The Impact of Food Safety and Quality Standards on Developing Countries Agricultural Producers and Exports

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Abstract

The agricultural trading environment is increasingly determined by food safety and quality standards. Standards define the terms of chain membership, imply rules and conditions for participation, and hence lead to processes of (re)distribution within the chain. For some producers, standards may open up new opportunities as they permit market access to particular market segments. At the same time, the process of (re)distributing market shares is accompanied by marginalization and exclusion, as standards may impose prohibitively high barriers for certain producers in terms of the short-term and long-term efforts needed for production under certification. This thesis aims to have a closer look at the concern voiced by many researchers that food safety and quality standards establish a particular burden for exports from developing countries and, within the developing countries, for the small producers. Coming from this starting point the thesis aims to establish a detailed understanding of a) how developing countries` export shares are affected differently by food safety and quality standards, b) the particular impact of food safety and quality standards on small producers and c) the compliance decision process standards at the producer level.

Results of the thesis show that developing countries are a heterogeneous group that shows various different tendencies regarding market share development under the impact of strengthening food standards. In addition, the analysis showed that “being small” in terms of export quantity at the country level does not necessarily lead to a negative impact of food safety and quality standards on the export share. Results of the analysis rather hint to the fact that a stronger involvement of the government and the private sector in SPS activities as well as a better communication structure within the country increase SPS capacity of a country and thus have a positive effect on a successful export performance.

The same differentiated perspective is necessary to understand the impact of food safety and quality standards on small producers. On a theoretical basis small farmers could well have a comparative disadvantage in complying with quality standards owing to their specific endowments, which hamper their ability to acquire information on the standard and to implement it. However, empirical evidence of the Moroccan case study shows that farm size only correlates marginally with the cost or compliance. The survey rather shows how important the forward integration in the value chain is in order to understand the importance of food safety and quality standards for the marketing performance. To maintain market

shares or even increase those in high quality markets, producers need information about the buyers' requirements. Results of the survey show the importance of vertical coordination and direct information exchange between downstream actors, buyers and producers as information on buyer's demands is rarely communicated horizontally amongst the farmers themselves.

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A Introduction

1 Background

The export of agricultural and food products to industrialized countries is of particular importance for most developing countries' economies. The international trade in these products has expanded remarkably over the last decades, notably in high-value food products. Fresh and processed fruits and vegetables, fish, meat, nuts, and spices now jointly account for more than 50 % of the total agri-food exports of developing countries (CTA, 2009). Among these products, the trade of fruits and vegetables is exceptionally dynamic since the demand of consumers in high income countries for exotic and out of season products opens up new markets for southern suppliers (Borot de Battisti et al., 2009).

The positive development of the sector provides foreign exchange earnings to the exporting developing countries. Additionally, since horticultural production is labor intensive the positive development of the horticultural sector offers a source of income to those with little access to land and an employment possibility in rural areas, where few alternatives regarding work exist. However, an important development that affects the degree of opportunities facing developing country suppliers is the proliferation and increasing stringency of food and agricultural quality standards[1] which pose new and huge challenges to most exporting developing countries (Broberg, 2009; Disdier et al., 2007; Henson et al. 2001; Jaffee and Henson 2004; Wilson and Abiola, 2003; Otsuki et al., 2001, Wilson and Otsuki, 2001).

The increasing prevalence and strengthening of standards within the last two decades can be explained by three major reasons: First, consumers in high income countries demand high quality and healthy products. The consumers' perception of food has been seriously affected by various food scandals such as BSE, FMD, pesticide residues in fruit and vegetables and overall environmental pollution. These incidents have intensified concerns about healthy nutrition and raised the awareness regarding the quality of one's daily diet. Additionally,

1 Food quality standards include various product and process attributes required by the consumer: the technical value, the sensory quality, the nutritional value and all aspects of food safety, as well as the idealistic and psychological values of a product (Brockmeier, 1993; Wiegand, 1997). Food safety is an integral part of product quality since it is a basic prerequisite for any quality attribute (OECD, 2009). Food safety is a "public good" because safe food is a basic requirement of any food system to ensure trust in the food supply (OECD, 2009). It is the responsibility of the government to provide regulations which guarantee that food is safe when offered to consumers. Akerlof (1970) was the first to show that markets will not provide the socially desired quality due to information asymmetries.

consumers increasingly demand that the production and processing process of their food is environmentally sustainable, animal friendly and that recognized social and labor standards are adhered to (Fulponi, 2007).

The second reason for the increasing prevalence of standards can be found on the supply side: Retailers are the main link between consumers and the upward food chain. One of the retailers' new tasks is the communication of consumer demands back up the chain and product information downwards to the consumer. Retailers try to deliver the "desired" products in an increasingly competitive market where price competition has changed to price – quality competition (Fulponi, 2007). Traditional essentials such as cost efficiency and supply reliability are not sufficient anymore to increase or keep market shares. As a result, the agri – food system in most high income countries has changed significantly. There is the tendency to move away from spot markets to higher degrees of vertical coordination (Pingali et al., 2005; Buhr, 2003; Gibbon and Ponte, 2005). One aspect of the vertical coordination process is the increasing prevalence of standards which enables the heterogeneous characteristics of a product, including process and traceability requirements, to be marketed whenever there is a willingness to pay for these characteristics. This makes quality standards, which may be public as well as private, an ideal instrument to overcome market inefficiencies and to reduce transaction costs.

The third motivation to introduce food and agricultural standards can be found in the ongoing liberalization process of agricultural markets. In the Uruguay Round, the highly protected agricultural sector was for the first time effectively included in the international negotiations on trade liberalization. Traditional protection measures for the agricultural sector had to be dismantled to a large extent and developing countries saw the access to industrialized countries' food and agricultural markets as a main motivation for approving the Uruguay Agreement (Beghin, 2001). However, the liberalization and consequently globalization of food and agricultural supply means that new food safety risks are being introduced into countries and contaminated food can be spread across greater geographical areas, causing illness on a global level (Buzby, 2001). As a consequence, simultaneously with the liberalization of agricultural markets the importance of food safety and quality measures increased significantly (Grothe, 2002). Safe food is defined by a certain tolerable level of hazards in food. How high this level is differs tremendously from country to country; this depends on cultural habits, economic development, climate conditions and the institutional environment (Jaffee and Henson, 2004). The WTO Agreement on Sanitary and Phytosanitary

Measures (SPS Agreement) and the Agreement on Technical Barriers to Trade (TBT Agreement) allow countries to adopt technical regulations in order to protect human, animal and plant health as well as to ensure environment, wildlife and human safety. The SPS and the TBT Agreements respect the national sovereignty of countries to define their individual level of food safety while introducing a regulatory framework which aims to keep the possible trade impeding effect of these safety measures as minimal as possible. However, developing countries underline the possibility of using food safety measures as a substitute for traditional trade barriers and point out their potentially protectionist motivation.

The three aspects mentioned above result in stricter mandatory food and agricultural safety measures from the governmental side as well as in the increasing prevalence of private voluntary quality standards in food market chains. Even though the governmental legislation constitutes the minimum requirement for market access, the compliance with private standards is required by many of the larger retailers and turned out to be "quasi-mandatory" for high income markets (Borot de Battisti et al., 2009).

For the EU market the most important private standards are the *European retailers' protocol for good agricultural practice for farms* (GLOBALGAP[2]) and the *British Retail Consortium Global Technical Standard*, which applies to processors. Some developing countries perceive the trade-restrictive impact of private standards as being greater than the legal requirements set by governments.

Food quality standards differ between countries because of various reasons. These can be found in different tastes, diets, income levels as well as climatic conditions and available technology (Jaffee and Henson, 2004). Most standards are imposed by national governments or private bodies in high income countries and create major challenges to suppliers from developing countries who operate in very different political, institutional and economic circumstances. Therefore, the overall concern prevailing in this discussion is that the bulk of different standards in combination with the lack of technical, administrative and financial capacity will disfavor developing countries' participation within international trade (e.g. Broberg, 2009; Disdier et al., 2007; Henson and Jaffee, 2006; Wilson and Abiola, 2001; Wilson and Otsuki, 2001).

2 GLOBALGAP is formally known as EUREPGAP. In late 2007, EUREPGAP changed its title to GLOBALGAP to reflect the farm assurance standard's expanding international role. Since most research on this thesis was conducted before 2008, the name EUREPGAP will be used.

However, empirical evidence on the particular impact of standards on developing countries' trade flows is still limited. Available surveys are mainly case studies which analyze the impact of SPS measures on trade flows of individual developing countries' export sectors (e.g. Aloui and Kenny, 2005; World Bank, 2005; Henson et al. 2000, Maertens, 2006; Minten et al. 2006). Little quantitative research is available (e.g. Chen et al., 2006; de Frahan and Vancauteren, 2006; Disdier et al., 2007, Moenius, 1999; Moenius, 2006; Wieck, 2006; Yang and Woo, 2005) and finally, little research exists which leads to a more differentiated and comparative perspective of the impact of agricultural and food standards among the group of developing countries. Available literature which aims to provide a more detailed perspective is mainly based on theoretical considerations or draws a synthesis of the existing case studies within a common analytical framework (e.g. Athukorala and Jayasuriya, 2003; Disdier et al. 2007, Frohberg et al. 2006; Henson and Jaffee, 2006, Maertens and Swinnen, 2006, World Bank, 2005).

Another critical point associated with the increasing prevalence of standards is the potential exclusion of developing countries' small producers from high-standards export markets, with subsequent negative effects on household incomes and rural poverty. Several surveys outline the specific problem of food standards disadvantaging smaller business (Gibbon, 2003; Humphrey et al., 2004, Reardon et al., 2001, Reardon et al., 2003, World Bank, 2005; Kleinwechter and Grethe, 2005). The reasons often mentioned for this tend to fall into two main categories: 1) The costs of compliance with a certain quality standard may be higher for small producers (World Bank, 2005; Aloui and Kenny, 2005; Jaffee and Henson, 2004; Willems et al., 2005) or 2) the transaction costs involved in the compliance process for other chain participants such as exporters may be higher in the case of smaller farms. It may therefore be better for buyers to cooperate with larger farms (Pingali et al., 2005; Swinnen, 2005).

Various surveys state that particularly private standards (such as the GLOBALGAP standard), which require on-farm process certification and subsequently lead to a sudden increase in the cost of compliance, are regarded as too demanding to be run by smallholders (Borot de Battisti et al., 2009). Further, the certification process of private standards often regulates not only food safety aspects but additional social, environmental and ethnical criteria along the supply chain as well.

According to Maertens and Swinnen (2009), empirical surveys show a mixed picture rather than a general exclusion of small producers. Evidence from Kenya (Humphrey et al, 2004,

Jaffee, 2003), Morocco (Aloui and Kenny, 2005), Costa Rica (Berdegué et al., 2005) and Senegal (Maertens, 2006) rather describes examples of small farmers losing market share as a result of increasing quality standards. Other surveys find very different effects. Examples for the inclusion of small farmers in modern value chains can be found, for example, in Madagascar (Minten, Randrianarison and Swinnen, 2006) and South Asia (Gulati et al., 2007).

However, the overall problem with the available literature is that – even if it has expanded rapidly since the end of the 1990s, when the relevance of standards for international trade of agricultural and food products first attracted the interest of researchers – few surveys with primary empirical data are available. Questions like 1) *which determinants lead to a possible negative impact of standards on small producers* and 2) *which factors finally might lead to "non-compliance" with certain standards* are still being insufficiently addressed.

Since smallholder agriculture shows a great impact on rural equity and poverty the question whether small farmers are disfavored by the prevalence of standards is a relevant question from a development perspective. Smallholdings are typically operated by poor people who use the major part of their labor capacities, both from their own households and from their neighbors. When small-farm households spend their incomes, they tend to spend them on locally produced goods and services, thereby stimulating the rural nonfarm economy and creating additional jobs (Hazel et al., 2007).

2 Research objective

Overall, the thesis aims to analyze the impact of quality standards on developing countries from three different perspectives:

1) It aims to analyze the **trade effects** of standards.

The thesis evaluates the trade performance of developing countries in a trading environment which is determined by standards. It particularly analyzes the question of how developing countries' export shares develop in a different manner under the particular aspect of standards.

2) It aims to analyze the particular impact of standards on **small producers**.

The thesis theoretically assesses the effect of standards on small producers in developing countries. It develops an analytical framework that structures the problem whether, how, and

to what extent small producers in developing countries are at a disadvantage due to the increasing prevalence of standards and provides a detailed overview of the existing literature.

3) It aims to analyze the **compliance process with private standards**

Addressing the compliance process of standards, the thesis analyzes two particular questions: 1) Which producers comply, and which do not; and 2) why do some producers comply while others do not? This thesis explores these two questions with regard to the Moroccan tomato export sector. It provides a comprehensive empirical analysis of the compliance decision behavior and the compliance process.

3 Outline and Summary

The four articles which constitute the core of this thesis address the impact of standards on developing countries from different perspectives. The first paper approaches the topic from a macroeconomic perspective which allows for an analysis of the impact of standards on trade and the impact of standards on developing countries' market shares. In the following papers the perspective becomes much more microeconomic focused. The second paper switches from the macroeconomic perspective to the impact of standards within countries. It aims to structure the problem theoretically. Finally, the third and the fourth paper comprise case studies of the Moroccan tomato sector and analyze the individual compliance decision processes of farmers.

As explored in section 1 the debate on better market access for and the competitiveness of developing countries' agricultural exports cannot be separated from the discussion on the effects of food and agricultural standards on the ability of developing countries to export goods. Even though available literature frequently points to the potential market share losses of developing countries due to the prevalence of standards, little empirical evidence on the particular impact of standards on developing countries' trade flows is available (see section 1). The first paper, entitled **"Standards, a catalyst for the winners - a barrier for the losers? An empirical analysis of the impact of SPS measures on the trade performance of developing countries",** aims to contribute to a more differentiated and comparative perspective of the impact of agricultural and food standards among the group of developing countries. Further, the paper aims to assess whether it is possible to empirically measure the particular impact of standards on trade performance.

Exports of developing countries to OCED countries are compared between two time spans: 1993 to 1995 and 2002 to 2004. Between these two periods, the prevalence of standards set by OECD countries increased significantly. Further, the paper concentrates on two commodity groups that are strongly influenced by standards - fruits/vegetables and meat. A cluster analysis groups countries according to their trade performance into those that have managed to increase market share and those that lost market share, respectively.

Results of the analysis show that in line with the overall considerations on market concentration most large scale exporting countries managed to increase their export performance while various smaller scale exporter lost market share. However, there are considerable differences between the results of the fruit/vegetable sector and the meat sector. Even though the market for fruits and vegetables is heavily dominated by a few major players, various small scale exporting countries increased their market share during the second period. Results of the meat market analysis show very different results. The cluster analysis underlines the observed strong concentration process taking place in the meat market with two giant winners – Chile and Brazil – and numerous small-scale exporting countries that are losing market share heavily.

Regarding the question of whether it is possible to empirically assess the particular impact of standards on trade performance, the concept of "SPS capacity" is introduced using a gravity model. "SPS capacity" is described by five variables. All variables have been chosen as the best available indicators to express a country's commitment, interest and efforts made to comply with its trading partners' requirements. Since data availability is very limited, most of the data has been developed by the authors. Results of the analysis empirically support the impact of SPS measures on trade flows. However, the results of the gravity model have to be interpreted carefully because of limited data available. Most interesting is the positive result of the EUREPGAP variable which underlines the importance of private sector involvement in food quality requirements in order to increase market share.

The second paper, **"Quality Standards for Food Products – A Particular Burden for Small Producers in Developing Countries?",** develops an analytical framework which structures the problem of whether, how and to what extent small producers in developing countries are disadvantaged by the increasing prevalence of food quality standards. The basic hypothesis - that small producers have a comparative disadvantage in the compliance process - is based on their specific farm characteristics and the institutional environment. These affect

the costs and benefits of compliance, which are the two main determinants of the compliance process.

The methodical framework of the paper, which enables the problem to be examined systematically, is structured into four analytical stages. The first stage explores whether small producers independently comply with the standard. The second analyzes how small producers may comply with the standard, but only with the support of a downstream actor in the marketing chain. The third stage discusses the effect that a growing dependency of small producers on downstream actors could have, and the fourth stage investigates whether exclusion from high-quality standard markets would be problematic for small producers. In an extensive literature review the empirical evidence is structured according to the analytical framework. The paper finds that small and medium producers rarely comply if they do not receive any support from downstream actors. In cases where there are well-educated and relatively wealthy farmers, forward integration can also be found. No empirical support exists for the intuitively appealing hypothesis of a lower cost of compliance per unit of output for large producers.

Overall, available case studies concentrate on a rather general impact of standards on the agricultural and food sector. They rarely present any farm-specific analyses, and the compliance process is largely neglected. The case study of the Moroccan tomato sector, which covers the last two papers of this thesis, aims to particularly address these shortcomings.

The Moroccan tomato sector was chosen as the case study for two reasons. First, the EU and Morocco maintain lengthy and close trading relations. For several decades now, more than 90% of tomato exports have gone to the EU. Morocco is covered by the Euro-Mediterranean Partnership and, as the only country in the world, has the possibility to export tomatoes under a preferential entry price to the EU. The outstanding importance of the EU as a Moroccan trading partner leads to the fact that all demand changes – whether they might stem from EU import policy changes or from private EU trading partners – directly lead to observable changes on the Moroccan supply side. Second, a wide range of producers are involved in the sector, from large-scale plantations cultivating more than 200 ha to small producers with less than 10 ha. This opens up the possibility to analyze and compare the impact of standards on different producer groups.

The first paper, entitled **"EU Trade Preferences for Moroccan Tomato Exports – Who Benefits?",** is the only paper included in the thesis which does not address the impact of

standards on developing countries' stakeholders. It provides a detailed breakdown of the Moroccan tomato sector including the socioeconomic, institutional and political environment. It provides the necessary background information for a detailed case study of the Moroccan tomato sector. From a Moroccan perspective, tomato exports are of special importance due to their high share in agricultural production and trade. In addition, the sector is of particular social importance as it offers income possibilities to those with little access to land, and moreover, provides possibilities of employment in rural areas where there tend to be few other alternative jobs.

The Moroccan agricultural sector includes about 1.5 million farms (WTO, 2003) of which about 8,000 produce early vegetables and only 400 produce export tomatoes. Around 30% of tomato producers are small scale farmers who cultivate less than 5 ha. Their production area represents only about 10-15% of the total production area for early tomatoes. The majority of the producers cultivate an area between 5-20 ha. Farms belonging to this group cultivate around 50% of the total tomato area. Only 10-15% of the farms are larger than 20 ha, but they represent around 40% of the early tomato area. The production and marketing chain can be subdivided into three major levels: the production or farm level, the processing level and the exporting level. The largest part of the production (between 75 – 90%) is produced in integrated or semi- integrated supply chains.

The EU applies a complex system of preferences for tomato imports from Morocco. Quantities are fixed and serve as entry price quotas and tariff rate quotas at the same time. The paper puts particular emphasis on providing empirical evidence of 1) the existence of an economic rent under the EU preferential scheme for tomato imports from Morocco, and 2) the distribution of that rent.

Based on an analysis of the Moroccan Standard Import Values (SIVs) as reported by the European Commission, as indicators for the Moroccan import price and empirical data on the Moroccan production costs, the paper provides evidence for a rent of about €22 - 37 million per year. This equates to 16-24% of the total export value of Moroccan tomatoes to the EU. Due to the structure of the Moroccan export sector as well as the EU method of allocating import licenses, it is likely that a large part of the quota rent ends up on the Moroccan side and that a dissipation of the rent within physical rent-seeking activities is limited.

It is expected that negotiations on market access in the current Doha Round will result in a further reduction of Most Favorite Nation (MFN) tariffs and entry prices and thus result in an

erosion of the rent. Furthermore, an additional erosion of the rent may take place due to increasing production costs caused by higher product or processing standards, e.g. the EUREPGAP certification.

The fourth paper, entitled **"The Compliance Process of Food Quality Standards on Primary Producer Level: A Case Study of the EUREPGAP Standard in the Moroccan Tomato Sector"**, addresses the compliance decision process of Moroccan tomato producers with the EUREPGAP standard. Certification with the EUREPGAP standard has become a major requirement for participation in the EU tomato market. For some producers, the EUREPGAP standard opens up new opportunities as it permits access to particular market segments. At the same time, the increasing demand for private certification is accompanied by marginalization and exclusion, as standards impose prohibitively high barriers for certain producers in terms of the short-term and long-term efforts that have to be undertaken for production under certification. In order to understand whether there are certain groups of producers which are affected by the EUREPGAP standard in a particular manner, the paper provides a comprehensive empirical analysis of the compliance decision behavior and the compliance process. The survey analyzes drivers for a positive or negative compliance decision by comparing the determinants of the decision process of non-certified producers with those of certified ones.

For its explanatory approach, this paper mainly draws on the theories of innovation adoption and diffusion research, since these make it possible to systemize the decision process and integrate it into a close network of economic, social and institutional determinants.

Research data was collected in 2006 by conducting semi-structured interviews with 63 Moroccan tomato producers in the region of Souss Massa. The survey concentrates on the EUREPGAP standards as EUREPGAP has turned out to be the most important private certificate at the farm level in trading relations with EU partners.

One of the most important results of the survey is that being small in size seems to be overvalued in the scientific discussion, especially when talking about the technical upgrading costs that farms may have to invest. Even though very large farms tend to become certified to a larger extent than smaller ones, the results do not suggest that small producers are particularly disadvantaged in the compliance process, as farm size correlates only marginally with the cost of compliance.

Instead, the results rather point to the fact that less-organized or less integrated farmers tend to make a "non-compliance" decision. Forward integration tends to be of particular importance because it opens up the direct access to information on the buyers' requirements. The vertical information flow plays a major role in the motivation to become certified. Non-integrated producers mainly depend on horizontal information from other producers regarding market developments within the EU. However, the results of the case study support the fact that vertically integrated producers have little interest in sharing the necessary information with non-integrated producers and, through this, keeping them within the market by providing them with information on particular market developments.

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Standards, a catalyst for the winners - a barrier for the losers? An empirical analysis of the impact of SPS measures on the trade performance of developing countries

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Standards, a catalyst for the winners - a barrier for the losers? An empirical analysis of the impact of SPS measures on the trade performance of developing countries

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Abstract

Developing countries' market access to international agricultural markets is increasingly determined by the ability to respect their trading partner's food safety and quality standards. Empirical evidence on the particular impact of standards on developing countries' trade flows is still limited. This paper analyses two questions. 1) How do developing countries export shares develop differently under the particular importance of standards and 2) is it possible to empirically assess the particular impact of standards on trade performance? Regarding the first question, cluster analysis groups countries according to their trade performance into those which manage to increase market share and those which lose market share, respectively. The analysis of how food safety standards influence this trend towards market concentration is subject of the second part of the paper. For the analysis the concept of "SPS capacity" was introduced in a gravity model.

