



Price, quality and trade costs in the food sector[☆]



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ABSTRACT

Recent developments in international trade theory have placed considerable and growing emphasis on the quality of the exported products, showing that it affects both the direction of trade and the countries' export performances. However, as quality is unobservable, a measurement problem clearly emerges. In this paper we review and apply some of the most recent methods developed in the international trade literature to estimate quality of traded products. We focus on the food sector, where the growing attention on quality and safety issues is leading to an increase in the demand for high quality products. In the first part of our empirical analysis, we investigate the properties of the estimated qualities, drawing some interesting results. In particular we find that, in contrast with what is often assumed in the literature, quality and prices are imperfectly correlated. The second empirical section is dedicated to the study of the relationship between price vs. quality and trade costs. What emerges is that, interestingly, the price and the quality of food exports are influenced differently by *ad valorem* and specific trade costs. Moreover, the magnitude of this relationship changes according to the level of product differentiation.

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Introduction

In recent years, the food sector has seen a growing importance of quality as a fundamental feature of products. This is particularly true for developed countries, where consumers are increasingly concerned about the quality of the food products they buy, and aware of nutrition and health issues (Caswell and Mojduszka, 1996; Grunert, 2005; Bontemps et al., 2012).

This attention toward quality has been exacerbated by the recent significant increase in trade of agri-food products. Due to the progressive fall in trade barriers, worldwide consumers have had access to a wider choice of differentiated products coming from various origins. Since exporting countries often have different institutions and regulatory framework with respect to the importers, consumers at home perceive a higher risk of dealing with unsafe products. As a consequence, they become increasingly concerned about food safety and quality (Krissof et al., 2002).

In order to meet consumers' needs, national and international policies are laying down stringent quality requirements to guarantee the production of higher quality goods. The last years have been marked by the diffusion of many public and private food standards. These policies have been set with the aim of raising minimum quality requirements and giving consumers further information on what they are actually eating.

Other policies have been developed with similar objectives. This is the case, for example, of the European Union (EU) quality schemes, which identify geographical indications and traditional specialties with the purpose of promoting and protecting names of quality foodstuffs. In a broader context, FAO has recently launched a program concerning origin-linked quality and geographical indication, with the aim of valuing domestic food products in developing countries.

In this framework, the enhancement of food quality represents an important driver for countries' development, as well as a fundamental step toward raising products competitiveness in the international market. It also presents new challenges, especially for developing countries aiming at exporting to rich countries, as they have to make their products meet the high quality requirements (Maertens and Swinnen, 2009; Henson et al., 2011; Minten et al., 2013; Olper et al., 2014).

The importance of quality has been stressed by several authors in the international trade literature. Indeed, quality is often recognized for its essential role in driving the direction of trade and viewed as a pre-condition for export success (Grossman and Helpman, 1991; Amiti and Khandelwal, 2013).¹ According to the quality ladder models of Grossman and Helpman (1991) and

¹ Product quality enters the international trade models with the seminal contributions of Linder (1961), Flam and Helpman (1987) and Falvey and Kierzkowski (1987). The first empirical evidence about the role of quality in determining the international trade patterns can be found in Schott (2004) and Hallak (2010). At firm level, recent theoretical and empirical contributions allow quality to be heterogeneous across firms (Baldwin and Harrigan, 2011; Verhoogen, 2008; Crozet et al., 2012; Fajgelbaum et al., 2011; Crinò and Epifani, 2012; Curzi and Olper, 2012).

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Aghion and Howitt (1992), the ability of a country to upgrade the quality of exports can positively affect economic growth and development (see Hausmann et al., 2007).²

In this context, it is important for countries, as well as international organizations and policy makers, to be able to have access to as “objective” information as possible on the quality of traded foods. This helps, on one side, to identify the pattern of product quality, which can be useful, for example, to assess the effectiveness of quality oriented policies. On the other side, identifying product quality rankings could be valuable for the allocation of the resources aimed at enforcing food control strategies and for supporting products’ compliance with national and international standards.

However, the study of product quality is hindered by the difficulty to measure it, as quality is unobservable. Indeed, quality depends more on consumers’ perception than on objective features of products. Researchers have tried to deal with this problem by using proxies for quality, in most cases assuming a direct relationship between price and quality. This assumption, albeit convenient, may lead to an inaccurate measure of quality. Indeed, prices usually reflect several other elements that are not attributable to quality. Moreover, consumers do not always associate higher prices with better quality when buying a food product, but they look instead at other characteristics, such as the advertisement for the product and/or its nutritional and dietary characteristics.

To address this issue, some studies have recently developed alternative methods to infer products quality, with the aim of obtaining more reliable measures (see, e.g., Khandelwal, 2010; Hallak and Schott, 2011; Khandelwal et al., 2013; Feenstra and Romalis, 2014). These methods have the advantage of disentangling quality from trade unit value, leading thus to the estimation of a quality measure separate from price.

