and/or if there is a strong country of origin prejudice, linked to the level of development, standard setting and enforcement by external actors, such as supermarkets may be beneficial. This trust effect has been important for the growth of high quality food exports in many developing countries.

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 may be bypassed. Trust will be based on the NGO reputation and the perceptions consumers have about NGOs incentives and efficiency in monitoring compliance with standards

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