5 Introduction

In an increasingly liberalized agricultural trading environment, the debate on better market access for developing countries' agricultural exports cannot be separated from the discussion of the effects of food and agricultural standards on the export capability of developing countries.

Since standards define rules and conditions for participation in international markets, they lead to a process of redistribution among countries, regions and stakeholders (Gibbon and Ponte, 2005). The overall concern prevailing in the scientific discussion is that of developing countries losing market share due to their typically weaker public food safety and quality management systems as well as their technically less advanced systems of production (Henson and Jaffee, 2006).

However, empirical evidence on the particular impact of standards on developing countries' trade flows is still limited. Available surveys are mainly case studies which analyze the impact of sanitary and phytosanitary (SPS) measures on trade flows of individual developing countries' export sectors (e.g. Aloui and Kenny, 2005; Henson et al. 2000; Maertens and Swinnen, 2006; Minten et al. 2006; World Bank, 2005). Little quantitative research is available (among these are, for example, de Frahan and Vancauteren, 2006; Disdier et al., 2007; Moenius, 1999; Moenius, 2006; Wieck, 2006; Yang and Woo, 2005,) and finally, little research exists which leads to a more differentiated and comparative perspective of the impact of agricultural and food standards among the group of developing countries. Available literature which aims to provide a more detailed perspective on this is mainly based on theoretical considerations or draws a synthesis of the existing case studies within a common analytical framework (e.g. Athukorala and Jayasuriya, 2003; Frohberg et al. 2006; Henson and Jaffee, 2006; Maertens and Swinnen, 2006, Taylor and Wilson, 2008).

To shed more light on this issue, the objective of the paper is to analyze the question of how developing countries perform within a trading environment that is determined by the increasing importance of food and agricultural standards. In a first step, the paper evaluates in an exploratory manner the trade flows of developing countries within the new trading environment. We are in particular interested in the question how countries are affected differently by standards. Hence, the analysis classifies countries according to their trade performance into those which manage to increase market share and those which lose market

share, respectively. In order to do so, the paper analyzes the development of exports from developing countries to OCED countries (which were perceived as the most important standard setters) between two time spans – from 1993 to 1995 and from 2002 to 2004. Within these two time spans the importance of food standards for international agricultural trade increased dramatically. The analysis concentrates on two commodity groups that are strongly influenced by standards - fruits/ vegetables and meat.

In a second step the paper aims to empirically assess the particular impact of standards on trade performance. We therefore introduced the concept of "SPS capacity" in a gravity model. SPS capacity is described using five variables: 1) Border rejections, 2) SPS activity (a) trade concerns and b) SPS committee attendance, 3) the number of EUREPGAP[3] certified producers in the country, 4) investments by the Standards and Trade Development Facility (STDF). All these variables have been chosen as the best available indicators to express a countries commitment, interest and effort made to comply with its trading partners' requirements. Since data availability is limited, most data has been developed by the authors.

The paper is organized as follows. Section 2 develops the analytical framework for the analysis. Laying out the analytical course of the paper, the section is divided into two subsections. While the first subsection "trade under the particular perspective of standards" describes the exploratory framework, the method and the data for the analysis of the trade flows, the second subsection "determinants of trade" does so for the gravity model. Section 3 again is twofold and presents the results of each analysis step. Section 4 draws final conclusions.

6 Analytical Framework

Introducing the concept of our analysis, we begin with exploring the costs of complying with food safety standards[4]. The compliance with food safety regulations involves costs for the foreign supplier in terms of an augmentation of the cost of production. Systematically, cost of compliance can be subdivided into different components. First, they may be differentiated according to their appearance - either on a public or on a private level. Public costs of

[3] The EUREPGAP standard is the most important private food standard for the EU market. It was developed by the Euro-Retailer Produce Working Group.

[4] Food safety is an integral part of food quality. Food quality includes various different quality aspects such as: the technical value, the sensory quality, the nutritional value and all aspects of food safety, as well as the idealistic and psychological values of a product (Brockmeier, 1993; Wiegand, 1997). It is the responsibility of the government to provide regulations which guarantee that food is safe when offered to consumers.

compliance arise for the establishment and maintenance of a national food quality management system. This may, amongst others, include the cost of installing and maintaining a competence authority, control and certification mechanisms, pest management strategies and the upgrading of laboratories. Private costs of compliance arise for the private supplier on each level of the value chain. According to Chemnitz et al. (2007), private cost of compliance can be classified into five major components: physical upgrading, human capital upgrading, management, higher variable production costs, lower yields and higher social costs.

Both, the public and the private costs of compliance, are mainly borne by the supply side. This results from the fact that legal food safety requirements of the importing countries are considered to be public goods (Wiegand, 1997). Safe food is defined by a certain tolerable level of hazards in food. To ensure a particular safety level, goods which exceed the national tolerable level of hazard are not allowed to enter the country's market. Hence, for products complying with this minimum level of food safety, no additional willingness to pay arises on the consumer side.

As legal food and agricultural standards change the cost of production, they consequently also change the competitiveness of countries. Following plausibility considerations it is assumed that the countries who are enlarging their market share show lower costs regarding compliance in relation to other exporters. These redistributional effects were assumed to lead to supply shifts over time. In sum, we assume that potential trade effects of food safety measures can be observed in a comparison of trade flows in the respective periods and markets.[5] *A priori* we assume that the group of developing countries can not be treated homogeneously and that small scale exporters will lose market shares while large scale exporter will manage to increase their market share. To which extent changes in market shares can be followed back to the impact of standards will be analyzed in the gravity model.

[5] A similar approach was undertaken by Wieck and Rudloff (2007) in an analysis of trade impacts of administrative food import regulations.

6.1 Trade under the particular perspective of standards

"Weaker economic players, including smaller countries, enterprises and farmers will be further marginalized" (UNCTAD; 2005).

"The investment and recurrent 'costs of compliance' could undermine the competitive position of developing countries" (Jaffee,S., Henson, S.; 2004)

In the literature, the group of developing countries is still treated relatively homogeneously regarding the impact of food standards on their export ability. Yet we are particularly interested in the question of how standards affect developing countries differently. Which countries managed to increase their export share in the time period under consideration and which countries lost market share? Being a bit provocative, we have named all countries that managed to increase their export performance more than the average "winners" and labeled all countries which lost market shares as "losers".

6.1.1 Research design - analytical step I

In order to understand the evolution of developing countries' trade performance and its particular relation to standards, the analysis focuses on (1) the years 1993-1995 and 2002-2004. During this period the importance of food safety standards in agricultural trade increased significantly. (2) Trade flows from developing countries to OECD countries are chosen since the latter are considered to be the most important standard setters. (3) The analysis concentrates on the export values of meat and fruits/ vegetables as these products are particularly affected by food safety standards.

In the following we explain all three elements of this research design in detail.

1) The reason for choosing these two time spans is the tremendous increase of recognition that food standards received between these periods in international agricultural trade (Athukorala and Jayasuriya, 2003; de Frahan and Vancauteren, 2006; Henson and Jaffee, 2006; Jaffee and Henson 2004; Josling et. al 2004; Maertens and Swinnen, 2006; Moenius, 2006; Roberts and Krisshoff, 2004). Apart from the empirical observations found in the literature, a quantitative indicator of the growing importance of food standards in international trade is the number of SPS notifications to the WTO. Even though the WTO notifications, as such, are a likely conservative indicator of the effects of SPS measures on trade flows (Moenius, 2006; Roberts and Krisshoff, 2004), their strong augmentation may nevertheless underline the prominent role food and agricultural standards have played within international trade in the last decade.

Annual notifications more than tripled from less than 200 notifications in 1995 to a total number of 617 in 2005 (WTO, 2002a, WTO, 2003, WTO 2005a).

2) The analytical framework includes developing countries' exports to OECD countries since these are seen as being the most important "standard setters".[6][7] While in 1995 nearly all SPS notifications to the WTO came from the OECD countries (OECD, 2002), developing countries now contribute at least one quarter to today's SPS notifications. Principally, only 59% of all WTO members notified at least one SPS measure to the WTO 1995 and nearly half of all notifications during the last ten years came either from the US or from the EU (WTO, 2005a).

3) The fruit /vegetable and the meat sector were chosen because of their particular relevance regarding food safety[8] (Jaffee and Henson, 2004). In the last decade, several importing countries lowered the level of detection for pesticide residues on fruit and vegetables to a zero tolerance limit or principally tightened the residue level (Chemnitz and Günther, 2007). In the meat sector, certification requirements were intensified as a result of several food scandals and epidemics at the beginning of the new millennium. Today, all countries where meat originates must be on a positive list of eligible countries for that particular product. Amongst others, the eligibility criteria are that the country of origin must have a competent veterinary authority which must guarantee the relevant hygiene standards through inspection and certification as well as having a monitoring system in place to verify compliance with EU requirements. In addition to the increasing stringency of food standards regarding these products the markets for fruits/ vegetables and meat are of specific importance for many developing countries. The average share of developing countries in these two markets ranges from 35 to nearly 40% market share for fruit/ vegetable products and around 16-18% for meat products with a slight upward tendency since 1998 (FAO, 2006).

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[6] In this respect, it would be interesting to compare the development of exports from South to North with those from South to South, or from South to East, thus in countries where standards are not as strict. However, this was not analyzed due to lack of adequate data.

[7] For reasons of better data quality, imports by OECD countries from each developing country are used to describe developing countries' exports.

[8] The only other commodity groups which are not included in the analysis, but are important sectors regarding the impact of SPS measures, are fish and seafood products. With respect to the very low quality of data, fish and seafood products have not been included in the analysis.

6.1.2 Methods and data

The analysis of trade flows is conducted with the objective of revealing patterns within the dynamics in the export performance of countries. We employ cluster analysis to group developing countries according to their dynamics in export performance within both the fruit and vegetable and the meat sector. The method of cluster analysis can be used for an exploratory, empirical classification of objects according to their similarity. The analysis is conducted for the two commodity groups separately. This paper uses the Ward method to determine the number of clusters (based on the increase in the agglomeration level between two solutions) and the K-Means algorithm to determine the final partition. Homogeneity of clusters and stability of the solutions are assessed through the proportion of variance of single (z-standardized) variables within clusters compared to those in the whole sample (F-value) (Backhaus, 2000) and a Rand index measuring the proportion of consistent allocations (Bacher, 1996).

Three variables for each sector are used in the cluster analyses: 1) the "ratio" and 2) the "difference" of export volumes between the two time spans (1993-1995 and 2002-2004) and 3) the "coefficient of variation" during the second period. All variables are calculated from OECD country imports recorded in the PCTAS[9] database. Three-year averages are used to level out extremes in single years. The ratio of exports in 1993-1995 compared to 2002-2004 describes the dynamics of export performance without taking into consideration the absolute level of exports. However, the ratio is sensitive to the absolute volume of trade as, for example, a doubling of exports starting from a very low initial value is much more likely to occur. The second variable, therefore, describes the difference between the average values of exports for the respective commodity group in 1993-1995 and 2002-2004. It takes into account the absolute level of exports. With this variable it is especially the large countries relatively small percentage changes in export value which are captured better, if one looks at the absolute value. In the cluster analysis, the logarithm of the difference is used as the variable has a high skewness. Finally, the coefficient of variation is calculated for the period

[9] The sample consists of 67 countries in the case of the fruit and vegetable market and 48 countries in the case of the meat market. Countries for which no data was available in the full first period were excluded from the analysis. For the remaining countries, missing data in single years in PCTAS were treated as a trade volume of 0. More than half of all developing countries were not included in the analysis because of a lack of data. For the member states of the Southern African Customs Union, Eurostat data was used instead of PCTAS data for figures on meat trade (and countries were excluded from the analysis of the fruit and vegetable market, as meat plays a the much stronger role for these countries) as data is not available for single countries in PCTAS.

2002-2004 to gain an idea about the stability of exports coming from a country. It would be interesting to compare the variability in the two time spans, but the variable has several missing values in the first period if single years are not reported and this therefore would reduce the sample.

We are aware of the fact that variation in trade flows can be induced by various factors and that it would be too simplistic to dedicate it to standards alone. Therefore, the analysis aims to test the impact of standards on trade flows, thus correcting for other determinants of trade flows. The following section describes a model of determinants of trade flows and variables reflecting the potential impact of standards on global trade flows.

6.2 Determinants of Trade

"Compliance costs undermine the comparative advantage of developing countries in high-value food trade" (UNCTAD, 2005).

"It is evident that developing countries are constrained in their ability to export agricultural and food products to developed countries by SPS requirements" (Henson, no year).

In the literature, food standards are seen as one of the major determinants for market access. Nevertheless, little empirical evidence exists on the particular impact of standards on agricultural trade. Hence, we are interested in the question if it is possible to show the impact of food safety standards on developing countries' agricultural trade empirically. We aim to answer the question whether the SPS capacity of a country has a significant impact on the development of its export shares.

6.2.1 Research design - analytical step II

In order to analyze the impact of standards on trade flows, we propose the concept of SPS capacity and test its impact on trade flows. A country's SPS capacity depends on the public capacity to meet the institutional requirements and to provide the relevant institutional infrastructure as well as the private efforts which were undertaken in order to meet international food safety requirements. In order to make the SPS capacity of individual countries comparable we developed five indicators as explained below (see Table 1).

Due to limited data availability for SPS related information; the analysis concentrates on the EU market for fruit and vegetables in the year 2004. Even though this limits the validity, the analysis still includes important market segments. As mentioned above, the EU is the largest

importer of fruit and vegetable products from developing countries and, at the same, time fruit and vegetables were among the most important export products of developing countries.

6.2.2 Methods and data

The analysis of the impact of SPS capacity on trade flows is performed by means of regression analysis in a gravity model. The gravity model has been widely used for the analysis of similar questions; e.g. the trade effects of food safety regulations (Disdier 2007; Moenius 2006; Otsuki et al. 2001a and b, Wilson and Otsuki 2004) and of intellectual property rights (Yang and Woo 2006)). The gravity model predicts bilateral trade flows based on country characteristics of both, exporters and importers, including income (assuming that countries with a higher GDP per capita trade more, due to better capital endowment and infrastructure), population (scale effects or market size), distance between country pairs (transportation costs) and factors that distort trade (e.g. tariff or non-tariff barriers to trade). In international economics the gravity model is seen as being the most successful estimation technique to analyze trade flows empirically (Rauch and Trindade 1999). We use a simplified specification of the gravity model. In this model we include "standard" gravity variables as well as the variables on SPS capacity for which we want to test their distortive effect.

Table 1: Model determinants to describe international agricultural trade

Variable	Indicator	Definition	Source
Control variables	**GDP** (per capita)	Per capita real gross domestic product of exporting country	World development indicators, World Bank (2006)
	Population	Population of exporting country	World development indicators, World Bank (2006)
	Distance	Geographic distance between exporting country and the European Union	Glick and Rose (2002)
	Colonial history	Dummy variable. X= 1 If country i shares a colonial history with a Member state of the European Union	Glick and Rose (2002)
	Level of trade preferences	Difference between market access possibilities of the preferential country and the MFN regulations.	Own compilation based on : Candau and Jean (2006); Grethe et al. 2005; Francoise et al. 2006; Yu and Jensen, 2005; Wainio et al. 2005; own calculations.
SPS capacity	**Border rejections**	Number of events of rejection at EU border of food imports (fruits and vegetables).	Own compilation based on : RASFF 2006 (www.http://ec.europa.eu/food/food/rapidalert/index_en.htm).
	SPS activity I: - Attendance in SPS committee	Number of attended SPS committee meetings between 2000 and 2003. Not counting the number of delegates per country.	Own compilation based on : WTO (various issues)
	SPS activity II: - Trade concerns	Number of trade concerns raised by a county in the SPS at the SPS committee in 2004.	Own compilation based on : WTO (various issues)
	EUREPGAP certification	Number of EUREPGAP certified producers (fruits and exports)	Unpublished information 2006
	STDF investment	STDF investment in SPS capacity.	STDF Database (http://stdfdb.wto.org/)

Source: own elaboration

First, the table depicts the gravity control variables. Following Glick and Rose (2002), we include the GDP of the exporting country, population of the exporting country, distance between country pairs and colonial history for country pairs. As we treat the EU as one

country, and therefore have only one importing "country", the variables distance and colonial history taken from Glick and Rose are aggregated: To determine the distance (colonial history) between EU and any developing country, we consider the distance to the closest (common colonial history with any) EU country.

As additional control variables we include tariff barriers to trade. While the overall level of tariff barriers is surely of major importance for trade flows, in a comparison of country pairs, bilateral and multilateral trade preferences are the most distinguishing feature. We construct ordinal variables on a scale of one to three, capturing the level of trade preferences between country pairs.

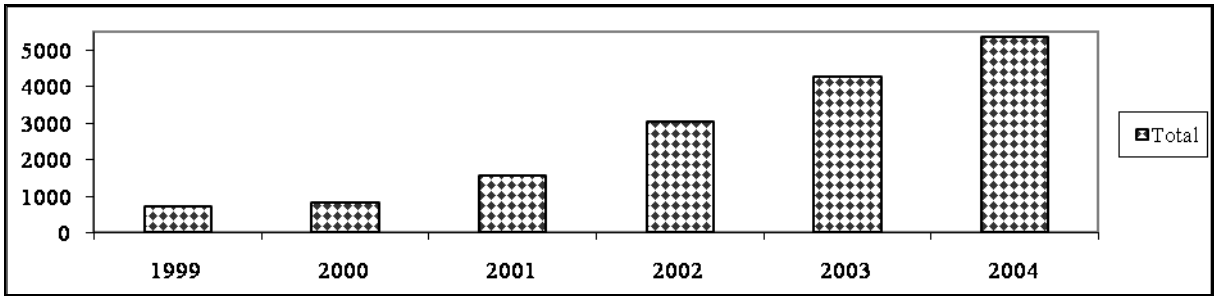
Furthermore, Table 1 shows the five variables we developed to represent a country's SPS capacity and thus test the impact of standards on international trade. The SPS capacity of a country includes 1) the number of border rejections, 2) a country's "SPS activity" revealed by a) the trade concerns it announces in the SPS committee and b) its attendance in the WTO SPS committee meetings, 3) investment by the Standards and Trade Development Facility (STDF) and 4) the number of private certification activities. Each variable is described below.

1. Border rejections: Border rejections are indicators of food safety and quality problems, as they are always linked to an export country's inability to comply with the importing countries' requirements.[10] Information on border rejections related to food safety and health concerns is rare. Data for the EU is available since 2001 (since the implementation of the Rapid Alert System for Food and Feed (RASFF)). [11]

[10] Border rejections take place for two different reasons: 1) Shortcomings in the food safety and quality management systems. 2) Export concentration on products which faced a particular increase in food safety measures. As a consequence, the exporting country has to adopt the new requirements.

[11] Information for the US market is only available for 2005/06. According to a survey of the FAO (Ababouch et al. 2005), border rejections for all other countries, with the exception of Japan and Canada, are not available.

Figure 1: EU information on total border rejections 1999-2004



Source: own illustration, (RASFF, 2002; RASFF, 2003; RASFF 2004)

As depicted in Figure 3, the number of border rejections increased heavily from 698 in 1999 to 5562 in 2004. Information by the RASFF is twofold. First, it provides information on border rejections (information notifications). These products were not able to enter the EU market. Second, the RASFF provides information on products which do not comply with EU norms, but have already entered the EU market (alert notifications). The number of alert notifications rose during the time period from only 97 in 1999 to 691 in 2004. Additionally, information notifications increased during the same time from 263 to 1897.

The variable has a shortcoming as the border cases do not indicate how many tons or kilograms were involved in each rejection. However, the variable provides a rough indication of a country's capacity to satisfy the SPS requirements of its trading partners.

2. The SPS activity of a country: The "SPS activity" includes two sub-components. First, the attendance of a country at the WTO SPS committee meetings between 2000 and 2003. Therefore, the lists of participants at WTO SPS committee meetings were assessed. We count the attendance of a delegation in each year, though not accounting for the number of delegates per country.

Second, the SPS activity is proxied by the number of trade concerns. Trade concerns make it possible for countries to attract attention and initiate discussion about a particular concern without using the official WTO dispute settlement mechanism. The increasing importance of SPS measures for international trade is depicted by the number of trade concerns raised within the SPS committee meetings. Since the implementation of the SPS Agreement altogether 204 trade concerns were raised until 2004 (WTO, 2005a). Only 56 trade concerns have been reported to be resolved in the total period. During the indicated period developed countries raised specific trade concerns 143 times, followed by 101 cases of trade concerns coming from developing countries. Only two least-developed countries raised specific trade concerns (WTO, 2005b). The variable describes the number of trade concerns raised in 2004.

3. EUREPGAP certification: This variable differs from the former ones as it focuses on a private standard instead of legal SPS measures. EUREPGAP is the acronym for the Good Agricultural Practices (GAP) developed by the Euro-Retailer Produce Working Group (EUREP). The standard mainly refers to fresh fruit and vegetables. Even though this private certificate has become more and more significant in the last decade, it has only recently turned out to become a quasi mandatory certificate for imports to the European market. Unfortunately, only data on certified producers is available and not on the quantity of the certified products nor on the certified areas planted.

4. STDF investment: Donor investment in food safety issues is explored in order to depict SPS capacity development activities. The Standard and Trade Development Facility (STDF) is a financing and a coordination mechanism at the same time. It provides grants for developing countries in order to comply with SPS standards, thereby increasing or maintaining their market access. Until August 2003 (which is the last online update of the STDF database) funding was granted to 151 different developing countries, 46 of them are LDCs. Only three LDCs did not receive a grant. The total grants amounted to more than $ 8.5 billion. Kenya is with more than $ 3 billion by far the top receiving country of STDF grants, followed by Iran (649 million), Pakistan (410 million) and the two LDC countries Nepal (371 million) and Bhutan (386 million). Nevertheless, 25 LDCs are ranked at the end of the countries list with total grants lower than $ 20 thousand.

The econometric specification of the model is

$$\text{Log}\ (Exp_i) = b_0 + b_1\log(Dis_i) + b_2\log(Pop_i) + b_3\log(GDPpc_i) + b_4D_{Col} + b_{5(}(PrefEU) + b_6PrefUS + b_7\log(Reject) + b_8(SPScom) + b_9\log(Tradecon) + b_{10}Log(CertFarms) + b_{11}\log(STDFinv) + \varepsilon_i.$$

where i stands for the exporting country. Parameters b_x are coefficients, ε_i is the error term. Exp denotes the export volume from country i to the European Union. Variable names are those in table 1.

For the regression analysis we employ ordinary least square estimation. Since our sample is rather small (n=65) and components of SPS capacity are correlated amongst each other, we proceed stepwise, testing first a base model with different specifications, and then the impact of single proxies for SPS capacity.

