Journal of Development Economics 116 (2015) 105–121

Contents lists available at ScienceDirect

Journal of Development Economics

journal homepage: www.elsevier.com/locate/devec

Review

Quality signaling through certification in developing countries☆

Emmanuelle Auriol [a,*], Steven G.M. Schilizzi [b]

[a] Toulouse School of Economics, ARQADE and IDEI, France
[b] Agricultural and Resource Economics, Faculty of Science, The University of Western Australia, Australia

ARTICLE INFO

Article history:
Received 27 July 2012
Received in revised form 6 March 2015
Accepted 16 March 2015
Available online 31 March 2015

Keywords:
Credence good
Quality signaling
Certification
Developing countries
Seeds

ABSTRACT

This paper studies how signaling the credence attributes of consumer goods distorts their market equilibrium in developing countries. Costs of certification, sunk in order to achieve credibility, play a key role in producing an oligopolistic market, leading to high prices that form a barrier for consumers in the South. To lower the cost, certification is better achieved by a single independent body which can be financed either by end consumers, through a fee, or by public subsidies. The paper identifies the conditions under which each funding mechanism is most efficient, taking into account the government's budget constraint. The theoretical analysis is motivated with reference to agricultural seed certification.

1. Introduction

Globalization of trade has brought quality attributes of consumption goods under the limelight. Confronted with worldwide division of labor, individuals and firms can no longer trace the origin nor control the composition of inputs or products. A permanent flow of innovations exacerbates the problem. This is obviously true for complex commodities like pharmaceutical products, but it is also true for more simple ones like agricultural products with, for instance, the appearance of genetically modified organisms (GMOs) or certified seeds. Consumers and public authorities are giving weight to quality attributes such as nutritional content, safety, functionality, and social and environmental impact. They want to purchase commodities the origin and composition of which is certified. In the process, problems arise linked to the possibility for consumer deception and, more generally, to the efficient signaling of the quality attributes of goods and services. This problem of quality signaling is global. However, it is far worse in developing countries than in advanced economies because of the structural weakness of their governments. Counterfeiting of drugs illustrates the extent of the problem. These drugs are produced in developing countries, mainly in India, and exported to other developing countries where they represent a threat to public health.[1] It is estimated that in some parts of Asia, Latin America and Africa, 30% of the medicines on sale are counterfeit. By contrast, advanced economies have a low percentage of counterfeit drugs, less than 1% of market value (OECD, 2008).

Although it is important to understand why this problem is so prevalent in developing countries and what can be done about it, there are surprisingly very few studies on this topic. In the context of developing countries, the literature focuses on the impact of process certification of products purchased by consumers in the North on the welfare of producers in the South. Examples of process certification include various labels for organic farming and fair trade (e.g., Max Havelaar). The development literature has not, until now, considered how consumers in the South might have access to the high quality, certified products consumed in the North, such as pharmaceuticals or agricultural seeds. Yet the high prices of these products form a barrier to access in the South. The present paper contributes to the literature by focusing on the implications of certification costs on the industrial organization of

☆ We would like to thank for their useful comments on an earlier version of the paper: Jean Tirole, Marcel Fafchamps, Karine Van Der Straeten, Sylvie Lambert, Francois Bourguignon, Josepa Miquel-Florensa, Stephane Straub, Jean-Paul Azam, Priscila Souza, and Gaelle Balineau, as well as seminar audiences at the Toulouse School of Economics, at the Paris School of Economics, at the School of Agricultural & Resource Economics at the University of Western Australia, at the EUDN scientific meeting and at the Australian Agricultural and Resource Economics Society. The paper has also greatly benefited from insightful comments and suggestions from two anonymous referees. We are extremely grateful for the improvements they all have made possible. Emmanuelle Auriol would also like to thank the French Development Agency (AFD) for its financial support. All remaining errors are ours.

* Corresponding author.
E-mail addresses: emmanuelle.auriol@tse-fr.eu (E. Auriol), Steven.Schilizzi@uwa.edu.au (S.G.M. Schilizzi).

[1] It is estimated that India produces 75% of these drugs, followed by 7% from Egypt and 6% from China (Barnes, 2007). In 2003, estimates of the annual earnings from substandard and/or counterfeit drugs were over US$32 billion (WHO, 2004). More generally an OECD (2008) study concluded that international trade in counterfeit and pirated goods could have accounted for up to USD 250 billion in 2007, representing 1.95% of world trade.

http://dx.doi.org/10.1016/j.jdeveco.2015.03.007
0304-3878/

the sectors confronted with difficulties in signaling quality in developing countries. We illustrate our theoretical analysis of the problem with agricultural seed certification. The paper first studies the *laissez-faire* equilibrium, notably firms' strategies in pricing and supply of quality (sustained at best with self-certification, at worst by nothing); and secondly, it explores the types of economic policies that can be implemented to improve quality and welfare.