In this paper we apply the models by Khandelwal (2010) and Khandelwal et al. (2013) to estimate product quality from trade data in the food industry. These approaches are based on the intuition that, conditional on price, traded products with higher market shares are assigned higher quality. Once we obtain the quality estimates we propose two different empirical exercises, which share the objective of assessing whether the quality measure gives additional information with respect to the use of price. Moreover, the first application is aimed at investigating countries’ competition strategies, while the second one has the objective of testing how trade costs affect quality and price of exported food products.

In the first empirical section, we use the method by Khandelwal (2010) to estimate the quality of EU-15 food imports from worldwide partners, using data covering the period 1995–2007.³ We aim at analyzing the evolution of quality over time, in comparison with unit values growth. This allows us to assess whether the two indicators go in the same direction and, moreover, to identify countries’ (industries’) competition strategies in international markets. In particular, two main strategies are often identified by the literature: price and quality competition. However, previous works aimed at identifying which of the two strategies prevails (e.g. Baldwin and

Harrigan, 2011; Baldwin and Ito, 2011; Crozet et al., 2011) made use of unit value as proxy for quality. Our paper adds value to this line of research by considering quality separately from the price of traded goods.

In the second empirical section, we explore the relationship between export prices vs. quality and trade costs. This topic is considered of relevant importance in the literature, particularly due to the progressive trade liberalization and the associated fall in trade barriers. The issue of how trade costs condition countries’/industries’ exports has been widely studied by previous works, but only few studies made use of direct quality measures (see Amity and Khandelwal, 2013; Curzi et al., 2015). Our analysis, compared to previous literature, allows splitting export prices into a quality and a pure price components, and then investigating the relationship between trade costs and these two measures. To do this, we make use of the quality measure obtained with the method by Khandelwal et al. (2013), as it allows separating the quality component of export prices (expressed as unit values) from the pure price (quality-adjusted price). The effect of trade costs on price and quality is investigated taking into account both *ad valorem* and specific tariffs.

The main results can be summarized as follows. The first empirical section shows that there is poor correlation between the evolution of our quality estimates and unit values over time. This result is in line with what was found by Hallak and Schott (2011), who showed that price and quality often move in two opposite directions. This finding suggests being careful when using price as a proxy for quality in empirical analyses, since this could lead to a misleading interpretation of the results. From the second empirical section, it turns out that trade costs cause different effects on price and quality of exports. This is another piece of evidence showing that quality and price capture different attributes of food products. This analysis also allows having a more complete picture of the effect of trade barriers on consumers’ welfare. In particular, our results show that *ad valorem* tariffs have a negative impact on the quality of exported products, while specific tariffs lead countries to export higher priced products but tend to have no significant effect on quality.

The remainder of the paper is organized as follows. In Section ‘Estimating quality from trade data’, we review the main methods to estimate quality, focusing on the approaches proposed by Khandelwal (2010) and by Khandelwal et al. (2013). Section ‘Data and estimations’ presents the data and the quality estimation results. In Section ‘Going inside our quality estimates’ we analyze in-depth some properties of the obtained quality estimates, and we compare price growth with quality growth for different groups of countries. In Section ‘Price, quality and trade costs’, we use the quality estimates obtained with the Khandelwal et al. (2013) method to estimate the relationship between price vs. quality and trade costs. Section ‘Conclusions’ presents some concluding remarks.

Estimating quality from trade data

The growing importance assumed by the quality of exported products in explaining the international trade patterns leads to face a relevant issue, that is the measurement of the quality of traded products.

The most common proxy for quality used in the trade literature is unit value (price), defined as nominal value divided by physical quantity of a traded product. This indicator has been widely used in empirical studies relying on the conjecture that higher unit value means higher quality, like the important contributions of Schott (2004), Hummels and Klenow (2005) and Hallak (2006). These works provide the first formal evidence that export unit

² The necessity for developing countries to improve the quality of their food products when exporting to wealthier countries is pointed out by Asche et al. (2015), who analyze the case of fish. The authors show that developing countries tend to export high value fish to developed countries, while importing low value fish from other developing countries. This pattern of trade is due to an income effect, governed by the Benet’s Law, according to which as people become wealthier they substitute away from low-quality foods toward higher-quality foods.

³ The food industry has been only marginally covered by the estimates in Khandelwal (2010), which focused on products imported to the US in other manufacturing industries. Food products were only marginally included among the analyzed sectors, since, according to the Rauch (1999) classification, they are largely considered as homogeneous goods, and thus do not exhibit substantial quality differentiation. Our work is instead focused on the European food market, estimating quality for food products exported from all the world countries to the EU.

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