The following section presents the results of both analytical steps. It begins in section 3.1 with the discussion of the cluster analysis and turns in section 3.2 to the discussion of the gravity model.

7 Results

7.1 Export performance of developing countries in meat and fruits/ vegetables sectors

Regarding the cluster analysis it has to be noted that for both sectors the data does not have a perfectly clear cluster structure for the chosen variables.[12] However, we regard them as the best available indicators of export performance. The exploratory nature of cluster analysis possibly contradicts our assumptions about categories such as "winners" and "losers" – there might be groupings found through cluster analysis which are somewhat difficult to interpret as the clusters are comprised of both minor losers and minor winners. With regard to the overall objective of the analysis, we put emphasis on distinguishing between "losers" and

[12] This became clear from instabilities of solutions using the K-Means algorithm depending on which of the different clustering variables had a higher contribution to the clustering (this can be read from the F-value, calculated by ANOVA to estimate how strongly each variable contributes to the classification). Giving higher priority to a certain variable cannot be forced in a cluster analysis (unless variables are given different weights), but we considered the F-values in the choice of the number of clusters in the way that the "difference" and the "ratio" should have a higher contribution to the classification than "coefficient of variation".

"winners" as clearly as possible. The analysis begins with a cluster analysis of the fruit/ vegetable sector and continues on with the analysis of the meat sector.

Table 2 depicts the results of the cluster analysis that focused on the fruit/ vegetable sector. Clusters are arranged by the mean "difference" of exports volume, thus the largest exporting winners are listed first. Clusters were labeled according to the most important characteristics of the groups which can be read from the means of the clustering variables in each cluster group. The table only depicts "examples" of countries which were included in the cluster. The cluster membership tables can be found in the Annex. All clusters are homogenous as defined by the F value.

Table 2: Cluster labels – fruit and vegetable exports

Cluster No.	Cluster label	Examples	No. of countries	Mean of clustering variables		
				Difference (million $) 02/04–93/95	**Ratio** 02/04/ 93/95	**Coefficient of variation** 02/04
8	Very large scale exporters; very strong winners	Mexico, China, Chile, Costa Rica	4	1404928	1.8	0.2
7	Large scale exporters; strong winners	Brazil, Ecuador, Morocco	9	337274	1.6	0.1
5	Medium scale exporters, very strong winners	Peru, Ghana, Zambia,	7	69038	3.7	0.2
4	Medium scale exporters, very strong winners	Bolivia, Nigeria, Malawi	4	10859	3.7	0.4
3	Small scale to very small scale exporters; winners	Kenya, Egypt, Paraguay	18	33971	1.8	0.2
1	Very small scale; strong winners	Niger, Nepal	2	375	2.8	0.8
2	Very small scale; strong losers	Burkina Faso, Venezuela, Mozambique	6 (5)	565	0.8	0.4
6	Small to medium scale exporters; strong losers	Malaysia, Indonesia, Iran Gambia, Sri Lanka	16	-16141	0.9	0.2
9	Large scale exporter; strong looser	Thailand	1	-239517	0.82	0.2

Source: own calculation

For the interpretation of the clusters we took the overall export dynamics in the market for the group of all developing countries into consideration. Consequently, when comparing the country ratios to the ratio of all exports of developing countries to the OECD, a ratio of fruit/ vegetable exports in 2002-04 compared to 1993-95 above 1.4 indicates an increase of exports above the average.

The first cluster explored in table 2, cluster 8, includes a small group of the countries with the largest export quantity and, in total values, the most strongly expanding exporters. The cluster consists of the four countries China, Mexico, Chile and Costa Rica. These countries almost doubled their exports starting from an already high export quantity in the first period. Mexico and China clearly dominate OECD fruit and vegetable imports. They account for more than 30% of total fruit /vegetable imports from developing countries in OECD countries in the years 2001 to 2004. Another 10 countries with a market share between 10 and 2% supply more than 50% of the OECD fruit vegetable imports from developing countries. These countries are mainly found in cluster 7. The cluster consists of 9 countries which increased their market share by an average of 1.6. It is rather plausible that most of the already large exporters managed to increase their market share significantly. Taking into account the current debate on market concentration, it is particularly interesting that smaller exporters also managed to increase their market share. The countries included in the clusters 5, 4, 3 and 1 have a market share of less than 2% of total fruit/ vegetable exports to OECD countries, but some of them increased their market share tremendously when looking at it in relative terms. Although the clusters 4 and 5 are relatively heterogeneous according to the export volume of the countries included, we can describe them as medium scale exporters with very strong gains in market share.[13] In cluster 5, all medium scale exporters tripled their market share between the two time periods. A similar scenario can be observed in cluster 4, even though it is a much smaller export quantity here.[14] Except for Bolivia, all three other countries of the cluster more than tripled their market share, even though they had a relatively high coefficient of variation, the cost being instable exports. Cluster 3 includes 18 small and medium scale exporters which managed to increase their market share. The cluster is rather heterogeneous, and the ratio ranges between 1.25 and 2.55. Finally, cluster 1 includes Nepal and Niger, two LDCs which managed to nearly triple their market share; however, they did start out with a very small quantity.

The remaining clusters include countries which lost market share. Cluster 2, consisting of 6 countries, of which Madagascar was the only country which managed to increase its market share (therefore Madagascar does not fit well into this cluster). The mean for this cluster is

13 In cluster 5 Peru has a trade volume which is more than three times larger than the export volume of the second large exporter of the cluster.

14 The difference of the cluster is strongly dominated by the relatively large scale exporter Bolivia which - according to its size - does not fit perfectly into the structure of the cluster.

therefore somewhat misleading for the interpretation. All other countries of the cluster lost market share, however in relatively small total quantity. Cluster 6 includes 16 medium to small scale exporters which lost market share.[15] Major losers in total terms were Iran, Panama and St. Lucia as well as Indonesia. The only very large scale producer that lost heavily when it comes to market share within the two time spans is Thailand. Considering the large market share of Thailand the strong decrease is especially notable.

The coefficient of variation yielded little additional information. In most clusters, variation between single years in the second period is rather low. It is higher in the smaller, more dynamic clusters. Interestingly, stronger variation within the fruit and vegetable market is not a characteristic that defines the loser clusters, as could be expected, if countries with low SPS capacity are less able to stabilize their exports.

Overall, results of the analysis show that very different development patterns can be observed for fruit/ vegetable exports. Some general trends are: (1) All large scale exporters are winners, except for Thailand. (2) Within the group of small and medium scale exporters we find a larger group of winners than of losers. We find the same diverse structure within the group of LDCs. (3) We find rather stable exports in the second time span, especially when comparing the coefficient of variation to the one we will observe within the meat market. Thus, even though the market of fruits and vegetables is heavily dominated by a few major players, various small countries increased their market share during the last decade. Consequently, results of the analysis hint to the fact that SPS measures in the sector did not simply strengthen the competitiveness of large producers and impede the competitiveness of small ones. Results of the analysis mainly contradict the *a priori* hypothesis of small scale exporters losing market share due to the SPS requirements of their trading partners.

The cluster analysis for meat shows very different results. The sample is smaller for meat exports (n=46) as a large proportion of developing countries does not export meat to the OECD at all, or only in certain single years. Additionally, the coefficient of variation in meat exports is much higher than the one for fruit/ vegetable exports, indicating in turn a higher instability within this market. The meat exports of all countries under consideration increased by 1.6 during the two time spans. Again, this is the benchmark against which we label a cluster as a “loser” or a “winner”.

[15] The only country which managed to increase its market share slightly was the Syrian Arabic Republic.

We chose an eight cluster solution as the best available result, even though the solution does not very clearly distinguish winners and losers. Statistically, all clusters are homogeneous. However, for ease of interpretation, we propose a slightly different grouping, relocating a few countries into clusters where they fit a bit better in order to more clearly describe winners and losers. The respective cluster summaries are displayed in parentheses for the regrouped clusters. Cluster memberships are displayed in Table 3.

Table 3: Cluster labels - meat exports

Cluster No.	**Cluster label**	**Examples**	**No. of countries**	**Mean of clustering variables**		
				Difference (million $) 02/04– 93/95	**Ratio** 02/04/ 93/95	**Coefficient of variation** 02/04
4	(extremely strong large scale winner)	Chile	1	296180	23.0	0.5
7	(very strong very large scale winner)	Brazil	1	1085546	2.2	0.3
6	(very strong large scale winner)	Thailand, China, Mexico	3	296106	2.9	0.1
8	(very strong small scale winner)	Malaysia, Cote d'Ivoire, India	3	3510	14.7	0.2
1	(strong small scale winner)	Philippines, Algeria, Mozambique, Niger	4	414	4.4	1.1
3	(Strong medium scale loser)	Nicaragua, Indonesia	18	-5301	0.9	0.4
5	(Medium scale loser)	Guatemala, Honduras, Uganda	16	-5389	0.4	1.2
2	(Strong very large scale loser)	Argentina	1	-235568	0.7	0.2

Source: own calculation

The overall export structure of the meat sector is even more concentrated than in the fruit and vegetable sector. Results of the cluster analysis nicely underline the assumed strong concentration process taking place within the meat market. The two major winners are Chile and Brazil (the first in relative, the latter in total terms). Chile (Cluster 4) increased its exports to OECD countries by more than 20 times and Brazil managed to double its market share, already having started with an extremely high export quantity in the first period. Today,

Brazil alone supplies 38% of the total OECD meat imported from developing countries. The other three top players of the meat market are included in cluster 6 (Thailand, Mexico and China). The high ratio of the cluster is mainly dominated by the increasing exports of Mexico (5.1). Thailand and China, though, also nearly doubled their exports within the relevant period. These five countries alone supply more than 80% of developing countries' total export to the OECD in the last decade. No other country has an export share of more than 5%.

Similar to the analysis of the fruit and vegetable market, it is not particularly astonishing that the already large scale exporters increased their market share. However, this analysis again provided some results which contradict the *a priori* assumptions. The clusters 8 and 1, for example, show that not all small scale exporters lost market shares in the period under consideration. Both clusters include small scale to very small scale exporters which even managed to increase their exports strongly; even though at a low total quantity. Malaysia, Cote d'Ivoire and India (cluster 8) showed a very strong increase of their exports and even countries such as Niger, Mozambique and the Philippines showed a positive ratio (on average 4.4). As countries such as Niger and Mozambique were principally considered to have weak food quality safety systems, the question arises as to why these countries managed to increase their market share in contrast to countries with already existing trading relations. However, when taken in total numbers, more countries lost market share in the meat sector in comparison to those who managed to increase their market share.

The clusters 3, 5 and 2 of Table 3 depict those countries which lost market share.[16] Cluster 3 and cluster 5 include 36 countries, the largest share of our sample in the meat market, which lost market share quite heavily. All of these are small scale exporting countries. Only cluster 2 includes a large scale exporter loser. Argentina is the only large country which shows losses on a very high level – in relative as well as in absolute terms.

In order to compare the results of the analyses of the two sectors, we had a look at them by cross tabulating the winners and the losers.

[16] Morocco, Ecuador and Fiji do not fit well into the structure of the cluster as these two countries actually increased their market share within the relevant time period.

Table 4: Cross-tabulation of "losers" and "winners" in the meat and the fruit/ vegetable market

		No cluster	Meat loser / winner		Total
			Loser	winner	
FV loser / winner	Loser	9	11	7	27
	Winner	13	20	7	40
Total		22	31	14	67

Source: own calculation

As can be seen in Table 5, only 11 countries of the 45 countries considered in both cluster analyses are losers in both, the meat and the fruit/ vegetable market. However, only 7 countries are winners in both markets. 27 countries are winners in one market and losers in the other market. Overall the meat sector contains more losers than the vegetable market. Only 7 countries are winners in the meat market while being a loser in the fruit/ vegetable market. However, 33 countries are winners in the vegetable market while being a loser in the meat market or are not even included within the analysis of the meat market.

Overall, in the fruit /vegetable market 60% of the countries under consideration managed to increase their market share, while only 31% of the countries in the meat market did so. The cross-tabulation nicely depicts the different structures and developments within the two sectors. While in the fruit/ vegetable sector the participation of developing countries and even LDC countries tends to increase, the development of the meat sector tends to develop in a completely different manner. The participation of developing countries in the market tends to decrease quite significantly. Furthermore, the table shows the tendency of developing countries of becoming specialised for and within their export market. The fact that only 7 countries out of the sample of 67 countries are winners in both, the fruit/ vegetable and the meat market, underlines this impression.

While the results of the meat cluster analysis clearly underline the *a priori* theoretical assumption of a stronger market concentration, the results of the fruit/ vegetable analysis rather contradict this assumption. In both analyses only some countries show a specific antidromic development of their export shares. In the meat sector we have the examples of Argentina - which is the only large scale exporter which lost a lot of its export share - or in a positive way: Niger and Mozambique as well as Côte d'Ivoire. Why did these countries manage to increase their market share in meat so clearly even though they started out from a

very low initial quantity in the first period? The same accounts for various countries in the fruit/ vegetable analysis. Why did Thailand's market share decrease so significantly whereas other countries such as Mexico, Chile or even Kenya and Tanzania increased their market share? The main question in this context, though, is: How important is the SPS capacity of a country for the development of export shares?

Interpretation of the results of the gravity analysis in combination with qualitative information of countries' SPS behavior aims to provide answers to the questions raised above.

7.2 The impact of SPS measures on trade performance

We first tested the gravity specification for our sample and for the selected markets without considering standards. Results are shown in Table 5.

Table 5: Results of the gravity model I

	Model 1		**Model 2**		**Model 3**	
Cons	-5,902 (2,514)	*	-1,391 (3,391)		-,296 (3,391)	
Dis_log	,059 (,201)		-,099 (,202)		,014 (,195)	
Col	,845 (,349)	*	,841 (,335)	*	,910 (,338)	**
Pop_log	,610 (,151)	**	,598 (,175)	**	,458 (,159)	**
GDPpc_log	1,312 (,361)	**	,786 (,462)		,608 (,458)	
PrefEU			-,630 (,237)	*	-,562 (,238)	*
PrefUS			,219 (,125)			
N	65		65		65	
R2	0,29		0,38		0,35	

Source: own calculation

Results of Model 1 depicted in Table 4 show that among the "standard" gravity variables colonial distance, population and GDP per capita are significant and coefficients carry the expected sign. Distance in contrary is not significant. This supports general observations which outline that, even in markets such as fruit / vegetables and meat, which are transport intensive, distance plays a decreasing role for trade flows since costs for transportation were relatively low.

We tested the effects of trade preferences from both the EU and the US as the most important OECD markets (model 2). Although we focus on the EU market, we are able to test if exports are diverted to US markets because of US trade preferences. The level of preferences granted by the US is not significant in our models. Contrary to this, the coefficient for the level of trade preferences granted by the EU, however, is significant, but carries the opposite sign than expected. This can be explained by the fact that EU trade preferences are correlated with GDP per capita of countries: the lower the GDP, the higher the trade preferences. Consequently it does not surprise that GDP per capita turns insignificant if trade preferences are included. This underlines the development perspective of European trade policy. To keep complexity of the model low and degrees of freedom high, and to avoid multicollinearity problems, we continued with model 1 and tested the impact of standards and countries' capacity to meet them.

Table 6: Results of the gravity model; SPS capacity variables

	Model 4		Model 5		Model 6		Model 7		Model 8	
Cons	-4,834 (2,708)		-3,010 (2,838)		-,082 (3,042)		,855 (2,221)		-5,956 (2,548)	*
Dis_log	,103 (,205)		-,009 (,199)		-,179 (,205)		-,042 (,157)		,066 (,205)	
Col	,850 (,349)	*	,911 (,342)	*	,746 (,330)	*	,440 (,279)		,851 (,353)	*
Pop_log	,497 (,185)	**	,452 (,167)	**	,291 (,176)		,153 ,137		,596 (,167)	**
GDPpc_log	1,107 (,410)	**	,864 (,416)	*	,802 (,379)	*	,489 ,309		1,320 ,367	**
Reject_log	,446 (,423)									
SPScom			,431 (,213)	*						
Tradecon_log					1,446 (,477)	**				
CertFarms_log							,733 (,115)	**		
STDFinv_log									,005 (,027)	
N	65		65		65		65		65	
R2	0,30		0,34		0,38		0,58		0,29	

Source: own calculation

We now included the above explained variables on SPS capacity in the gravity model.

The first *a priori* hypothesis was that a higher level of border rejection indicates a lower level of SPS capacity for a particular product and thus leads to decreasing market shares. Hence, we test the direct impact of non-compliance with standards on trade volume. Before turning to the

results of the analysis it should be mentioned that - without any further knowledge of the data - border rejections constitute the best available indicator for SPS capacity of a country. However, results of the analysis show that the regression coefficient of border rejections and trade volume is not significant. One reason for this might be that the data availability of border rejections is relatively weak since a quantitative unit is not included here. Furthermore, we used the data at a relatively high aggregate level. Even though we distinguished border rejections according to the product of relevance, the level of aggregation is still relatively high. The assumption is that border rejections become more relevant at a different level of disaggregation and better data availability.

In Model 5 and 6 we tested the "SPS activity" of countries. This variable includes the attendance at the WTO SPS committee and the SPS trade concerns that came up in this forum. Results of Model 6 show the positive coefficient of the attendance at the WTO SPS committee. This result underlines our preliminary assumption that countries which participate in the debate on standards and the standard setting process have the possibility to take the food quality requirements of their trading partners into account and (re)act with respect to them. We assume that governments participating in the WTO SPS committee regularly consider SPS measures as being significant and acknowledge the important role of governments in making the public infrastructure of a food quality and management system available in order to gain or increase market access. Furthermore, we assume that a regular participation in SPS committee meetings increases the flow of information from the European standard setters to their trading partners.

Additionally, the announcement of trade concerns shows a positive result. As with the participation in the SPS meetings, raising trade concerns means that a particular involvement of the country within the SPS debate is taking place. Governments need to be aware for what products specific regulations of their trading partners impede their competitiveness. This is only possible when, in addition to the information of the trading partners, requirements as well as information on particular difficulties of exporters within one's own country are available to the government. The second kind of information is quite rare as the institutional framework for downstream communication within value chains in developing countries only exists sporadically. Consequently, raising trade concerns indicates a better communication structure within the country and thus, an awareness by the government of strengths and weaknesses of the own food quality management system. Results of the analysis hint to the fact that countries which show this awareness have a higher degree of success in increasing

their market share. Population turns insignificant in this model, indicating some scale effect for the trade concerns: The larger the exporter, the more trade concerns are announced.

In Model 7 we included the variable EUREPGAP. Interestingly, we found a very clear relation between the number of certified farms and the trade performance. The model has the highest coefficient of determination, even though all other gravity variables turn insignificant in this model. Obviously, the variable EUREPGAP is better able to explain the observed trade volumes rather than the standard predictors of bilateral trade flows. This can be partly explained by the fact that we are dealing with a sectoral model, whereas the predictors relate to the national economy. We conclude that the relation between certification and the fruit and vegetable trade is particularly strong.

This result supports the hypothesis that SPS measures have an impact on the export ability of countries. Even though EUREPGAP is a private standard - certification takes place at farm level - it requires a public infrastructure of laboratories and laws which guarantee public testing, monitoring and food quality management facilities. A strong level of EUREPGAP certification is assumed to indicate a strong proactive involvement of the country. Additionally, results underline the particular importance of private standards. They hint at the fact that respecting SPS measures alone does not guarantee the maintenance or even the increase of market shares in the fruit/ vegetable market. Additional efforts in the private sector seem necessary.

Finally, the impact of STDF investment on trade performance is tested in model 8. The variable is insignificant in the model. Keeping in mind the very uneven distribution of STDF as explained in section 2, this finding is not surprising. However, taking the total amount of money invested in various countries to strengthen developing countries' export capacity, it seemed relevant to us to include this variable within the analysis. A closer look over a longer time period might bring more concrete results.

8 Conclusions

The objective of this paper was to shed more light on the question of how developing countries perform in a trading environment which is determined by the increasing importance of food safety and quality standards. The paper aimed to turn away from the traditional assumption of standards, implying particular barriers to trade for developing countries. It rather had a closer look at the diverse development of market shares of individual countries

within a time period where the importance of standards increased significantly. Results of the cluster analysis show that the simple generalization of developing countries being a group of market share losers when taking these new developments into account is false. The closer look of the analysis explored the fact that developing countries are a very heterogeneous group. This group shows various different tendencies regarding market share development. In addition, the analysis illustrates that it is not appropriate to categorically title small exporters as losers and to generalize large exporters as winners. Especially within the fruit/ vegetable sector, various small and very small exporting countries managed to increase their market share more than the average. This sector seems to imply the potential of participating in the positive market development for small and large exporters alike. Nevertheless, it can be generalized that most of the large developing countries exporters extended their market shares, sometimes even quite significantly. A slightly different picture was found for the meat market. Only very large exporters extensively increased their market shares while many small and medium exporting countries lost out. However, few clusters of small and medium winner were found as well.

Thereby the question remains of how important the relevance of standards is regarding the ability to export products and goods? Results of the gravity model give us - due to very limited data set - just a small impression of the big picture and, thus, have to be interpreted carefully. Two of the variables we developed to express a country's SPS capacity turned out to be significant; the SPS activity as well as the EUREPGAP certification. All variables hint at the fact that a stronger involvement of the government in SPS activities as well as a better communication structure within the country increase SPS capacity of a country. Most interesting is the result of the EUREPGAP variable which underlines the importance of private sector involvement in food quality requirements in order to increase market shares. Again SPS capacity seems to be important for a successful export performance.

Especially for the coming years - when trade preferences will, due to further trade liberalization in the agricultural market, play a minor role - the importance of standards and SPS capacity for a successful participation on the international markets will increase more and more.

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10 Annex

Annex 1: Cluster membership – fruit and vegetable exports

Cluster number	Countries
1	Nepal, Niger
2	Bahrain, Jordan, Burkina Faso, Mozambique, Madagascar, Venezuela, RB
3	Paraguay, Benin, Oman, Bangladesh, Lebanon, Tanzania, United Rep of, Sudan, Nicaragua, El Salvador, Senegal, Zimbabwe, Pakistan, Belize, Tunisia, Cameroon, Egypt, Arab Rep., Kenya, Cote d'Ivoire
4	Togo, Nigeria, Malawi, Bolivia
5	Trinidad and Tobago, Uganda, Saudi Arabia, Zambia, Fiji, Ghana, Peru
6	Mauritius, Guinea, Guyana, Gambia, The, Syrian Arab Republic, Algeria, Dominica, St. Vincent and the Grenadines, Sri Lanka, Malaysia, St. Lucia, Jamaica, Indonesia, Honduras, Iran, Islamic Rep., Panama
7	Dominican Republic, Guatemala, India, Argentina, Colombia, Morocco, Philippines, Ecuador, Brazil
8	Costa Rica, Chile, Mexico, China
9	Thailand

Annex 2: Cluster membership – meat exports

Cluster number	Countries
1	Philippines, Algeria, Mozambique, Niger
2	Argentina
3	Indonesia, Morocco, Tunisia, Fiji, Iran, Islamic Rep., Ecuador, El Salvado Bangladesh, Saudi Arabia, Lebanon, Peru, Pakistan, Syrian Arab Republi Jordan, Nicaragua, Panama, Costa Rica, Zimbabwe
4	Chile
5	Namibia, Swaziland, Cameroon, Uganda, Bahrain, Domenica, Venezuela, RE Belize, Egypt, Arab Rep., Colombia, Botswana, Mauritius, Dominican Republi Paraguay, Guatemala, Honduras
6	Thailand, China, Mexico
7	Brazil
8	Malaysia, Cote d'Ivoire, India

B Quality Standards for Food Products – A Particular Burden for Small Producers in Developing Countries?