Quality signaling can better be understood once different categories of goods are acknowledged. Nelson (1970) and Darbi and Karni (1973) developed the triple categorization of search, experience and credence attributes of goods. Search attributes are those for which consumers can assess the quality of a good before purchasing it. Typical examples are external physical attributes such as color, size, polish and style. Experience attributes are those for which consumers cannot assess the qualities until they have purchased and used or consumed them. Typical examples are taste, system functionality, performance, or productivity. It is only by trialing the goods, with experience, that the quality can be assessed (e.g. software, cars). Finally, credence attributes are those for which consumers can assess the quality attributes neither before nor after purchase and use. Typical cases refer to environmental impact at the production stage, to health and safety related attributes such as food nutritional composition, or to the chemical formula of a drug. Historically, as the set of products and technological processes have broadened to encompass an increasing number of credence goods, consumers' awareness and demand for quality have risen over time. As a result, quality signaling to consumers has become a major challenge.

One practical solution to this problem is the process known as *certification*. Certification may be defined as a process whereby an unobservable quality level of a product is made known to the consumer through some labeling system, usually issued by a third independent party. There are both product and process certifications, the first linked mostly to consumption, the second linked mostly to production. The international ISO 9000 and ISO 14,000 families of norms address, respectively, these two types. Obviously, a major concern with certification is consumer confidence which depends on the credibility of the certification process and stamp. It must be done by an authority above all suspicion. A second concern, which is directly linked to the first, is that to signal quality without or with little uncertainty, certification is costly and may indeed in some cases be very costly. Typical examples relate to health and environmental safety. In addition, such assessment procedures take time. In developed countries, enforcement is carried out by government agencies such as the Food and Drug Administration in the United States; or by private certification firms such as Underwriters Laboratories, who issues the US Green Seal. In developing countries, the public sector is usually unable to exercise adequate control over private supply chains because of their limited resources and weak governance. It leaves the market either totally unregulated or open to private certification (e.g., to NGOs such as the Fairtrade Labeling Organizations International, who issue fairtrade labels).[2]

The present paper focuses on how certification costs in poor countries impact on market structure and performance when quality is costly to produce and unobservable by consumers. The costlier the certification process, the fewer will be the firms able to afford it. We study how these supply factors intersect with the demand for certification, which is the driving force behind the whole process, and what the characteristics of a market for certification look like. How the certification process is made credible is left as a black box. But we do assume that to credibly signal quality, firms rely on a certification process that is costly.

We first show that private incentives to self-certify quality are suboptimal. Certification is an input in the firm's production process, which for credibility reasons is better achieved by an independent party. Third party certification is better than self-certification because it avoids duplication of certification costs. We next study the optimal certification policy both under private and public funding. Poor political governance and inefficient institutions raise the shadow cost of public funding and make credible certification much harder for governments in developing countries to achieve. In the absence of public funding, even when producing high quality products is relatively cheap, poor countries are trapped with low quality products due to the high cost of certification. This is an area where international aid agencies and NGOs can play a significant role by bringing credibility to the certification process as well as funds.

We illustrate the importance of certification for development using the example of agricultural seeds. The reason for the choice of seeds is their increasing importance in a world where a growing population needs ever more food and fiber. According to the FAO, 800 million people today are chronically undernourished. Many countries face food shortages and emergencies. Since the world population is predicted to grow from 7 billion to 8.3 billion by the year 2025, the food insecurity problem is likely to worsen. Finally, more than 70% of the world's poor live in rural areas and agriculture is their main source of income and employment (The World Bank, 2013). We do not however conduct an empirical test of the theory because the dataset is small and of insufficient quality. Nevertheless, combined with the theoretical analysis, it provides some insight into the problems raised by the financing of seed certification and, beyond, by the supply of high quality products in developing countries.

The paper is organized as follows. In Section 2 we present a review of the development literature on certification issues, including the case of certification in the seed market: this is to illustrate the relevance of the problem addressed in this paper. Section 3 presents a simple model that describes the relationship between demand for certified goods and services, certification costs, and market structure. Section 4 examines the relevance and role of the external provision of certification when self-certification is inefficient, and it compares the public and private funding of the certification process in developing countries. Finally, Section 5 concludes.

2. Examples and related literature

There is a substantial body of empirical and applied literature dealing with labeling and certification. Fields of application relate to quality of the environment and food safety.[3] A major concern with the certification of credence attributes is the extent to which the certification process is credible to consumers. This issue has been investigated in a series of theoretical papers which highlight the difficulty in achieving an efficient market for certification.[4] This suggests that public intervention might be a good thing in this area. However, credibility is sometimes difficult to achieve for the government.

Certification is a form of information provision, and the quality of that information cannot be disconnected from the quality of the social bodies that produce it. This raises the question of who, government, NGOs or private firms, should be in charge of providing certification. To answer this question it is useful to look at the literature on corporate social responsibility (CSR). Besley and Ghatak (2007) define CSR as the corporate provision of public goods, or the curtailment of public bads, independent of legal benchmarks. According to Besley and Ghatak (2007) CSR is a reaction to distortions in government preferences or

[2] See http://www.fairtrade.net.

[3] See Gallastegui (2002) for a survey and discussion of the literature on eco-labels and Lesourd and Schilizzi (2001), chapter 9, for an overview of the ISO 9000 and ISO 14000 families of international norms for quality. In agricultural economics, the literature focuses on public and private policies governing credence attributes of foods, generally from a game theoretical approach (see Dranove & Jin, 2010 and Bonroy & Constantatos, 2013 for nice surveys).

[4] See Biglaiser, 1993; Wolinsky, 1993; Emons, 1997, 2001; Lizzeri, 1999; Albano and Lizzeri, 2001; Jahn et al., 2005.