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Quality Standards for Food Products – A Particular Burden for Small Producers in Developing Countries?

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Abstract

This paper develops an analytical framework which structures the problem of whether, how and to what extent small producers in developing countries are disadvantaged by the increasing prevalence of food quality standards. Based on a literature review, the empirical evidence is structured and research gaps are identified. The paper finds that small and medium producers rarely comply without support from downstream actors. In case of well-educated and relatively wealthy farmers, forward integration is also found. No empirical support exists for the intuitively appealing hypothesis of a lower cost of compliance per unit of output for large producers.

1 Introduction

In the course of increasing and more differentiated demand for product quality, the nature of traded food products has changed from homogeneous to more heterogeneous products that have several quality characteristics: technical value, sensory quality, nutritional value and food safety, as well as the idealistic and psychological values of a product (Brockmeier, 1993, 23; Wiegand, 1997, 43). While the technical value and sensory quality of a product can be assessed by the consumer, the other three quality characteristics cannot. Nutritional value and food safety are credence characteristics that can be assessed based on the final product by third parties. Most idealistic values can be classified as Potemkin attributes – characteristics which cannot be assessed based on the final good either by the consumer or by third parties (e.g. social, environmental, and animal health and welfare conditions in the production process) (Jahn et al. 2003; Tietzel and Weber, 1991).

Akerlof (1970) was the first to show that markets tend to fail for quality characteristics which cannot be assessed by the consumer because of asymmetric information. Despite consumers' willingness to pay for these characteristics, the market does not provide them since consumers are unable to identify or assess the particular quality of the product. To overcome this market inefficiency, an information flow must accompany the traditional product flow that can communicate each "traded" attribute of food. This is of particular importance in today's highly fragmented global food markets, which are characterized by the increasing international separation of different parts of the value chain, such as production, processing, storing and transportation (Arndt and Kierzkowski, 2001). Therefore, the amount of parallel information requirements increases at every level of the value chain (Theuvsen, 2003). Providing such parallel information flows causes transaction costs which may be reduced by the establishment of adequate institutions.

As a consequence, there is the tendency to move away from spot markets to higher degrees of vertical coordination (Pingali et al., 2005, 11; Buhr, 2003, 24; Gibbon and Ponte, 2005, 111). As a result, management within the product chain changes, moving from management of individual firms that are trying to optimize their production processes towards total value chain management. The individual firm is thereby conceptualized as a part of the chain, interlinked with the production and exchange activities of other value chain participants (Kaplinsky and Morris 2000; Mayoux, 2003).

One aspect of the vertical coordination process is the increasing prevalence of standards, which enables the heterogeneous characteristics of a product, including process and traceability requirements, to be marketed whenever there is a willingness to pay for these characteristics. The guarantee of standards requires the collection, accumulation and communication of information along the food production chain (Theuvsen, 2005). This makes quality standards, which may be public as well as private sector-driven, an ideal instrument to overcome market inefficiencies and to reduce transaction costs. As such, standards define the terms of membership of a chain and impose rules and conditions for participation. Gibbon and Ponte (2005, 163) underline the potential of standards to facilitate the inclusion of producers from developing countries in high-value chains, which are highly driven by consumers' demand for quality. Standards provide retailers with the option to obtain products from independent producers instead of fully integrated production without any information on product quality. However, standards do modify the challenges producers face in the marketing process, and may affect different types of producers differently, depending on the nature of the standard as well as the capability of the producer to comply with its requirements. Hence, the introduction of standards potentially affects market shares, and may be accompanied by the marginalization and exclusion of producers.

Besides the concern that small producers may be generally disadvantaged by institutional changes in the value chain (Gibbon and Ponte, 2005, 143; Pingali et al., 2005, 6), it is frequently asserted that small producers in developing countries have more difficulties coping with the increasing prevalence of standards. The reasons often mentioned for this tend to fall into two main categories:

1. The costs of compliance with a certain quality standard may be higher for small producers. This could result from the fixed cost component of complying with the standard, which would favour larger producers due to economies of scale (World Bank, 2005, 97). However, it could also be due to farm characteristics such as illiteracy of farmers, which makes information and documentation requirements more costly, or illiquidity, which may exclude farmers from the investments necessary to upgrade their farm to comply with the standard (Aloui and Kenny, 2005, 18; Jaffee and Henson, 2004, 15; Willems et al., 2005, 41).
2. The transaction costs involved in the compliance process for other chain participants such as exporters may be higher in the case of smaller farms, for example owing to higher communication costs and monitoring compliance costs. It may therefore be better for buyers to cooperate with larger farms (Pingali et al., 2005, 11; Swinnen, 2005, 46).

As a result, small producers may be excluded from markets which require standards, and their economic situation may deteriorate (Humphrey et al., 2004, 69; Reardon et al., 2001, 12; Reardon et al., 2003, 29; World Bank, 2005, 3). This may especially be the case for private standards which include on-farm process certification, because of the sudden increase in the cost of compliance and the higher level of requirements with respect to information, communication and documentation involved in process certification. This is in contrast to most public product standards, which have evolved gradually over time and typically do not require sudden fundamental adjustments in farm management and on-farm certification.

As an alternative to market exclusion, compliance and transaction costs could be reduced by ensuring a higher level of integration and coordination of farmers along the marketing chain.[17] In contrast to remaining a single chain segment, the participation of producers in the value chain may take different forms. According to Orden et al. (2004), there is a continuum of coordination with at one end the spot market and at the other vertical integration. Between these two extremes, various forms of vertical coordination can be found, such as contract farming, relation-based alliances, or equity-based alliances (Peterson et al., 2001). In a trading environment that is increasingly determined by standards, transaction and compliance costs could be reduced by vertical coordination, including support from a downstream actor in the marketing chain. Vertical coordination, however, potentially increases the dependency of small producers on downstream actors, which can weaken their position.

In addition to costs, compliance with a standard may also bring benefits which may however be distributed unequally among farm types. Some sources mention productivity gains as a result of restructuring the farm when implementing the standard (World Bank, 2005, 71; Hatanaka et al., 2005, 362-363). If small farms are less efficient than larger ones, they may benefit more from such productivity gains.

Unfortunately, however, the assessment of the effect of standards on small producers in developing countries only has a very thin empirical base and is largely based on plausibility considerations. Furthermore, no systematic overview of the factors that could determine the comparative disadvantage of small producers in coping with quality standards exists.

This paper therefore has two main objectives. First, it seeks to develop an analytical framework that structures the problem whether, how, and to what extent small producers in

[17] For an example of the successful integration of small developing country farmers in high-value export marketing chains, see Minten et al. (2006).

developing countries are disadvantaged by the increasing prevalence of food quality standards. This analytical framework is presented in Section 2 of the paper. Although it can be applied to compliance with food quality standards in general, certain aspects are only relevant for compliance with process standards, which are accompanied by third-party certification of agricultural producers.

Second, the paper attempts to synthesize and structure the empirical evidence on the effects of quality standards on small producers in developing countries. Section 3 of the paper presents a literature review, which is organized according to the structure developed in Section 2. Finally, Section 4 draws some conclusions and identifies future research needs.

2 Structure of the Problem

The overall hypothesis that small producers have a comparative disadvantage in the compliance process is based on their specific farm characteristics and their institutional environment. This is depicted in the analytical framework provided in Figure 1, which is divided vertically into three blocks. The left side depicts farm-individual characteristics of small producers, characteristics of the institutional environment and characteristics of the standard. These affect the costs and benefits of compliance, which are depicted in the second block of the figure and comprise the two main determinants of the compliance process. Finally, the third block depicts the ways in which the costs and benefits of compliance may disadvantage small producers.

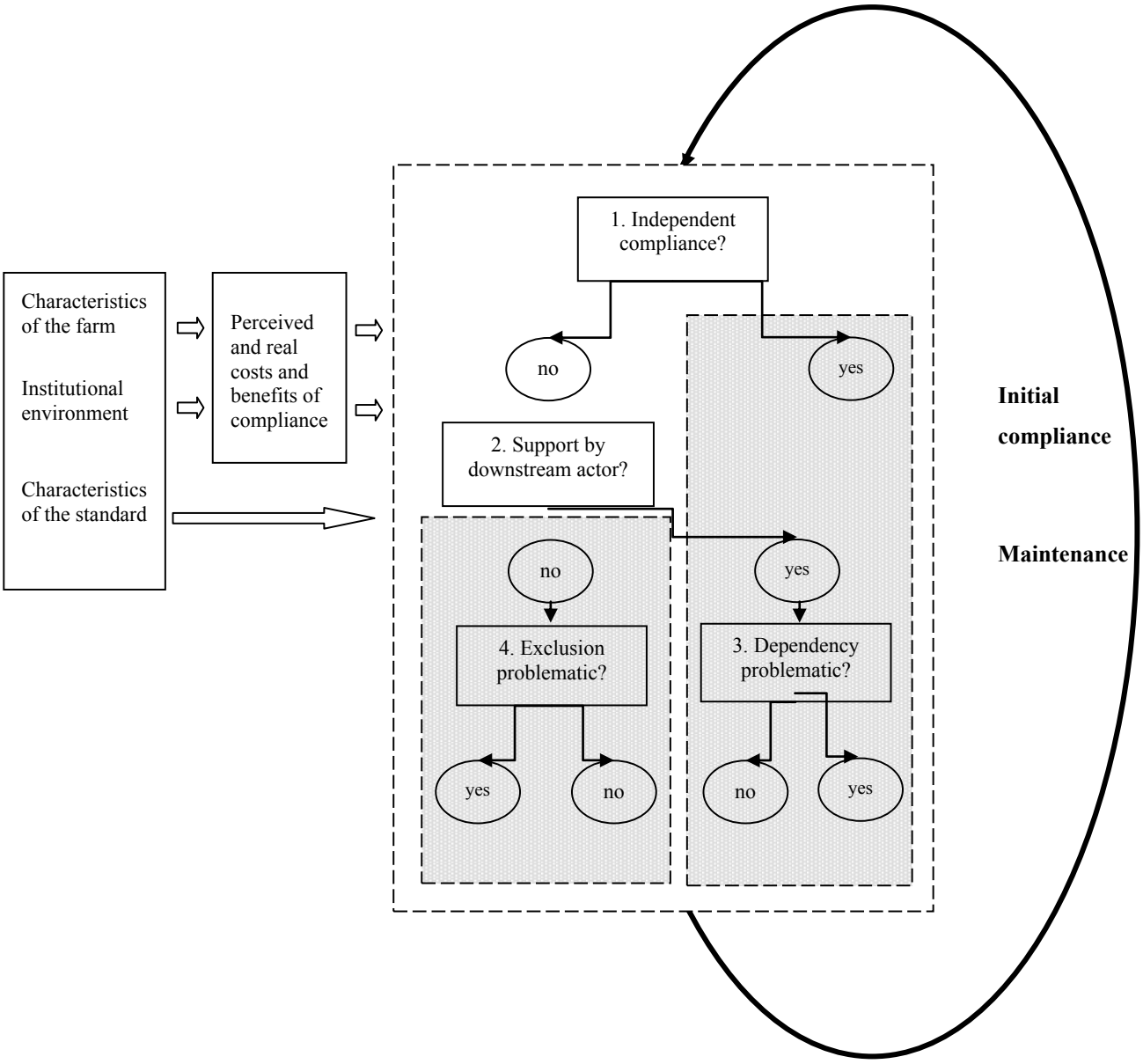
To enable this problem to be examined analytically, this part of the figure is structured into four analytical stages. The first stage explores whether small producers comply independently with the standard. The second shows how small producers may comply with the standard, but only with the support of a downstream actor in the marketing chain. The third stage discusses the effect that growing dependency of small producers on downstream actors could have, and the fourth stage investigates whether exclusion from high-quality standard markets would be problematic for small producers.

The arrow on the right-hand side of Figure 1 indicates that compliance with a standard should not be seen as a one-off event, but rather as a process. For those producers who initially complied with the standard, questions at analytical stages 1 to 4 can be posed again with respect to maintenance, including upgrading because of potential updates of the standard. The

only difference is that in case of first compliance, the necessary adjustments and costs involved are typically more significant.

As long as the standard is economically relevant, those producers who do not comply with the standard at any point in time will continuously be confronted with the choice of whether to comply or not. Therefore, the questions at analytical stages 1 to 4 again apply.

Figure 1: Framework for the Analysis of Disadvantages for Small Producers in Coping with Food Quality Standards



Source: own illustration.

2.1 Individual Farm Characteristics, the Institutional Environment, and the Characteristics of the Standard

Individual farm characteristics and the institutional environment are the basic determinants of the compliance process, and small farms tend to share particular characteristics. This supports the hypothesis that they are disadvantaged in terms of their compliance with standards. These unfavourable characteristics and their institutional environment relative to large farms are:

- Lower technological production level
- Less capital and land resources
- Less human capital
- Less ability to cope with risk
- Less ability to exploit economies of scale
- Less access to credits
- Less access to information
- Less output, urging downstream actors to cooperate with many small farms to receive large quantities

In this definition, the term "small farmer" is defined in relative terms, which is the perspective chosen in this paper. However, small producers for markets which require standards may not necessarily be small (or even poor) in relation to farmers who produce for other markets, or subsistence producers. From a development point of view, this issue takes on special relevance if the relatively small producers for the market which requires the standard are poor, or if they face the risk of falling into poverty through a deterioration of their economic situation.

In addition, the characteristics of the standard determine whether small producers in developing countries are disadvantaged in the compliance process. For example, standards which require high levels of investment and access to capital or a high degree of documentation and the ability to read, write and keep records may be more difficult for small producers to fulfill than ensuring that the maximum residue levels of pesticides are not exceeded in the final product.

2.2 Costs and Benefits of Compliance

Figure 1 shows that the characteristics listed above potentially affect small producers' competitiveness through the costs and benefits of compliance. The costs of compliance can be defined as "all additional costs necessarily incurred […] in meeting the requirement to comply with a given standard in a given […] market" (World Bank, 2005, 67).

The costs of compliance include all costs resulting from upgrading the production process as well as money spent to maintain the level of compliance. Table 1 shows that the costs of compliance for the producer can be grouped into five main categories:

i) costs for physical upgrading,
ii) costs for human capital upgrading,
iii) management costs,
iv) the opportunity costs resulting from potentially lower yields,
v) social costs.

In addition, recurrent and non-recurrent cost elements can be distinguished (Bennett et al., 2000, 108).[18] Recurrent costs are defined as the cost difference between the annual cost of production before and after compliance, once the standard has been implemented.[19] Non-recurrent costs cover all upgrading costs needed to reach the quality level required by the standard. These are to a large extent "sunk" costs once the standard has been implemented. These two terms are used here in contrast to fixed and variable costs, since part of the recurrent costs is not related to the production quantity and therefore does not vary.

Table 1 additionally distinguishes between capital and labour costs, and indicates which of the cost components have to be borne by the producers, and which may alternatively be taken on by downstream value chain participants. In practice, producers are often supported in implementing a standard by the buyers of the products, who bear part of the costs of compliance. For example, "motivation of employees" requires capital as well as labour input. Theoretically, the capital requirements could be fully borne by any

[18] In addition, Bennett et al. (2000, 106) distinguish between direct and indirect costs, while the World Bank (2005, 69) distinguishes between tangible and intangible costs. As these concepts are a matter of measurement rather than a conceptual distinction, we do not use them throughout this text.

[19] This distinction is not always unanimous. In reality, most standards evolve over time. Therefore, a typical compliance process would involve repeated upgrading as a response to updating of the standard and thus non-recurrent cost components.

downstream actor. For the labour requirements, this may also hold for the non-recurrent component, for example through a downstream actor organizing an initial training workshop. For the recurrent labour requirement, which would involve the daily observation and motivation of farm workers, it seems plausible that at least part of the labour requirement must be borne at the farm level. The distinction as to whether compliance costs can, partially or fully, be borne by downstream actors is not clear-cut and depends on the structure of the value chain. Table 1 purely depicts the theoretically possible assumption of cost components.

Table 1: Costs of Compliance at Producer Level

Categories	Components	Non-recurrent		Recurrent	
Physical upgrading		Capital	Labour	Capital	Labour
	Buildings	●	●	● (maintenance)	● (maintenance)
	Machinery	●	●	● (maintenance)	● (maintenance)
	Equipment	●	●	● (maintenance)	● (maintenance)
	Certification	●	●	● (maintenance)	● (maintenance)
Human capital upgrading	Training of employees	●	●	●	●
	Adaptation of employee structure	●	●	-	-
Management	Motivation of employees	●	●	●	○
	Own information	●	○	●	○
	Conceptualization	●	●	-	-
	Coordination with trading partners	●	○	●	○
	Coordination with group members	●	○	●	○
	Documentation	-	-	●	●
	Analyses	-	-	●	●
Higher variable production cost	More intermediate inputs	-	-	●	●
	More expensive intermediate inputs	-	-	●	●
	More labour	-	-	●	●
Lower yields	-			x	
Social costs	x			x	

The cost component can be assumed by a higher-level actor: ● completely; ○ partly; x not.

Source: own analysis.

Like the costs of compliance, the benefits of compliance consist of several components and depend on farm-individual characteristics and the institutional environment. In addition, these benefits depend to a large extent on the further development of the prevalence of standards. Producers' benefits from compliance include:

- less risk of being excluded from the market requiring the standard;
- the option to sell a larger quantity on the market requiring the standard;
- higher product prices;
- cost reduction through optimized input use/technological change;
- higher yields through optimized input use/technological change.

Similar to the costs of compliance, the benefits of compliance can accrue to producers as well as to downstream actors. Who is able to capture which share of the benefits again depends on the structure of the value chain.

2.3 Analytical Stages

Analytical Stage 1: Does the Producer Comply Independently?

This sub-section explores under which circumstances small producers comply independently from support by downstream actors, whether as individual farmers or as farmer groups. Initial compliance with a standard can be separated into two steps; first the decision to adopt the standard, and second its implementation. The former is largely determined by the producer's perceived costs and benefits. A rational producer will comply whenever the perceived benefits are larger than the perceived costs. This situation changes once the producer starts to implement the standard, when compliance is increasingly determined by the real costs and benefits, which may differ from the ones initially perceived. Since investments in standards are usually in the long term, the benefits also tend to appear in the long term, and future market developments are important determinants of benefits.

Small producers share common features which tend to increase their costs of compliance. As displayed in Table 1, additional costs may arise from the physical upgrading process for human capital upgrading and management, because of lower yield, and in the form of social costs, and are discussed below in this order.

The capital intensity of the technical upgrading may be highly problematic for small producers' initial compliance. Since small farmers usually produce capital extensively at a lower technological level, the difference between this and the required technological level for

compliance tends to be higher than for larger farms. As a consequence, substantial investments may be required to upgrade the farm. Taking into consideration the fact that small producers often have less own capital and less access to credit, costs thus tend to be higher than for larger producers.

Producers need access to information for human capital upgrading and management activities. Consequently, the introduction of standards not only requires a greater information flow from the producer to the buyer, but also from the buyer to the producer. Since small producers often have less access to modern means of communication and a lower level of market integration and human capital than larger producers, it is difficult for them either to generate this information individually or to receive it externally. Fairman and Yapp (2004), as well as Henson and Heasman (1998), underline how small enterprises are dependent on externally generated information. The need for information covers three different levels. First, the initial awareness of the existence of the standard and its importance for the market. Second, in the decision process, the producer needs detailed knowledge on the requirements of the standards. And third, far-reaching extension and support may be necessary in the implementation process, especially if human capital levels are low. Other special features of small producers which impede initial compliance comprise their weak capacity to cope with temporary income losses and the missing option to implement the standard only on part of their farm, which is often observed on larger farms.

Furthermore, the independent compliance of small producers is determined by factors other than considerations of the economic costs and benefits. These factors may include personal characteristics such as risk aversion or a preference for traditional production methods, or they could include institutional conditions (Strang and Meyer, 1993; Walgenbach and Beck, 2003). DiMaggio and Powell (1983) pronounce the importance of institutional isomorphism, which is defined as the tendency of participants in a sector to form homogeneous organizational structures. Since sectors form a homogeneous production network consisting of individual producers, the decision to comply with a standard at an early stage of diffusion implies the decision to depart from the homogeneity of the network. Conversely, not to comply with a standard which is already widely diffused also involves leaving the homogeneity of the network. Rogers (2003) underlines that small producers acting in close social relations might experience high social costs in taking such a step.

One important element of compliance with many process standards is the requirement of external farm certification. The certification process and the associated information,

organization, and documentation require a high level of on-farm management skills, which are often less prevalent on small than on large farms. In order to cope with these constraints, the certification of farmer groups is an alternative option to certifying producers independently. This implies that a group of farmers establishes an internal quality management system which is externally audited. In this case, the producer group is the holder of the certificate.

Forming producer groups may reduce costs at various levels, and has three main implications. First, group certification implies that not each producer is audited externally; consequently the costs for the external audit per producer are lower. Second, the producer organization might function as a source of information for producers, who accordingly do not have to generate all information by themselves. The group can establish direct contact with the buyer and consequently develop an information flow from the buyer to the producer. Third, the external motivation for certification is much higher if producers are organized in a group which includes several members who have already been certified. Having said that, the implementation of an internal quality management system requires considerable management skills and produces high costs, to the extent that it is not clear at the outset that group certification is generally any more favourable for small farmers than individual certification.

Analytical Stage 2: Does the Producer Comply with Support by a Downstream Actor?

An alternative to complying independently with a standard is the compliance of a producer with support by a downstream actor in the supply chain, such as an exporter enterprise. This implies that the downstream actor bears part of the costs of compliance. The level of support can have different dimensions:

1. Low level of support: The downstream actor shoulders part of the costs of the information about the standard. Besides the information on the development of existing standards, this is of special relevance for the awareness of the existence of new standards. Since small producers often have limited access to information channels, they tend not to recognize the necessity of compliance; this is rather noted by the downstream actor, who is more directly aware of importers' requirements.
2. Medium level of support: In addition to information costs, the downstream actor also bears other management costs to support the producer in order to implement and manage the standard. This implies that the downstream actor might carry out and take on parts of the costs of human capital upgrading and management activities (e.g. developing internal audits and management plans for the compliance process, training farmers and workers, etc.). In the case of standards that involve a certification process,

the downstream actor may shoulder the certification costs and also be the holder of the certificate.

3. High level of support: The downstream actor additionally carries out and bears the production process costs, which are relevant for compliance with a standard (e.g. carrying out all pesticide and fertilizer applications).

Depending on the different levels of support from downstream actors, the producer faces different costs and benefits of compliance. These might favour a positive compliance process: not only do compliance costs decrease for the producer since they are partially borne by downstream actors, but also the risk of a misinvestment is partially assumed by the downstream actor. Furthermore, the producer might experience a direct benefit from compliance, since he or she could experience high external pressure and market exclusion in the case of non-compliance.

From the perspective of the downstream actor, the phenomenon of support can be explained by two motives: first, small producers may become dependent on the downstream actor, which may be attractive from the latter's point of view. Second, downstream actors such as exporting companies are interested in a stable supply of compliant products. If this supply cannot be satisfied by larger producers alone, who should be more able to comply independently with a standard, companies have to revert to smaller producers who might neither see the necessity of implementing a standard without external support, nor be able to do so. However, in the long run the incentive for downstream actors to support small producers in compliance with the standards in order to ensure sufficient supply may diminish if larger producers apply the standard. In such cases, it may be more profitable for downstream actors to deal with larger suppliers because of the lower transaction costs involved in working with a few large producers instead of many small ones.

Although compliance of a small producer with support from a downstream actor allows the producer to avoid market exclusion, it does involve the risk of becoming dependent on the supporter. This risk increases with the level of support small producers receive.

The question whether this dependency is potentially problematic is discussed in analytical stage 3. If the producer does not receive any support and consequently does not comply with the standard, the subsequent question is whether exclusion from the market requiring the standard is problematic (analytical stage 4).

Analytical Stage 3: Is the Dependency Problematic?

The previous section introduced the risk of dependency on the part of the producer, which goes hand in hand with the level of support received. This dependency may be problematic for small producers for three reasons. First, compared to a situation of independent compliance, part of the value added may be transferred to downstream actors, which would cause the farm income of small producers to decline.

Second, when farm work and management tasks are carried out by downstream actors, the producer loses knowledge about the relevant production processes, i.e. those which are necessary to comply with the standard, as well as those which are generally relevant for production. He or she relinquishes control over production and management decisions, thus losing sovereignty. This could result in an "unlearning" process that could in the medium and long term deplete the farmer's capacity to be autonomous and independent. Of course, such assistance could also have the opposite effect: external involvement in production and management might also potentially enhance farmers' knowledge and thus result in a learning process.

Third, the downstream actor could make use of his or her strengthened market position, given the dependency of the producer (in an extreme case, this could be a fully monopsonistic position), and impose a product price that is below the competitive equilibrium. In case of standards which involve a certification process, the distribution of market power may hinge on whether the holder of the certificate is the farmer or the downstream actor.

Analytical Stage 4: Is Market Exclusion Due to Non-compliance with Standards Problematic?

It is evident that producers who fail to comply with a standard will be excluded from the market requiring this standard. Whether or not this is problematic depends on whether the possibility exists to produce for alternative markets for which compliance with the standard is not required; on whether production could be converted to other products; and on whether alternative employment opportunities exist. Alternative market access is determined by three different factors, as outlined below:

Existence of public quality standards. Countries apply different levels of public quality standards, depending on their average income level and on their cultural background.

Generally, high-income countries tend to have higher-level public standards than middle or low-income countries. Thus, producers in developing countries that are excluded from high-standard export markets can still sell to markets requiring lower standards, which are mainly those of non-OECD countries or domestic markets.

Enforcement of public quality standards. If small producers in developing countries are excluded from formal domestic markets because of public quality standards, they may choose instead to supply informal markets such as street markets and small retailers, where public quality standards are often not enforced (Reardon et al., 2003).

Prevalence of private quality standards. Voluntary standards lead to a higher degree of market segregation. Exclusion of small producers due to non-compliance only happens in those market segments that require the standard. This can be problematic if private standards are becoming quasi-mandatory in a market, since downstream actors may increasingly insist on compliance as an essential marketing premise (Will, 2003). This can be observed for example with the EUREPGAP standard for fresh fruit and vegetable imports to the EU (USAID, 2005). The EU market is still in a transition period: retailers in some EU Member States (e.g. the UK and the Scandinavian countries) require EUREPGAP as a precondition, whereas many retailers in other Member States such as Germany and France prefer to buy EUREPGAP-compliant produce, but are also prepared to buy non-certified products when no EUREPGAP produce is available. From a producer perspective, this means that EUREPGAP constitutes a clear marketing advantage, but non-certified producers do not yet face exclusion from the EU market as a whole. However, although there are no direct sanctions, not complying with EUREPGAP means not fulfilling buyers' preferences and, from a producer perspective, implies potential market exclusion in the future.

As long as sufficient alternatives to high-standard markets exist, producers which are not able to comply with high standards can serve these markets. In the long run, however, private as well as public standards are becoming increasingly relevant, even on the domestic markets of developing countries (Reardon et al., 2003; 2004). The same holds for eastern European countries and other non-OECD importers (Csáki et al., 2004). As a consequence, shrinking demand for non-compliant products could force prices down for these products.

3 Empirical Evidence

In this section we review the empirical evidence in the literature to answer our basic research question as to whether standards represent a particular burden for small producers in developing countries.[20] This literature has expanded rapidly since the end of the 1990s, when the relevance of standards for international trade of agricultural and food products increasingly attracted the interest of researchers.

To answer the research question, different strands of the empirical literature can be examined. Some analyses focus on the extent to which quality standards generally affect developing countries' exports, without explicitly dealing with effects at the producer level. This strand of literature comprises econometric studies based on cross-sectional data. Most of the econometric models applied are based on the gravity equation, which typically describes a country's exports as a function of a variable describing the standard imposed on exports from this country, GDP of exporting and importing country, and the distance between both countries, among other factors (e.g. Otsuki et al., 2001; Jayasuriya et al., 2006). Alternatively, other empirical analyses apply equilibrium models to show that quality standards can have significant effects on developing countries' exports (e.g. Maskus et al., [no date]; Ganslandt and Markusen, 2000; Peterson and Orden, 2006).

As this paper seeks to differentiate between producer groups within countries and sectors, we do not review the literature on the aggregate effect of standards. Instead, we focus on the part of the literature that can help us address the four questions raised during the analytical stages in Section 2. This part mainly consists of case studies based on sectoral surveys and, to a lesser extent, on farm surveys as well. We concentrate on the literature dealing explicitly with the effects of quality standards for food products on agricultural producers, and only incidentally draw upon the literature on organic and environmental standards, and standards for the manufacturing industry.

Some of the case studies formed part of larger research projects such as the USAID and Michigan State University surveys, which were conducted in Mozambique (Bawden et al., 2001), Zambia (Giovannucci et al., 2001), Malawi (Toomey et al., 2001) and Kenya (Harris et al., 2001). One year later, the results of a University of London project on the impact of standards on exports from Mediterranean countries were published. This project emphasized

[20] Empirical literature on the implementation of quality standards for food products in developing countries is dominated by research on the EUREPGAP standard, which therefore also dominates our literature review.

both the buyer's and the producer's perspective (Ababouch and Messaho, 2002; Yalcin et al., 2002; Laajimi, 2002). In 2003, as the result of a World Bank research project, Wilson and Abiola (2003) published case studies for Kenya, Mozambique, Nigeria, South Africa and Uganda.

Nevertheless, all these surveys concentrate on a rather general impact of standards on agricultural and food sectors. They do not present any farm-specific analysis, and the compliance process is largely neglected. However, most of the authors do assume that small producers tend to be more negatively affected by standards than larger farmers, but without providing any empirical evidence.

This is not the case in a recent and comprehensive World Bank research project, "Food Safety and Agricultural Health Standards: Challenges and Opportunities for Developing Countries" (World Bank, 2005). This includes case studies that look at both the supply and the demand perspective. On the supply side, case studies were conducted for Kenya (Jaffee, 2003), Morocco (Aloui and Kenny, 2005), Senegal (Mbaye, 2005) and Thailand (Manarungsan et al., 2005). These case studies include research at the farm level, but present little evidence on differentiation among producer groups.

In addition to publications in the context of these large-scale research projects, various other case studies have been published over the last decade. In the following sub-section, we review the literature in detail according to the questions raised in the analytical stages of Section 2. Since empirical evidence is still scarce, we also review some papers which do not have a particular focus on developing countries.

3.1 Empirical Evidence on Independent Compliance of Small Producers

Papers with a particular focus on the compliance process, and on the question of which factors affect this process, are rare. Henson and Heasman (1998) develop a model of the compliance process with food safety standards based on empirical evidence from food manufacturers and retailers in the UK. As one of their major findings, they underline that the compliance process differs for small and large firms. They state that small firms generally implement regulations later and are more likely to choose partial or non-compliance. Fairman and Yapp (2004) modify the Henson and Heasman model to adapt it for the particular compliance process of small enterprises in the UK with food safety standards. They stress the complete reliance of small business on external information, and note that the compliance process is externally

driven. Walgenbach and Beck (2003) discuss the compliance process of enterprises in various industries with ISO 9000 in Germany, based on new institutional economics theory. One of their major findings is the identification of a willingness to comply even if compliance is not in the direct economic interest of the firm. The authors emphasize the driving force of sectoral isomorphism for the compliance decision, which is based on interest in cooperation and social acceptance. This underlines the perspective of the decision-maker, who not only focuses on processes within the firm, but also sees the firm as part of an institutional system.

To the authors' knowledge, only three surveys explicitly explore the compliance process and compliance strategies of producers in developing countries. Okello and Swinton (2005) compare the compliance process of a large and a small family farm with the EUREPGAP standard in a paired case study in the Kenyan bean sector. The paper is based on transaction cost economics, the principal agent theory and the principle of economies of scale. One of its major findings is the identification of different strategies on the part of both types of producer to respond to private standard requirements. While the larger producer chooses to become certified as an individual farmer, the paper identifies considerable potential for smaller producers to reduce the costs of compliance through group certification. The paper does not provide any empirical evidence of small producers being particularly disadvantaged regarding upgrading costs, but does produce evidence that smaller farms face higher recurrent costs.

Chemnitz (2007) reports the results of a survey on the diffusion of the EUREPGAP standard in the Moroccan tomato sector, which includes a qualitative as well as a quantitative analysis. The paper explores the various factors that favour or impede certification based on innovation theory, new institutional theory, and the concept of economies of scale. Almost all Moroccan producers comply with the EUREPGAP standard independently from downstream actors. However, 22 out of the sample of 30 certified producers are vertically integrated into the value chain and control the processing and marketing of the raw product (whereas out of a sample of 33 non-certified producers, only 6 are vertically integrated). The ownership of the packing station may take two organizational forms, either individually or as a member of a cooperative. Two of the most important findings of the survey are that producers which are certified are in contact with their international buyers and experience external pressure from them, such as the threat of sourcing from other producers in case of non-compliance. The survey underlines the importance of vertical coordination for the compliance process of small producers. It also indicates that there is a medium to low correlation between the cost of

compliance and farm size, suggesting that the "starting point" could well be more important than farm size.

In a study based on a similar methodological approach, Kleinwechter and Grethe (2006)[21] analyse the compliance process with the EUREPGAP standard in the Peruvian mango sector. In the sample from this sector, all EUREPGAP-certified producers are engaged in contract farming or enjoy a higher order of vertical coordination. Only a few large farmers are certified independently, and all others rely on the support of export companies. The costs of compliance are found to range from 0.3% to 15.2% of the production value, and average 3.8%. This shows that the costs of compliance can impose a considerable economic burden, and are strikingly variable. No significant relationship between farm size and the cost of compliance is found.

3.2 Empirical Evidence on Producers' Compliance with Support from Downstream Actors

Fairman and Yapp (2004, 46) show for the UK market that smaller producers are unable to generate knowledge about consumer requirements. Hence, their compliance is mainly externally driven. Various case studies discussed in this section underline this finding for producers in developing countries, and point to the importance of downstream actors in supporting small producers in the compliance process.

In a study on how supermarkets in Central America obtain fresh fruits and vegetables, Berdegué et al. (2005, 265) describe a centralized procurement system under which a supermarket chain establishes technical assistance and training programmes to support its suppliers in complying with higher standards. Jaffee and Masakure (2005, 327-330) provide evidence from Kenya where exporters of vegetables support small suppliers by providing inputs, credits and extension services, advice in the application of agrochemicals, and supervision. Manarungsan et al. (2005, 6, 42-45) outline that with tightening vertical coordination, asparagus producers in Thailand are supported by exporting companies, packing houses or cooperatives. This support takes the form of the provision of training, extension, technical support and inputs. Generally, however, these studies do not go into much detail regarding the level, means and nature of support from higher-level actors.

[21] This study is comprehensively documented in Kleinwechter (2005).

Kleinwechter and Grethe (2006) underline the particular importance of downstream actors' support for the compliance process of small producers in the Peruvian mango export sector. One of the main findings of the study is that all small producers in the survey complying with the EUREPGAP standard rely upon outside support to implement the standard. This becomes especially visible through the observation that, despite the large differences between certified producers in terms of socio-economic characteristics such as farm size, education or wealth, all certified producers show a high level of vertical coordination, either by contracts with downstream actors or by vertical integration. In no case do producers who still sell to intermediate traders without direct contact to exporter enterprises comply with the standard. Additionally, the study shows that support may include the supply of inputs, extension and credit, as well as the assumption of farm management tasks (organization, application of pesticides). This reveals that the enterprises play a strong role in providing producers with information on the standard and directly influence their decision-making process. Thereby the downstream actors partially cover compliance costs by ensuring partial or complete coverage of cost components.

Finally, other studies mention the importance of contract farming for compliance with private standards (Reardon et al., 2004, 176; Swinnen, 2005, 4, 19; Pingali et al., 2005, 21; Minten et al., 2006, 2, 20; Swinnen and Maertens, 2006, 17). A case study from Madagascar (Minten et al., 2006) describes the success story of 10,000 small vegetable producers, who have benefited from micro contracts combined with on-farm extension and supervision programmes in order to comply with the required quality. Key and Runsten (1999, 386) see contract farming as a possibility to overcome the information gap of small producers, and thus to improve their knowledge on their trading partners' requirements. Swinnen and Maertens (2006, 10-13) show for various examples from Central European countries as well as from Mozambique, Kenya, Zambia and Latin America that farmers are increasingly engaged in contract farming and receive support in the form of credit, inputs, technical assistance and quality control.

In summary, there are many examples of downstream actors helping small farmers to comply with quality standards, although no real generalizations can be made. According to Swinnen (2005, 47), empirical surveys show a mixed picture rather than a general exclusion of small producers. Similar conclusions are drawn by Berdegué et al. (2005, 265), who find that 70% of the suppliers for Hortifruti, a highly developed specialized retail fresh fruit and vegetable supplier in Costa Rica, are small farmers.

By contrast, several papers describe examples of small farmers losing market share as a result of increasing quality standards. Humphrey et al. (2004, 69-70) describe the redistribution of market shares as a result of quality standards in the fruit and vegetable sector in Kenya. They underline that "own farm production" of downstream actors increased from 40% in 1998 to more than 60% in 2001. All interviewees stated that they had reduced their smallholder supply due to concerns expressed by supermarket buyers about product characteristics and product quality.

Maertens (2006, 3-5) underlines these findings for the horticultural sector in Senegal. Structural changes include a shift from contract farming with small-scale producers to large-scale vertically integrated farms owned by exporting companies. Some interview partners stated that they had shifted from 100% reliance on contract farming to 80% reliance on vertically integrated production.

There is insufficient empirical evidence to provide a clear picture on whether small producers are more excluded or supported when it comes to complying with quality standards. In addition, it would be interesting to know more about the determining factors for downstream actors' choice whether to support small producers or exclude them.

3.3 Empirical Evidence on the Dependency Effects of Supported Compliance

Given that farmers are often supported by downstream actors, this section discusses whether this support may, beside its positive effects, have any negative effects on small producers. Unfortunately, few studies explicitly mention and analyse the possible dependency effects of supported compliance.

In their analysis of contract farming and rural development in Latin America, Key and Runsten (1999, 381) outline the various problems involved in contract farming, including that smallholders can be extremely dependent on their contract partners. This is especially the case when contract farming goes hand in hand with decreasing diversification and the dependency on the provision of inputs, so that growers face limited exit options and lose bargaining power against downstream actors.

Jaffee and Masakure (2005, 330) show that the interference of exporting companies with the production process on farms in Kenya's vegetable export sector allows them to influence strongly key production decisions. Another aspect is highlighted by Kleinwechter and Grethe

(2006), who describe how exporter enterprises in the Peruvian mango sector sometimes hold the EUREPGAP certificate. This might provide firms with monopsony power and allow them to pay producer prices below the competitive equilibrium.

To establish the extent to which small agricultural producers face disadvantages through increased dependency on downstream actors, what these disadvantages look like and their severity, a detailed understanding of power and governance within the value chain requires further research.

3.4 Empirical Evidence on How Problematic Exclusion Effects due to Non-compliance re

Several papers mention the exclusionary effects of food quality standards for small producers.[22] This section takes a closer look at how problematic exclusion really is. For this purpose, we examine on which specific markets exclusion due to non-compliance plays a role, and which alternative markets exist.

Various surveys suggest that the export market is divided into three different standard levels: Scandinavia and the UK at the top, the remaining EU countries in the middle, and non-OECD countries at the bottom as low-standard markets (Aloui and Kenny, 2005, 16; Jaffee, 2003, 16). Chemnitz (2007) explores the exclusionary effects on the Moroccan tomato export market. Exports to high-level countries are only possible with EUREPGAP certification, and for the UK only with even higher standards such as "Nature's Choice" and "From Farm to Fork". Exporters to medium-standard countries have not until now faced any sanctions or pressure if they are not certified. However, all producers interviewed in that survey expect to encounter problems in marketing non-compliant products in the future.

According to Berdegué et al. (2005) and Reardon (2005), food standards are becoming increasingly important for national markets in developing countries as well. This development is induced by the rapidly increasing importance of supermarkets in developing countries' markets. Several case studies place particular focus on the restructuring of national and regional markets and describe this process in developing and transition countries (Reardon et al., 2003; 2004; Swinnen, 2005). Various authors observe a market segmentation in which

[22] For example Gibbon, 2003, 615; Calvin et al., 2004; World Bank, 2005, xviif., 39, 97, 103, 112; Hatanaka et al., 2005, 361-362, 366; Giovannucci and Ponte, 2005, 298-299; OECD, 2005, 56; Kleinwechter and Grethe, 2006, 14; Shepherd, 2005, 10; Swinnen, 2005, 45; Pingali et al., 2005, 2; Maertens, 2006, 5.

smaller producers are selling to less demanding but also less profitable markets (Hatanaka et al., 2005, 361, 366; Manarungsan et al., 2005, 1).

In summary, exclusion effects can be observed on many markets and, owing to the globally increasing demand for high-standard products, alternative markets are shrinking even in developing countries in the long run (Moriarty et al., 2007; Traill 2006). This trend raises the question as to whether empirical evidence on poverty effects of market exclusion exists.

Recent studies emphasize the diverse effects of standards on poverty (Humphrey et al. 2004; Minten et al., 2006; Maertens, 2006). Based on a simulation model, Humphrey et al. (2004) argue that a shift away from smallholder production may have a poverty-reducing impact due to increasing employment on large farms. Maertens supports this conclusion and provides empirical evidence. One of the major findings of her survey is that high-standard agricultural trade is "an engine of pro-poor growth" in the Senegalese French bean sector (Maertens, 2006, 9). Increasing wage employment is found to provide income for the poorest households, while the reduction of contract farming concerns households which are relatively better off. Strengths of this study include the large sample size and the econometric consideration of a potential sample selection bias in isolating the effect of participation in a high value chain as contract farmer or as farm employee. Minten et al. (2006), on the other hand, provide evidence that 10,000 producers from the highlands of Madagascar have now entered the high-quality fruit and vegetable market of the EU, creating a new niche market. Small farmers who participate in this market have higher incomes and more income stability. In all three surveys, sectors have become increasingly competitive and have increased their international market share because they offer high-value production. This may be particularly important in interpreting the results by Maertens and Swinnen (2006), Maertens (2006) and Minten et al. (2006), who find a poverty-reducing effect of trade which is subject to high quality standards.

4 Conclusions and Future Research Needs

There is widespread concern that small producers in developing countries are negatively affected by the increasing importance of quality standards on international as well as national markets. In this article, we develop a conceptual framework to analyse this concern. We distinguish four analytical questions: do small producers in developing countries comply with quality standards independently, whether as individual farmers or in farmer groups? If not, do farmers receive support with compliance from downstream actors in the value chain? If they

do, is the resulting dependency problematic? And finally, if farmers do not comply, is their market exclusion problematic?

The concept of "small farmers" as applied in this paper and in several case studies is a relative one. Empirical evidence shows that so-called small farmers in developing countries producing for export markets may be neither small compared to producers for the domestic market, nor small in absolute terms (e.g. Chemnitz, 2007; Kleinwechter, 2005). In addition, the properties which disadvantage farmers in compliance and which are often associated with "small farmers", such as low production technology and efficiency as well as weak integration into the marketing chain, are only loosely related to physical farm size, especially when taking into consideration the small producers of the exporting sector.

On a theoretical basis we show that small farmers could well have a comparative disadvantage in complying with quality standards owing to their specific endowments, which hamper their ability to acquire information on the standard and to implement it. We structure the non-recurrent and recurrent components of the costs of compliance involved in a standard, and show how the properties of small farmers may result in higher costs of compliance than for large farmers. In addition, from a downstream actor's perspective, working with many small farmers instead of a few large ones may be less attractive owing to higher transaction costs.

In contrast to the concerns resulting from theoretical and plausibility considerations, relatively little empirical evidence can be extracted from the literature. Few studies analyse the compliance process of small producers in any detail. The studies reviewed here hint that small and medium producers rarely comply without support from downstream actors. In the case of well-educated and relatively wealthy farmers, forward integration is also found, but there is no empirical support for the intuitively appealing hypothesis of lower cost of compliance per unit of output for large producers. This may be due to problems of measurement, for example owing to the assumption of part of the costs by downstream actors. This issue requires more detailed research. More empirical work is also needed with respect to the effect of group certification on the cost of compliance, which is considered to be a promising alternative for small producers in particular, but for which there is as yet no empirical data.

Many case studies report that downstream actors such as exporters are supporting small farmers in the compliance process. This support can range anywhere between a low and a very high level, resulting in the downstream actor playing an important role in farm

production and management. There is, however, little empirical evidence as to why downstream actors act in this fashion, and how this affects power and value-added distribution along the value chain.

For some countries and sectors, there is some empirical evidence on the exclusion of small farmers from high-standard markets. Nevertheless, there is little evidence on how problematic such forms of exclusion are. Various alternatives could well exist, such as production for other markets, a shift to other products or wage employment in the high-standard production sector or elsewhere. Only few studies explicitly address the income effects of such alternatives which may also be caused by the econometric challenges resulting from a potential sample selection bias in comparing different groups of actors. Two of the studies reviewed here identify a strongly increasing level of wage employment as a result of the development of high-standard markets, which has a positive effect on income distribution and poverty. Indeed, "small" contract farmers are excluded from export markets, yet they still constitute a more wealthy group than those who earn their wages on larger farms. Evidence is still too thin to draw any general conclusions, but the facts so far certainly do not suggest that high standards generally cause income distribution to deteriorate or that they increase poverty.

In light of the limited empirical evidence, there is much scope for further empirical in-depth case studies. Extremely interesting aspects that should be examined are the motives of downstream actors in supporting small farmers, and how this impacts the position of small farmers in the value chain. As both compliance with a standard and vertical coordination are dynamic processes, one promising approach would be to build an analysis using panel data sets capable of reflecting developments over time. From a development policy perspective, it is especially interesting to identify the institutional and structural requirements that allow the poor, irrespective of whether they are small farmers or employed on larger farms, to benefit from the development of high-quality standards markets.

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C Case Study Part I: EU Trade Preferences for Moroccan Tomato Exporters – Who Benefits?

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EU Trade Preferences for Moroccan Tomato Exports – Who Benefits?

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We are grateful to the European Commission and to the Swiss Federal Customs Administration for making unpublished data available, and to many interview partners in Morocco for their readiness to share their knowledge. In addition, we would like to thank staff members of the European Commission for answering our questions and discussing our results.

Abstract: The EU applies a complex system of preferences for tomato imports from Morocco. Quantities are fixed and serve as entry price quotas and tariff rate quotas at the same time. This paper provides empirical evidence of i) the existence of an economic rent under the EU preferential scheme for tomato imports from Morocco of about €22-37 million per year, and ii) the distribution of that rent. Due to the structure of the Moroccan export sector as well as the EU method of allocating import licenses, it is likely that a large part of the quota rent ends up on the Moroccan side, and that dissipation of the rent in physical rent-seeking activities is limited.

Keywords: Morocco, tomatoes, trade preferences, Euro-Mediterranean Agreement, tariff rate quota, entry price, quota rent. JEL Q17, F14.

1 Introduction

The EU has notified the World Trade Organization (WTO) of 20 bilateral trade agreements with non-EU Member States which are currently in force (WTO, 2007). Under these agreements the EU grants limited preferential access to its agricultural markets for various countries and country groups (see Grethe (2005) for an overview). Morocco is covered by the Euro-Mediterranean Partnership and has substantial preferential access to selected EU agricultural markets under its Euro-Mediterranean Association Agreement with the EU. As the only country in the world in this position, Morocco may export tomatoes under a preferential entry price to the EU. From the Moroccan perspective, tomato exports are of special importance due to their high share in agricultural production and trade. In 2004/2005 tomatoes provided more than 11% of Morocco's agricultural export value, and the sector has had a value share of almost 30% in total preferential exports to the EU in recent years (Grethe et al., 2005). From an EU perspective, Moroccan tomatoes are of special interest because they stand in direct competition to domestic production, especially in Spain.

Often preferential access is granted limited by tariff rate quotas (TRQs), which result in an economic rent if they are filled or overfilled. If the above-TRQ tariff rate is prohibitive, the effects are equal to an import quota and an economic rent arises, because the marginal cost of supplying the imported good is below the selling price on the EU market. This mechanism and the potential distribution of the resulting rent have been discussed in general terms by various authors (Skully, 2001; Abbott, 2002; de Gorter and Kliauga, 2005), as well as more specifically for the countries covered by Euro-Mediterranean Agreements (Grethe et al., 2005), based on theoretical considerations. Empirical analyses of the existence and distribution of such rents, however, are rare. A variation of the TRQ is the entry price quota (EPQ) which the EU grants to a handful of developing countries for selected fruit and vegetables, *inter alia* tomatoes from Morocco. For much of the year, EU most favoured nation (MFN) entry prices (i.e. for countries for which no preferential trade policies apply) for tomatoes prohibit exports to the EU below the entry price level. Lower preferential entry prices granted within an EPQ allow for limited exports to the EU.

This paper provides empirical evidence of i) the existence of an economic rent under the EU preferential scheme for tomato imports from Morocco, and ii) the distribution of that rent. Preferential access to EU agricultural markets is often claimed to be motivated by

development interests, and the distribution of the resulting rents is therefore of special interest.

The paper is organised as follows. In Section 2, the institutional framework under which tomato exports from Morocco to the EU take place is described, providing first an overview of the EU MFN import policies for tomatoes as well as for tomato imports from Morocco, plus a description of the structure of the Moroccan tomato export sector. Section 3 then examines the EPQ from a theoretical point of view, deriving research questions and *a priori* hypotheses on the existence and distribution of an economic rent resulting from EU policies. Section 4 empirically examines these hypotheses, and explores different methods that could provide evidence of an economic rent. Finally, some light is shed on the distribution of the resulting rent based on interviews with various participants in the marketing chain for Moroccan export tomatoes. Finally, Section 5 draws some conclusions and discusses the potential future development of the quota rent.

2 Institutional Framework for Moroccan Tomato Exports to the EU

2.1 EU Import Market Barriers: Tariffs, Entry Prices and Preferences for Morocco

The EU applies two different MFN import policies for tomatoes: *ad valorem* tariffs and the entry price system. The *ad valorem* tariff is at a relatively low level and varies seasonally between 8.8 and 14.4%.

The entry price system is applied by the EU for many fruits and vegetables that are considered particularly sensitive, and effectively establishes minimum import prices. If the CIF import price of a shipment is below the entry price, the entry price system provides an opportunity to invoke gradually specific tariffs, in addition to *ad valorem* ones. If the imported good comes in at an import price not more than 8% below the entry price, the additional tariff will equal the difference between the import price and entry price. If the import price is more than 8% below the entry price, the full WTO-bound specific tariff, which is much higher than the *ad valorem* tariff, will be charged. This “eight percent rule” is a prohibitive import barrier for most imports below 92% of the entry price, because of the high level of the maximum specific tariffs. Table 1 shows the seasonal variation of *ad valorem* tariffs, entry prices and specific

tariffs which the EU applies to MFN imports of tomatoes as well as to preferential imports from Morocco.

Table 1: MFN and Preferential EU Tariffs and Entry Prices (2004/2005)

		Ad Valorem Tariffs (%)			Entry Prices			Specific Tariffs	
	EPQ 2004/05 (tons)	MFN	Morocco		MFN (€/t)	Morocco		MFN (€/t)	in % of MFN entry price
			in EPQ	Above EPQ		(€/t)	% of MFN		
Oct.[a]	10,000	14.4	0.0	14.4	626	461	73.6	298	47.6
Nov.[a]	26,000	8.8	0.0	8.8	626	461	73.6	298	47.6
Dec.[a]	30,000	8.8	0.0	8.8	626	461	73.6	298	47.6
Jan.[a]	30,000	8.8	0.0	8.8	846	461	54.5	298	35.2
Feb.[a]	30,000	8.8	0.0	8.8	846	461	54.5	298	35.2
Mar.[a]	30,000	8.8	0.0	8.8	846	461	54.5	298	35.2
April[a]	15,000	8.8	0.0	8.8	1126	461	40.9	298	26.5
May[a]	4,000	14.4	0.0	14.4	726	461	63.5	298	41.0
June	-	14.4	-	5.76	526	-		298	56.7
July	-	14.4	-	5.76	526	-		298	56.7
Aug.	-	14.4	-	5.76	526	-		298	56.7
Sept.	-	14.4	-	5.76	526	-		298	56.7

[a] Plus a conditional quota of 25,000 tons which may be used up to the amount of 30% each month, from November to May (for further details, see below).

Sources: European Union (various issues): OJ L345/121, 31.12.2003; OJ C103A, 30.04.2003; European Commission (2007a), own calculations.

Table 1 shows that MFN *ad valorem* tariffs are highest from May to October, while MFN entry prices are low compared to other periods during this time. This seems somewhat odd, as low entry prices in the summer months obviously reflect low EU prices during the main EU production season, and third-country exporters have no comparative price advantage in this period. Consequently there is no need to protect national producers by high entry prices. Nonetheless and somewhat inconsistently, the *ad valorem* tariff is highest during that season. MFN entry prices are highest in the winter months, peaking in April. This reflects the objective of protecting EU producers of winter tomatoes from other countries that adjoin the Mediterranean Sea and which have a comparative advantage and could therefore depress EU tomato prices. The country with the greatest interest in high prices during wintertime is Spain, as the largest producer of early tomatoes in the EU. The main Spanish production areas are

allocated in the regions of Almeria, Murcia, Alicante and the Canary Islands, where temperate climates allow the production of greenhouse tomatoes from October to May. In the region of Almeria and on the Canary Islands, the production season overlaps almost exactly with the production season of export tomatoes from Morocco.

Table 1 also shows that the maximum specific tariffs for tomatoes are much higher than the *ad valorem* tariffs, and sum up to 26.5 to 56.7% of the entry price. The entry price system therefore provides a strong incentive not to undercut the entry price level.

Additionally, Table 1 indicates the preferential treatment of tomato exports from Morocco to the EU in the marketing year 2004/2005. The relevant Protocol (OJ L345/121, 31.12.2003) establishes an EPQ of 190,000 tons for tomatoes originating in Morocco to be eligible for import at a preferential entry price of €461/t. This quantity can be imported without any *ad valorem* duty from October to May. Therefore, the EPQs are at the same time TRQs because, in addition to reduced entry prices, the *ad valorem* duty rate is also reduced (to zero). For simplicity, the respective quantities are designated throughout the text as EPQs, as the entry price reduction is the effect which dominates the reduction of the *ad valorem* tariff. From June to September (the main production season in the EU) the MFN entry price applies and the MFN *ad valorem* tariff rate is reduced by 60%.

The total quota (which can be exceeded by 1%) applies to a given marketing year, which is specified in the Euro-Mediterranean Agreement (OJ L70/02, 18.03.2000) as running from 1 October to 30 September. The quota is divided into monthly quantities. The marketing year starts in October with an EPQ of 10,000 tons. The period with the largest quotas is from December to March, with 30,000 tons in each month. If imports from Morocco undercut the relevant entry price level, the EU entry price system mechanisms described above come into force. The EPQs under the preferential price system, as well as TRQs for fruits and vegetables in general, are administered by the EU on a "first-come, first-served" basis: the import quantity is controlled at the border, and if the EPQ is exceeded, above-quota policies apply for the rest of the month. While Morocco guaranteed that it would not exceed the given annual quantity under a voluntary self-restraint (VSR) as part of the Euro-Mediterranean Agreement in the past (OJ L 305/20, 21.11.2001, Article 2; see also Council Regulation 2264/2001), it now has the opportunity to exceed the annual quantity of the EPQ by exports under MFN conditions (OJ 345/121, 31.12.2003). An incentive for Morocco not to exceed the annual EPQ is an additional quota which applies to the following marketing year should the basic quantity of the given year not be exceeded by more than 1%. If the EPQ is not adhered to, the

additional quota for the following year is notably lower than when the conditions are complied with. Since the marketing year 2003/2004, the additional quota started at 15,000 tons, and the quantity is augmented by 10,000 tons each year when the EPQ is complied with. If, however, Morocco exceeds the EPQ in any marketing year, the additional quota diminishes by 20,000 tons beginning in 2004/2005. The additional quota applies from 1 November to 30 May, but Morocco is not allowed to use more than 30% of the additional quota during any month.

The status of EU preferences for Morocco presented above depicts the current situation. The origin of trade preferences for Morocco dates back to its close relationship with France and has its roots in colonial history. Upon independence in 1956, the Moroccan vegetable market was largely integrated into the French market (Aloui, no year). Preferential access conditions have been regulated since then by France and later by the EU. Preferential agreements for tomato exports from Morocco have been revised several times. One large step was the negotiation of the Euro-Mediterranean Agreement, which was signed in 1995 and entered into force in 2000. Under the initial Agreement, Morocco received a preferential EPQ of 150,676 tons from October to March (OJ L70/02, 18.03.2000). Since then the preferential import quantity and the import period have been revised almost every year.

2.2 Structure of the Moroccan Tomato Export Sector

The agricultural sector in Morocco plays an important economic and social role. As shown in Table 2, the share of agriculture in total GDP has varied in recent years between 15 and 17%, mainly depending on rainfall in the production season. The value of total agricultural production was about €5.7 billion on average in 2004 and 2005 (own calculations; World Bank, 2007). Aside from the high economic importance of the sector, its social importance results from its high share in employment of the rural population. About 80% of the working rural population is employed in the agricultural sector, of which 22% in the horticultural sector (WTO, 2003).

Table 2: Production and Exports of Tomatoes Compared to the Size of the Agricultural Sector and the Economy as a Whole

		1994/1995	2004/2005
(1)	**Share of agriculture in GDP (%)**	16.6	15
(2)	**Value of agricultural production (mill. €)**	4,030.0	5,711.0
(3)	**Value of green house tomato production (mill. €)**	114.0[a]	239.0[a]
(4)	**Quantity of tomato production (1,000 t)**	737.0	1,209.0
(5)	**Quantity of greenhouse tomato production (1,000 t)**	320.0	535.0
(6)	**Value of total exports (mill. €)**	3,405.0	8,060.0
(7)	**Value of agricultural exports (mill. €)**	527.0	909.0
(8)	**Value of horticultural exports (mill. €)**	157.0[b]	223.0
(9)	**Value of tomato exports (mill. €)**	48.0	91.0
(10)	**In % of total exports**	1.4	1.3
(11)	**In % of agricultural exports**	9.1	10.1
(14)	**In % of horticultural exports**	30.1	41.2
(15)	**Quantity of Moroccan tomato exports (1,000 t)**[c]	168.0	175.0
(14)	**Of which to the EU (%)**	87.8	90.6
(17)	**Of which to Central and Eastern Europe (%)**	4.1	4.4
(18)	**Of which to Switzerland (%)**	2.9	4.9
(19)	**Of which to other destinations (%)**	5.2	0.1

[a] Own calculations based on Eurostat data for the years 1995/1996 and 2004/2005, [b]1998, [c]average marketing years 1993/1994-1994/1995 and 2003/2004-2004/2005.

Sources: World Bank (2005a) for GDP and total production value, EACCE (2007) for destination of exports, FAO (2007) for quantity of tomato production, APEFEL (2005) for production of greenhouse tomatoes, Office des Echanges for value of horticulture products exports, Eurostat (various issues) for IUV, own calculations.

Aside from livestock breeding and wheat production, the most important segment of the agricultural sector is horticulture, within which tomato production plays the most important role. The production value of greenhouse tomatoes averaged €114 million in 1994/1995 and increased to almost €240 million in 2004/2005. The total produced quantity of greenhouse tomatoes has also increased in recent years, rising from less than 200,000 tons in 1992/1993 to about 320,000 tons in 1994/1995, and reaching 535,000 tons in 2004/2005.

Agricultural goods play an important role in the Moroccan export sector. In 2004/2005, total exports had an annual value of more than €8 billion, while the share of agricultural products stood at 11%. Tomatoes rank fourth on the Moroccan export list of agricultural goods, with an annual export value of €91 million in 2004/2005 (immediately behind mandarins, oranges and olives). The export value of tomatoes is about 10% of the total agricultural export value, and in 2004/2005 the export of tomatoes covered more than 40% of the export value of horticultural products, which account for €223 million or 25% of agricultural exports.

In the marketing years 2003/2004 and 2004/2005, Morocco exported about 91% of its total tomato exports to the EU (EACCE, 2007). Within the EU, more than 79% of these tomatoes were delivered to France, followed by Spain (4%) and Italy (1.7%) (own calculations; EACCE, 2007). Other important export destinations for Moroccan tomatoes are central and eastern European countries, which accounted for 4.4% of total Moroccan tomato exports, and Switzerland (4.9%).

Even though Morocco has a long history of vegetable exports, the sector underwent a significant change in 1986 when the national export monopoly was liberalised. Since then, many producers have started production and the total area of greenhouse tomatoes in Morocco has increased, reaching 3,920 ha by 2004/2005 (see Table 3). About 90% of the area is located in the southern Atlantic coastal strip in the region of Souss Massa, in which 93% of total production originates (APEFEL, 2005). The high level of concentration in this region is related to the availability of relatively cheap land and favourable weather conditions for the production of early tomatoes.

The Moroccan agricultural sector comprises about 1.5 million farms (WTO, 2003), of which about 8,000 produce early vegetables and only 400 produce export tomatoes. As shown in Table 3, around 30% of tomato producers are small-scale farmers who cultivate less than 5 ha. Their production area represents only about 5-10% of the total production area for early tomatoes. The majority of producers cultivate an area between 5-20 ha. Farms in this group cultivate around 50% of the total tomato area. Only 10-15% of all farms are larger than 20 ha, although these represent around 40% of the early tomato area.

Table 3: Structure of the Moroccan Export Tomato Sector

(1)	**Number of total export vegetable producers**		8,000
(2)	**Number of total export tomato producers**		400
(3)	**Area of vegetable production in greenhouses**		30,000 ha
(4)	**Area of export tomato production in greenhouses**		3,920 ha
(5)	**Farm size**	**% area**	**% farms**
(6)	**Farm size from 0-5 ha**	5-10	30-35
(7)	**Farm size from 5-20 ha**	45-55	50-55
(8)	**Farm size larger than 20 ha**	35-40	10-15
(9)	**Number of farmer cooperatives producing tomatoes**		Ca. 40
(10)	**Number of export groups exporting tomatoes**		Ca. 12-15
(11)	**Share of the three largest export groups in total exports**		70%

Sources:APEFEL (2007) for the number of total export vegetable producers and the area of vegetable production in greenhouses; APEFEL (2005) for the area of tomato production in greenhouses; own interviews in 2005 for farm size, number of tomato producers, cooperatives, and export groups; and own calculations.

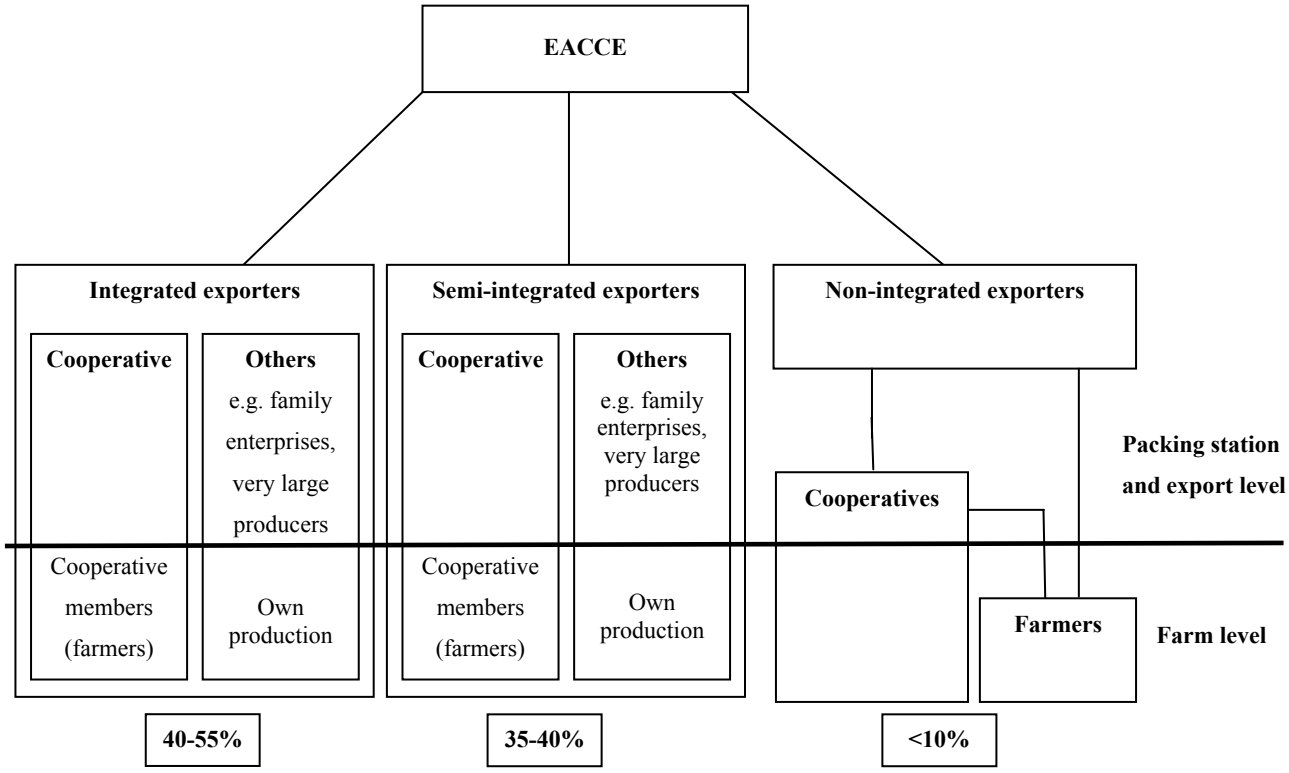
The production and marketing chain can be subdivided into three major levels: the production or farm level, the processing level and the exporting level. As depicted in Figure 1, the structure of the Moroccan export sector is highly integrated. The largest part of production, between 40 and 55%, is produced in completely integrated export structures. The integrated exporters take two different organisational forms. The first type is dominated by tomato producers of various sizes which are organised in farmer cooperatives at the packing stations level. Most cooperatives own, depending on their size, one or more packing stations, which provide technical services for packing and wrapping before the tomatoes are exported. Different cooperatives unite to form export groups. Producers join cooperatives and export groups to reach a higher organisational level and consequently improve their negotiating position in the marketing chain. The packing stations, cooperatives and export groups play an important intermediate role in the marketing chain between producers and different players in the export process. The packing stations are the most important source of information for producers and, if set up as cooperatives, organise the marketing process for their members. The task of these export groups is to organise all the logistics, such as transportation, the purchase of production inputs and the negotiations with banks and other actors in the sector.

The second type of integrated exporters is enterprises that cover all levels of the production and marketing chain, and only process and export products from their own farms.

The second important organisational form within the sector is that of semi-integrated exporters. These are large enterprises which own private packing stations where the products

of their farms are processed. Additionally, these enterprises process and sell tomatoes of other producers on a commission basis. 35 to 40% of total early tomatoes are sold by semi-integrated exporters, and 70% of the total exported tomatoes can be traced back to just three export groups, of which two are integrated and one has a semi-integrated structure.

Figure 1: The Structure of the Moroccan Tomato Export Sector



Source: Own expert interviews.

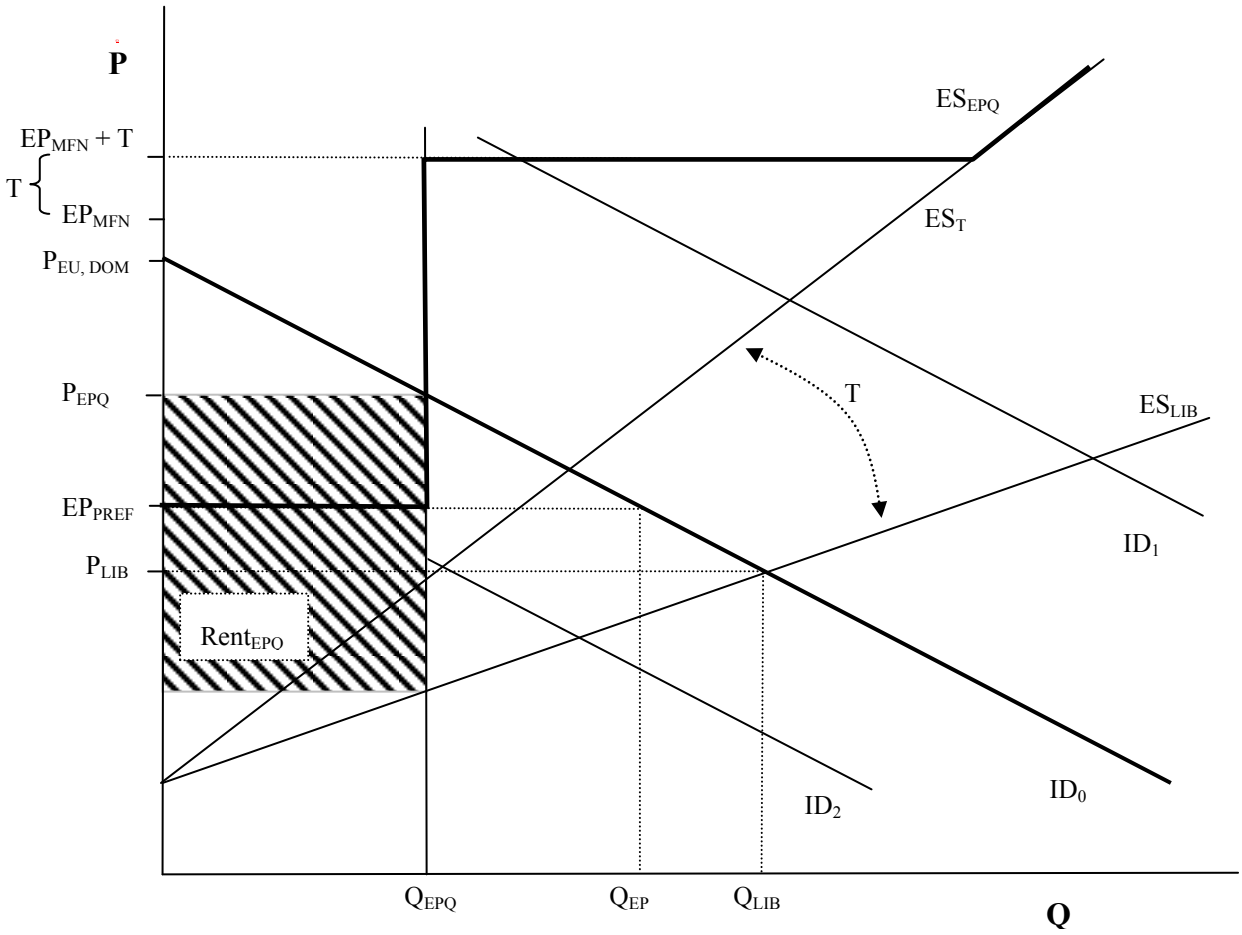
The last and least important organisational form is that of non-integrated exporters, which account for less than 10% of all exported early tomatoes. These exporters take tomatoes from cooperatives or from individual farmers on a commission basis. According to several statements by interviewees, the importance of this organisational form is likely to decrease still further in the near future.

The overall organisation of the export market of fruits and vegetables in Morocco is controlled by the EACCE (Etablissement Autonome de Contrôle et de Coordination des Exportations; the Public Export Control and Coordination Authority), which was founded in 1986 when the national export monopoly was liberalised. The EACCE controls and ensures compliance of Moroccan products with international and bilateral regulations in terms of quantity as well as quality. Furthermore, it functions as an important source of information for Moroccan producers, processors and exporters.

3 *A Priori* Hypotheses

The first *a priori* hypothesis is that the EPQ is binding. Otherwise Morocco would not have put so much effort into repeatedly negotiating increments (see above). Second, if the EPQ is binding, a rent results: the marginal cost of supplying Moroccan tomatoes to the EU is below their selling price in the EU. Again, this is supported by the sustained efforts of Morocco to increase the EPQ. But no *a priori* assumptions exist on the size of the quota rent, which we try to quantify in this paper. Figure 1 depicts a potential quota rent.

Graph 1: Potential Rent Resulting from an EPQ



Source: own illustration

Graph 1 shows a scenario in which the EU MFN entry price level (EP_{MFN}) is set above the level of domestic price equilibrium ($P_{EU\ Dom}$), which matches the EU import demand curve ID_0, so that no imports occur at MFN conditions. A reduced entry price (EP_{PREF}) which is granted together with an abolition of the tariff is set at a level below the domestic EU price

equilibrium, but above the price level which would occur with completely liberalised trade (P_{LIB}). With the export supply curve of the preferential supplier at ES_{LIB}, and without any further restriction, the domestic price level in the EU would thus be EP_{PREF} and the imported quantity would be Q_{EP}. But an EPQ is set at Q_{EPQ} such that the resulting EU price is P_{EPQ}. In this scenario, the quota rent is the price difference between the export supply curve at Q_{EPQ} and EP_{PREF} multiplied by Q_{EPQ}.

The resulting export supply curve of the preferential supplier (ES_{EPQ}), which includes the effects of policies, starts at EP_{PREF} and takes a horizontal course up to Q_{EPQ}, from where on it runs vertically until the level of the MFN entry price plus the MFN tariff. This is the price level at which an unlimited quantity would be allowed to enter the EU market: the export supply curve thus runs horizontally until it meets the export supply curve without the effect of the entry price system but including the tariff (ES_T), from where on it joins ES_T.

Unlike the domestic market constellations reflected in ID_0, which result in an exact fill of the EPQ, alternative domestic supply and demand constellations as reflected in import demand curves ID_1 and ID_2 are possible. ID_1 shows a higher import demand, which results in imports at MFN conditions exceeding the EPQ level and a domestic EU price at EP_{MFN} + T. ID_2 reflects a lower import demand with the domestic EU price at the EP_{PREF} and an EPQ underfill. In both situations the rents resulting from the import system, which are not depicted in Figure 1, can be calculated as the vertical distance between ES_{LIB} and the respective price level multiplied by the respective export quantity.

A third hypothesis based on the institutional framework described above is that a large part of the rent accrues to the Moroccan part of the marketing chain. This is because the "first-come, first-served" system of license distribution does not give EU importers any negotiating power, in contrast to the "license on demand" system, which the EU applies to most other products under which licenses are only distributed to EU importers. This leaves the question as to which participants in the Moroccan marketing chain receive the rent. Without any additional knowledge, two alternative *a priori* hypotheses are formulated:

1. The rent is dissipated in rent-seeking activities. Principally, the first-come, first-served system provides an incentive to export early for trading companies, in order to increase their share in the quota (Skully, 2001). If there is no coordination, then the rent can be expected to end up, for the most part, in the pockets of the owners of those factors/resources which restrict the possibility to trade early in the respective period.

As the EPQ is fixed for monthly periods, this could, for example, primarily benefit the owners of transportation capacity at the beginning of the month. In an extreme scenario, the efforts of producers and traders to be early could lead to marginal costs increasing to the extent that the initial quota rent fully dissipates.

2. The Moroccan export sector acts like a cartel. As the tomato-exporting sector in Morocco is relatively concentrated and well organised (see above), an alternative option could be a cartel-like division of EPQ shares among traders as well as producers. Such a coordinated process could be based on many factors, including historical market shares, readiness to pay to the coordinating unit, and so on.

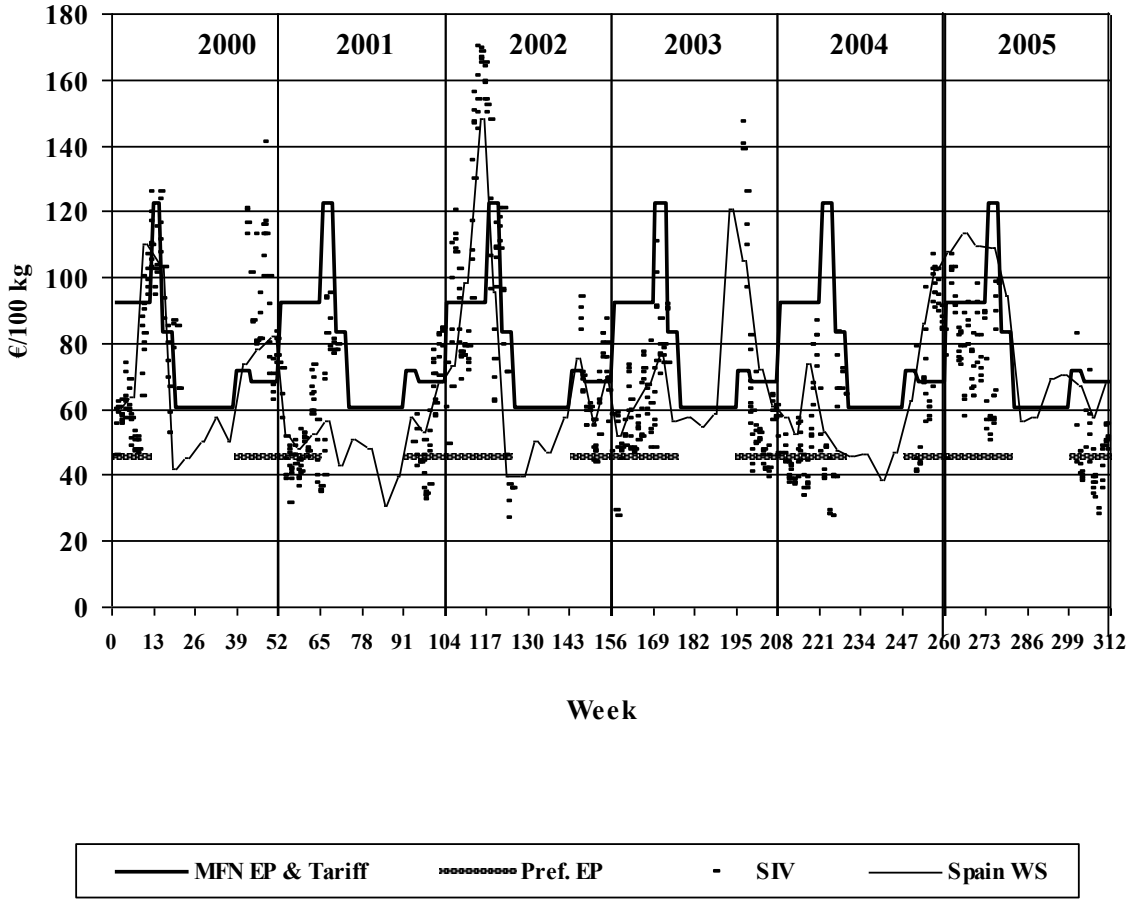
4 Results

4.1 Is the EPQ Binding?

To determine whether the EPQ is binding, it was first necessary to establish whether the entry price reduction allows tomato exports from Morocco to enter the EU. To this end, Graph 2 displays weekly MFN entry prices, preferential entry prices, Moroccan Standard Import Values (SIVs) as reported by the European Commission as indicators for the Moroccan import price, and Spanish wholesale prices (WP) for the period 2000-2005.

The MFN entry price plus the *ad valorem* tariff for tomatoes is higher in winter than in summer and reaches its peak in April. Furthermore, Graph 2 shows that the preferential entry price for Morocco in the winter months is considerably lower than the MFN entry price. The SIV of Moroccan tomatoes, which is the average of observed wholesale market prices for Moroccan tomatoes in the EU minus a marketing and transportation margin, is between the MFN and the reduced entry price in 55% of all observations. In such a situation it is the reduced entry price which allows for importation. In about 21% of all cases, however, Moroccan SIVs are below the preferential Moroccan EP. In such cases, additional duty must be paid or importation must take place according to alternative procedures. These procedures require the proof that the final selling price on the EU market of the shipment concerned is above the EP level (for details, see Goetz and Grethe, 2007). In 25% of observations, SIVs are above even the MFN entry price level. In those cases, the preferential entry price is not relevant to Morocco, as even the MFN entry price is not restricting. This occurs in situations in which the EU price level for tomatoes, which is indicated by the Spanish average wholesale price in Graph 2, is especially high.

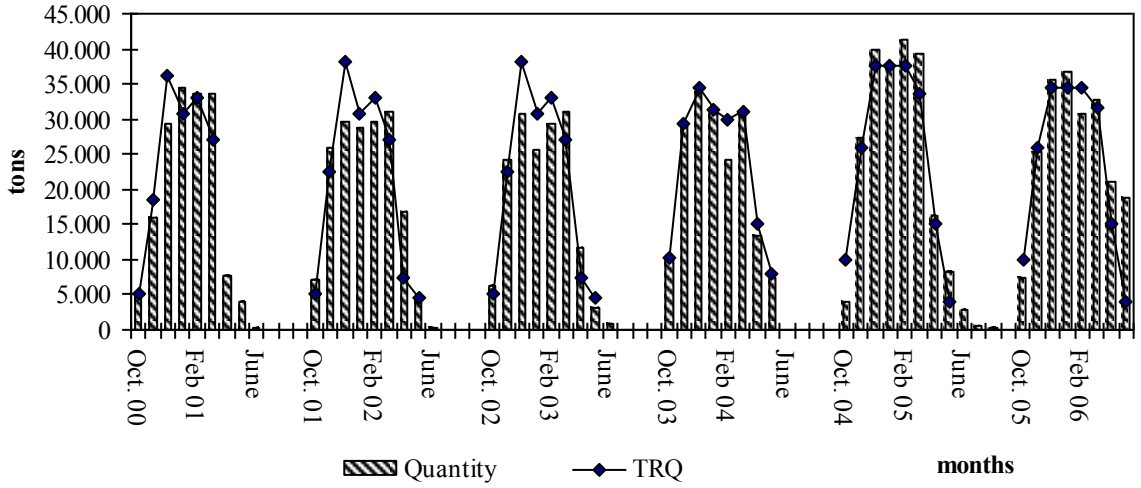
Graph 2: Weekly Entry Prices, Moroccan SIVs and Spanish Wholesale Prices for Tomatoes in the Period 2000-2005



Sources: European Commission (2007a, b, c), own calculations.

Thus it can be said that indeed for large parts of the high season of Moroccan tomato exports to the EU, it is the preferential price which allows for imports from Morocco. To check the extent to which Morocco makes use of the EPQs, Graph 3 depicts monthly EU import quantities of Moroccan tomatoes compared to the size of EPQs for each month.

Graph 3: Monthly EU Import Quantities and EPQs for Moroccan Tomatoes, 2000/2001-2005/2006



Sources: Eurostat (various issues), OJ L70/02, OJ L305/20, OJ L345/121, own calculations.

Graph 3 shows that, on average, EPQs are binding. While in some months Morocco does not completely fill the EPQs, in other months they are exceeded. The graph shows that, for example, from 2000 to 2002 the quota was not fully used in December, whereas it was exceeded in March and April from 2001 until 2003. In part, these irregularities result from the fact that Morocco can reallocate monthly EPQs up to 20% between months (see above). In some years Morocco did exceed its total annual quota. In 2001/2002, the total imported quantity was 172,858 tons and consequently exceeded the total limit of 168,757 tons of the EPQ by 4,101 tons, even though Morocco had guaranteed that total imports in a marketing year would not exceed the EPQ.

The graph also depicts that in all marketing years from 2000/2001 to 2002/2003, in the first period of the marketing year (October to February) total imports did not exceed the limit of the given EPQ. Consequently, the conditional contingency came into force which was then surpassed in all years. This is because the additional EPQs for April and May were granted only if total imports from Morocco did not exceed the given limit of the EPQ in the first period of the marketing year. This mechanism leads to the observation that the EPQ was only respected in the first part of the marketing year, and not adhered to in the second part of the year after the additional quota became relevant. Exceeding the quota had no negative effects for the next marketing campaign, and consequently there was no incentive not to exceed the EPQ subsequently. As an example, in the marketing year 2001/2002, the total basic EPQ of 156,676 tons was not exceeded, but the conditional contingent was surpassed by 9,433 tons.

From the marketing year 2003/2004 onwards, the rules were changed as described above and the total quota was not exceeded. In the following marketing year 2004/2005 Morocco surpassed its total given quota by 6.4%. As a consequence, the additional quota of the marketing year 2005/2006 was reduced by 20,000 tons. Hence, Morocco had an additional quota of only 15,000 tons rather than 35,000 tons.

The relevance of the additional EPQ for the Moroccan export sector between May and April becomes more apparent when the price situation in the EU during this portion of the year is examined closely. Graph 2 depicts a strong correlation between the Spanish wholesale price (which indicates the EU price level) and the Moroccan SIV. In all five years (2000-2005), from March to May, Spanish wholesale prices as well as Moroccan SIVs are low. This price drop is related to the beginning of the open-field tomato production season in the Mediterranean part of the EU. Due to the low price level in the EU, Morocco as a extra-EU country is no longer able to sell its tomatoes on the EU market at MFN entry price level. Consequently, Moroccan tomato exports highly depend on the preferential entry price during this time of the year. As a result, the additional EPQ is of special interest for Morocco and provides a strong incentive to respect the EPQ during the rest of the marketing year.

4.2 Does a Rent Exist?

There are three different ways of determining a potential rent. First, one can check whether the selling price on the EU market (minus the differential marketing cost) is above the selling price on the domestic Moroccan market. Second, one can compare the marginal cost of selling to the EU market to the selling price on the EU market, as lower marginal production costs would indicate the existence of a rent. And third, one can compare selling prices to prices in other countries in which imports are not subject to quantitative restrictions. Unfortunately, the first option is not feasible because the quality that is comparable to that exported to the EU is usually not sold on the domestic market. The remaining two options and the respective results are described in detail below.

4.3 Comparing Production Cost to Selling Price

The determination of the marginal production cost is based on the assumption that the marginal cost at sector level equals the average cost, and that the marginal cost can thus be measured as the average cost of an efficient producer. This assumes that the expansion of current production is possible without incurring higher private costs, e.g. for land, irrigation or

labour, which seems realistic in the current situation in which the area available and labour are abundant, and water is not priced according to its social cost (see below).

The survey of production costs revealed that this topic appears to be a very sensitive issue for Moroccan interviewees. Recently Morocco has participated in new negotiations for a possible extension of EPQs. Given that Morocco is the most important competitor of Spanish greenhouse production, it is more opportune, from a Moroccan perspective, to claim high production costs. As only very few surveys about production costs are available and are moreover relatively old, the determination of production costs is mainly based on interviews with various exporters and other experts in the sector. Table 4 provides an overview of the different cost components of the Moroccan export tomato sector.

Table 4: Production and Exportation Cost of Tomatoes

On farm production cost	**€/kg tomatoes**
Sources:	
APEFEL survey 1997	0.18
Average reported by exporters[a]	0.18
Range reported by exporters	0.15-0.22
Applied in further calculations	0.18
Corrected production cost	0.23
Exportation cost	
Processing cost	0.15
Transport cost	0.18
Total cost in Perpignan	0.56

[a] Interviews with five exporters in 2005.

Sources: APEFEL (1997), own interviews with exporters, own calculations.

The first rows of Table 4 depict the production cost in Morocco without any further processing or transport cost. According to different sources, the production cost lies between €0.15 and €0.22/kg. To this must be added an additional amount because not all greenhouse tomatoes produced for export are in fact exported on quality grounds, with part of the total production sold on the national market at prices below production cost. The loss thus depends on two variables: the share of production which has to be marketed on the domestic market, and the difference between the domestic price and production cost. Information on these variables varies from one source to the next. One survey (APEFEL, 1997) has estimated this share at 50% and the domestic selling price at €0.10/kg, yet own calculations based on production data from the Moroccan Ministry of Agriculture, Fishery and Rural Development

and export data from the EACCE suggest that the share which must be marketed domestically is around 60% with a selling price of around €0.14/kg. Interview partners consistently reported that around 40% is sold on the domestic market at an average price level of €0.10/kg. The production cost of export tomatoes is corrected for losses based on the assumption that 40% of production is sold on the domestic market at a price of €0.10/kg. Therefore the corrected production costs are estimated at €0.23/kg.

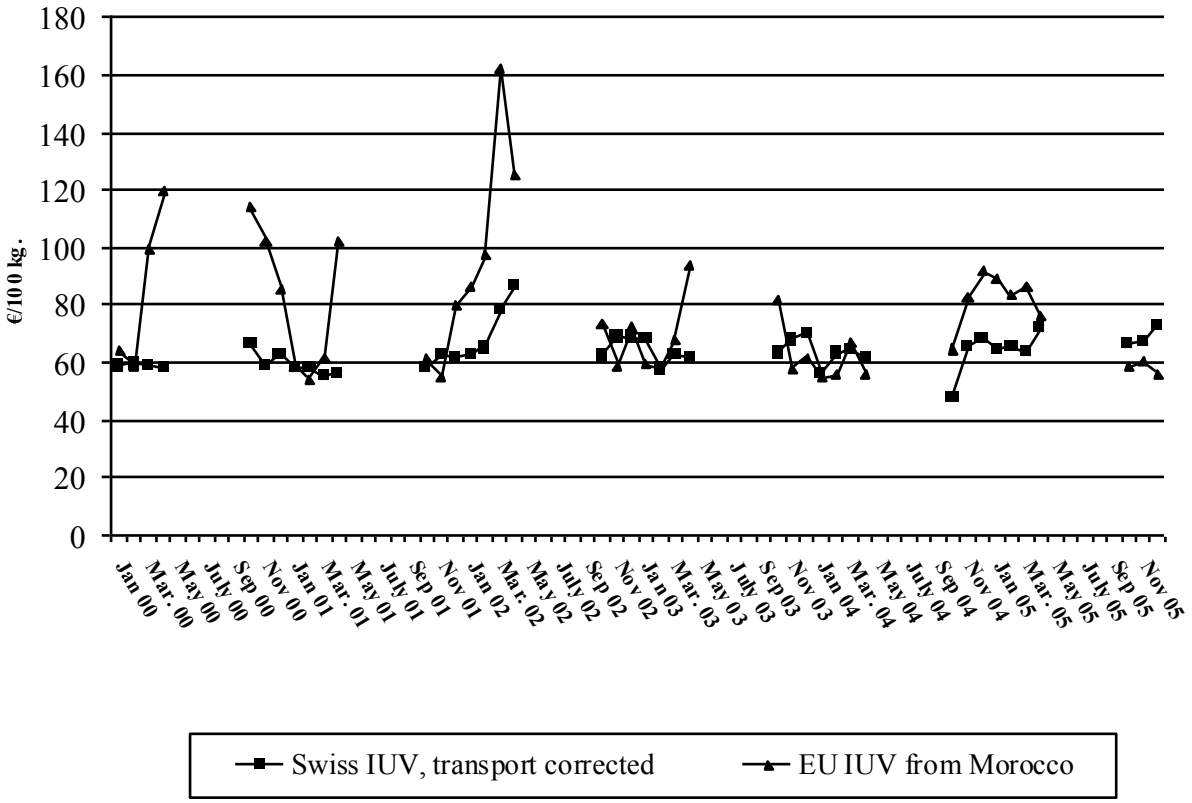
Adding the processing and the transport cost to Perpignan, the most important export destination, costs mount to €0.56/kg. The average export price to the EU from 2000 and 2005 was €0.76/kg (import unit values calculated based on Eurostat (various issues) are taken as an indicator of the export price). Thus, the resulting rent amounts to €0.20/kg. Based on an average annual export quantity to the EU of about 185,000 tons per year during that period, the resulting rent is estimated at €37 million per year.

4.4 Comparing Morocco's Export Price on the EU Market to that on Other Markets

The second possibility of determining the existence and size of a rent is to compare the selling price to the EU with the selling price to other countries. Even though most tomatoes are exported to the EU and exports to many other countries cannot be compared for quality reasons (for example those to central and eastern European countries), between 4,000 and 14,000 tons of tomatoes are exported to Switzerland annually, free of any tariff and without any quantitative restriction. Therefore, Graph 4 compares Swiss and EU import unit values (IUVs) for Moroccan tomatoes for the period 2000-2005.

For the period 2000-2005, during the EU preference period, the IUV for tomatoes from Morocco in Switzerland, corrected for about €0.05/kg higher transportation costs than to Perpignan, was about 15% lower than to the EU. If the selling price to Switzerland is not due to existing trade distortions, and is assumed to be the equilibrium price, the results suggest a rent of about €0.12/kg for exported tomatoes to the EU. This is about 60% of the rent estimated based on the comparison of production cost and selling prices to the EU.

Graph 4: Swiss and EU Import Unit Values for Moroccan Tomatoes, 2000-2005



Sources: Swiss Federal Customs Administration (2007), Eurostat (various issues), own calculations.

5 Who Gets the Rent?

The first question in the context of distribution of the rent is how the rent is shared between the Moroccan export and the EU import sides. The EU administers the EPQ according to the "first-come first-serve" principle. Furthermore, exports are coordinated among Moroccan exporters by the EACCE so that the EPQ quantity is exactly met. As Morocco has an interest in not exceeding the given EPQ in order not to lose the additional quota of 20,000 tons of tomatoes, exports are strictly organised. In the beginning of each month, exports to the EU are not limited and each export group may export as much as it wants. Exported quantities are however monitored by the EACCE. If, after 10-15 days, the export trend hints at a potential excess over the given monthly EPQ, the EACCE convenes an export committee comprising representatives from all export groups, from the Ministry of Agriculture, from the EACCE and the two most important producer organisations. In this committee, all export groups must reach a consensus on the distribution of the remaining quantity. Generally, the quantity is distributed according to the share in total exports that the export group had in the first part of

the month. The precise period is subject to discussion. As an incentive to export more to destinations other than the EU, the total exported amount is taken into account, not just the quantity exported to the EU. According to different exporters, shares in the remaining quantity stay relatively constant among export groups. Once the committee agrees on the distribution, the EACCE enforces compliance. Only exporters which are certified by the EACCE may export tomatoes, and certification must be renewed annually. The yearly renewal of the export certificate functions as a possible sanction against non-compliant exporters.

The Moroccan side thus acts rather like a cartel and consequently European companies have little negotiating power. Furthermore, all members of an export group are informed about the prices the different commissioners have obtained on the export market, and the resulting transparency adds to the negotiation power of Moroccan exporters. All this supports the assumption that much of the rent ends up on the Moroccan rather than on the EU side.

A second question is to what extent part of the rent is dissipated in rent-seeking activities or because of the involvement of extra-marginal suppliers. Given that tomatoes are traded when they are as fresh as possible, an "export run" at the beginning of each month is unlikely. Even though it would make sense for producers to export early in the month to obtain a large part of the rent, exporters try to plan a constant production period in order to meet the marketing needs of their clients, and ensuring that export tomatoes are as fresh as possible.

In addition, the allocation of the quota to the export groups needs to be arranged by consensus, which leaves little space for swaying any decision-making authority. As Figure 1 shows, below the level of the export committee, quantities are rationed at various levels in the marketing chain: by exporters among farmers and farmer cooperatives, and by farmer cooperatives among their members. At every level where quality allocation takes place, rent-seeking would be possible. However, as the graph shows, due to the highly concentrated organisational structure of the sector, 64-95% of all quantity allocation takes place within integrated or semi-integrated structures. Within cooperative export groups, the same allocation rule as in the export committee is usually applied. All producers are allowed to export as much as possible at the beginning of the month, and only if the committee limits exports do the export group and individual cooperatives distribute the remaining quantity based on the same past reference period as chosen by the export committee. This again leaves little possibility to sway any decision on quantity allocation. The fact that the export committee uses total tomato exports (including those to non-EU destinations), however, could

lead to part of the rent dissipating in exports which earn less than their marginal cost, but contribute to a higher share in the EU EPQ.

Even though there are rarely any physical rent-seeking activities, part of the rent does dissipate in the high organisational efforts of the sector, including the work of the export committee. The export groups, as well as the cooperatives, are financed by a margin of the selling price. Unless one is a member of an export group, it is scarcely possible to participate in the export sector.

As the sector is organised quite competitively, it seems very unlikely that a large part of the rent dissipates because of the existence of extra-marginal suppliers. According to various interview partners, there are only a few differences in production efficiency, whereas there are larger differences in marketing. Indeed, this leads exports to accumulate with a handful of the most efficient export groups. What is surprising, however, is that in spite of the significant rent, new producers and exporters rarely emerge. The mechanisms which explain the limited appearance of new enterprises in this sector are not completely clear, although one large obstacle for newcomers is the strict water policy in the region of Souss Massa, which does not allow the establishment of new farms in the region.

A third question is how the existing rent is distributed within Morocco. Due to the high degree of education (and thus knowledge about prices which can be realised on the EU market), it seems realistic that farmers should be able to obtain a large part of the rent. Depending on their degree of satisfaction with the price received, they may also choose to join an alternative cooperative or export as a group, something which happens quite often, and prevents intermediates from capturing a large part of the rent.

6 Conclusions

6.1 Size and Distribution of the Quota Rent

The indicators used in this study suggest a quota rent of €0.12 to 0.20/kg of tomatoes. Based on 2000/2005 export quantities, this results in a total rent of €22-37 million per year, or 16-24% of the export value of tomatoes to the EU during the preferential period. Compared with the total agricultural preference margin (without tomatoes) of about €50 million for Morocco under the Euro-Mediterranean Agreement, this is a significant amount (Grethe et al., 2005). As described above, due to the structure of the Moroccan export sector as well as the EU

method of allocating import licences, it is likely that a large part of the quota rent ends up on the Moroccan side. The export groups publish prices obtained on the EU market among their member cooperatives to create greater competition among importers and consequently improve the negotiating power of Moroccan exporters. The structure of the sector also suggests that rent dissipation is limited and that a significant part of the rent ends up in the hands of agricultural producers.

7 Future of the Quota Rent

The future of the quota rent greatly depends on the further development of the EU MFN barriers to its tomato markets. Obviously, there is little domestic incentive to reform the entry price system: even though the EU substantially reformed the common market organisation (CMO) for fruits and vegetables in 2007, the entry price system stayed untouched. However, the latter may be affected by the potential conclusion of international trade negotiations in the WTO. It is expected that negotiations on market access in the current Doha round will result in a further reduction of MFN tariffs and entry prices and could thus erode the quota rent (Goetz and Grethe, 2007).

In addition, the rent could be eroded by increasing production costs caused by higher product or processing standards, e.g. the EUREPGAP certification. One hypothesis is that the introduction of the EUREPGAP certification in Morocco could have poverty-reducing effects. Due to the structure of the Moroccan tomato sector, only a few producers receive much of the quota rent. By means of higher environmental and occupational health and safety standards implied by EUREPGAP, however, part of the rent could be distributed to workers in the tomato sector through higher wages and better working standards (Chemnitz, 2007).

EU preferences for tomatoes from Morocco are an example of trade creation rather than trade diversion. Due to its favorable geographic location with respect to transportation as well as climatic conditions, Morocco is a competitive supplier to the EU and could gain from a further liberalization of the EU's MFN policies for tomatoes. Even though Morocco would on the one hand lose its quota rent, it could, on the other hand, expand its quantity of exports and would gain more flexibility to react to price changes on the EU market or to meet the demands of clients. The resulting net welfare effect for the Moroccan export tomato sector depends on i) the size of the current quota rent and any inefficiencies tied to it, ii) the EU import demand elasticity for tomatoes, iii) the export supply elasticity of Moroccan tomatoes, and iv) the export supply elasticity and the competition from other countries.

Because of market size, it can be assumed that the EU import elasticity with respect to the Moroccan export tomato price is high, and thus the EU price effect of an expansion of Moroccan tomato exports will be low.[23] Therefore, the gains for Morocco are likely to outweigh the losses.

Yet the gains for Morocco may be limited, as the export elasticity of Moroccan tomatoes is closely correlated to the availability of water in the main production areas, as tomatoes require considerable amounts of water. In 1992 more than 92% of total water use in Morocco was for agricultural production (FAO, 2005). Export tomatoes are always produced in greenhouses with irrigation systems. At present about 12% of the usable surface area is irrigated and there is only limited potential to extend irrigation. Recent surveys indicate that about 1.36 million hectares are irrigated, corresponding to 15% of the usable area (with about 139,000 ha in the main production region of Souss Massa), of which 30% are irrigated with drip irrigation (WTO, 2003). As Morocco has faced difficult droughts in recent years, total water resources have already declined tremendously. The Souss Massa, with an annual rainfall of 200 mm, has an average annual water deficit of 260 m^3, which leads to an annual drop in groundwater levels of 0.5 to 2 meters (Agence du Bassin Hydraulique de Souss Massa, 2005). Even though the declining groundwater level has the greatest effect on the traditional sectors in the short run, it also affects the production cost of the tomato export sector by increasing costs if water must be pumped from greater depths. Furthermore, the policies of the Moroccan administration are changing in response to this problem. At the moment a significant part of agricultural subsidies goes directly into irrigation systems. Today's private water prices represent no more than 56-83% of the social cost, including the maintenance of irrigation systems (WTO, 2003). In 2002 the Moroccan government implemented a price of €0.002/m^3 for water used for agriculture. As the price is very low and largely symbolic in nature, it may be increased in the future. A water pricing policy which reflects the social cost of providing water to farmers may thus result in a significant decline in the current quota rent.

[23] Assuming the EU supply elasticity at 2 and the EU demand elasticity at 0.5, and calculating the EU import demand elasticity according to Blackhurst (1973), one reaches an import elasticity of about 40. A doubling of Moroccan exports to the EU would thus result in a price decrease of about 2.5%.

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D The Compliance Process of Food Quality Standards on Primary Producer Level: A Case Study of the EUREPGAP Standard in the Moroccan Tomato Sector

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The Compliance Process of Food Quality Standards on Primary Producer Level: A Case Study of the EUREPGAP Standard in the Moroccan Tomato Sector

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Abstract

The concern exists that small producers' participation in the fruit and vegetable trade could be diminishing as a result of the increasing prevalence of food quality standards. This paper analyzes two particular questions with regard to the distributional effects of standards: 1) which producers comply, and which do not; and 2) why do some producers comply while others do not? Therefore the paper analyzes and compares the decision process of EUREPGAP certified and non-certified producers in the Moroccan tomato sector.

Results of the survey show that being small in size tends to be overvalued in the discussion. Instead, the results point to the fact that less vertically integrated farmers in the value chain tend to be less favored, especially as forward integration diminishes the cost of compliance. Forward integration in the value chain is of particular importance because of the direct access to information on market developments and the buyers' requirements.

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1 Introduction

Fruit and vegetable sectors are principally seen as sectors where small producers are able to participate due to their low demand on land and their high labor requirements. However, the concern exists that small producers' participation in the international fruit and vegetable trade could be diminishing as a result of the increasing prevalence of food quality standards in the sector. Standards define the terms of chain membership, imply rules and conditions for participation, and hence lead to processes of (re)distribution within the chain (Gibbon and Ponte, 2005). For some producers, standards may open up new opportunities as they permit market access to particular market segments. At the same time, the process of (re)distributing market shares is accompanied by marginalization and exclusion, as standards may impose prohibitively high barriers for certain producers in terms of the short-term and long-term efforts needed for production under certification. This is particularly relevant since certification with private standards has become a major requirement for participation in fruit and vegetable markets worldwide. One of the most important private standards for fruit and vegetables is the EUREPGAP standard, which has now become quasi-mandatory for several export destinations (USAID, 2005).

This paper aims to analyze two particular questions with regard to the distributional effects of standards: 1) which producers comply, and which do not; and 2) why do some producers comply while others do not?

With respect to the first question, various surveys have mentioned the particular difficulties facing small producers within this new trading environment (e.g. Humphrey et al. 2004; Kleinwechter and Grethe 2006; Maertens and Swinnen 2006; World Bank 2005). However, most of these surveys have hypothesized that small producers are disadvantaged within the new trading environment on theoretical grounds without actually providing empirical evidence for this assertion.

Regarding the second question, various papers have argued, based on the theoretical background of economies of scale, that small producers tend to comply to a lesser extent because of the higher cost of compliance. Even though this argument may well be to some extent true, it can be criticized because it neglects the complex socio-economic and institutional framework that influences a farmer's decision to comply with a standard.

A multidisciplinary perspective is necessary to analyze decisions to adopt or not to adopt a standard, in order to obtain a deeper understanding of why some producers comply with food quality standards while others reject them.

This paper accordingly seeks to contribute to the debate by answering these two questions with regard to the Moroccan tomato export sector. It provides a comprehensive empirical

analysis of the compliance decision behavior and the compliance process. The survey analyzes drivers for the compliance decision by comparing the determinants of the decision process of non-certified producers with those of certified ones.

For its explanatory approach, this paper mainly draws on the theories of innovation adoption and diffusion research, since these make it possible to systemize the decision process and integrate it into a close network of economic, social and institutional determinants.

The Moroccan tomato sector was chosen as the case study because of the increasing importance of private certification in this sector. Nearly 90% of its tomatoes are exported to the EU, where EUREPGAP is a major requirement. Tomatoes are the second most important horticultural export product of the country, and a wide range of producers are involved in the sector, from large-scale plantations cultivating more than 200 ha, to small producers with less than 10 ha. In addition, the sector has a particular social importance in that it offers income possibilities to those with little access to land, and moreover provides possibilities of employment in rural areas, where there tend to be few other alternative jobs.

The remainder of this paper is structured as follows. Section 2 presents the theoretical background of the analysis, applying diffusion theory to the compliance process with food quality standards. Section 3 describes the methodology of the survey, including the theoretical framework and the data collection. Section 4 provides an overview of the structural and institutional environment of the Moroccan tomato sector, in order to provide an in-depth understanding of the compliance process. Section 5 discusses the results of the survey. Section 6 examines the similarities and differences among compliers and non-compliers. Finally, Section 7 draws some conclusions with regard to the impact of food quality standards on rural poverty in Morocco.

2 Theoretical Background

2.1 Standards – Innovations from the Producer Perspective

Different approaches offer a variety of evidence to explain decision behavior and the decision process. With regard to the objective of the survey, a multidisciplinary analytical approach offers the possibility of linking the individual decision process to the effects of the institutional environment and thus of identifying drivers for or against compliance with food quality standards. Diffusion theory offers a particularly suitable analytical framework that identifies the determinants of the innovativeness of the actors involved.

Diffusion theory is appropriate because food quality standards are, from a producer's perspective, a special form of innovation. Rogers (2003: 101) defines an innovation to be an

idea, practice or object that is perceived as new by an individual. In this context, diffusion theory can be applied to various process innovations in agricultural food chains.
However, there are some differences, as innovations from a traditional perspective lead to an increase in technical efficiency. By contrast, innovations in food quality typically result in higher food quality and/or in better information transfer of information on products and processes, but do not necessarily lead to some form of production advantage. Indeed, such innovations may actually be counterproductive to the technical production process of the firm (Walgenbach and Beck, 2003). Food quality innovations only result in gains if the higher quality product is differentiable from lower quality products.[24]

With regard to the information asymmetry existing in the food trade[25], quality standards are used to overcome these market failures. Nadvi and Wältring (2002: 6) define standards as agreed criteria by which a product or service performance, its technical and physical characteristics and/or the process and conditions under which it has been produced or delivered, can be assessed. Standards may consist of individual measures, or can take the form of a bunch of different measures which the producer has to fulfill and which are externally audited. Consequently, food standards not only consist of innovations – the standard itself is a form of innovation.

2.2 Applying the Innovation Decision Model to the Compliance Process with Food Standards – Strengths and Weaknesses

Diffusion research identifies three time dimensions: 1) the innovativeness of an individual in relation to the other members of a social system; 2) the adoption rate within a social system; and 3) the decision process (König, 2006). This subsection concentrates on the third of these dimensions, the decision process.

Rogers (2003: 168) defines the decision process as an information-seeking and information-processing activity in which an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation.

Diffusion research relies on the assumption of a multistage decision model. Rogers (2003) has developed a five-stage model where the decision-making unit passes from hearing about an innovation for the first time, to forming an attitude towards the innovation, on to deciding

[24] Akerlof (1972) explored this phenomenon for the "lemons" market.

[25] This asymmetry results from the fact that food products include various quality aspects, e.g. technical value, sensory quality, nutritional value, food safety as well as idealistic and psychological values (Brockmeier, 1993; Wiegand, 1997). The technical value and the sensory quality assessed by the consumer, and the nutritional value and food safety can be assessed in the final product by third parties (via laboratory tests); however, most idealistic values are Potemkin attributes (Tietzel and Weber, 1991) and cannot be assessed in the final good.

whether to adopt or to reject it, to implementing the new idea, and finally to confirming this decision.

The decision model provides three main advantages when it comes to analyzing the compliance process with food standards. Firstly, it clearly systemizes the decision process, distinguishing the different stages of the whole process and thereby making it possible to identify the determinants of the decision process, which might differ according to the stage. Secondly, the model puts the decision-maker at the center of the analysis, while at the same time taking interlinkages with the institutional environment into account. Thirdly, it combines various schools of thinking, including those of economics, education, rural sociology and geography to form an analytical framework of diffusion (Rogers, 2003).

However, the model can be criticized for formulating a relatively simplistic view of both the decision process and the final decision to adopt or reject an innovation. It is a mistake to see the decision process as linear; instead, it can be paused and rethought at every stage (Rogers, 2003). In addition, the model treats the adoption decision as a bivariate variable, where the only two possible options are either to comply or to reject. In reality, this decision is much more nuanced, and various potential responses exist. For compliance with food standards, Henson and Heasman (1998) explore compliance, which they show ranges from no-compliance to partial compliance and finally to full compliance. Kleinwechter (2005) even mentions over-compliance with standards, whereby larger firms in particular seek to obtain a marketing advantage.

Furthermore, the shortcomings of the decision model regarding the analysis of food safety innovations are reflected in the diffusion process, which excludes some aspects which are of major importance for the diffusion process of food standards. Rogers (2003: 5) defines diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system. Even though this definition covers much of what is important for the analysis of the compliance process with food quality standards, it is important to note the aspects that the definition does not include. Four major shortcomings can be identified in this regard.

First, as Strang and Meyer (1993) show, the definition excludes decision-making processes where actors' choices were not informed by the activities and choices of others. This aspect is of particular relevance for the compliance process with food safety and quality standards of small producers, who are extremely dependent on external sources of information (Henson and Heasman, 1998; Yapp and Freeman, 2004). A large enterprise may internally generate information, whereas a small enterprise is rather in the position of a recipient of information. With respect to compliance with food quality standards, this implies that whenever external sources of information are unavailable, small producers will be unable to start the compliance process.

Second, the diffusion process has been widely criticized for underestimating the institutional environment. Diffusion theory mainly concentrates on internal production processes, thereby failing to give the institutional environment of the decision-making unit sufficient importance (Walgenbach and Beck, 2003). DiMaggio and Powell (1983) pronounce the importance of institutional isomorphism[26] for the diffusion process. Walgenbach and Beck (2003) analyze this phenomenon in their survey of compliance decision processes with the ISO 9000 standard in Germany. They show that enterprises under uncertainty tend to conform more closely to the institutional expectations of their trading partners. Rational conformity with efficiency aspects of the production process is becoming less important, while the importance of institutional legitimacy which is guaranteed by homogeneous institutional structure is correspondingly increasing.

Third, the importance of concepts such as governance and pressure tend to be underestimated within value chains. Diffusion research includes the impact of the social system[27] with its horizontal network interrelations, norms and ethical values in the analysis (Rogers, 2003), but it does not provide an analytical framework to analyze it (König, 2006). Diffusion research has neglected in particular vertical coordination and vertical relations, including concepts of governance and power among participants of a value chain, even though vertical relations are known to be particularly important for information transmission (from the buyer to the producer) and in terms of pushing decision-making units in a certain direction (Humphrey and Schmitz, 2002). Vertical relations have been analyzed in particular in value-chain analysis literature, which analyzes the cross-border linkages between firms in global production (e.g. Humphrey and Schmitz, 2002; Gibbon and Ponte, 2005).

Fourth, diffusion research has been criticized for failing to take into consideration the dynamic interdependencies between the individual and its environment and their alternating effects (König, 2006: 101), despite the fact that these are seen as an important aspect explaining technological and structural development in the agricultural sector (König, 2006).

[26] Institutional isomorphism is defined as the tendency of institutions to form an homogeneous environment (Walgenbach and Beck, 2003: 499).

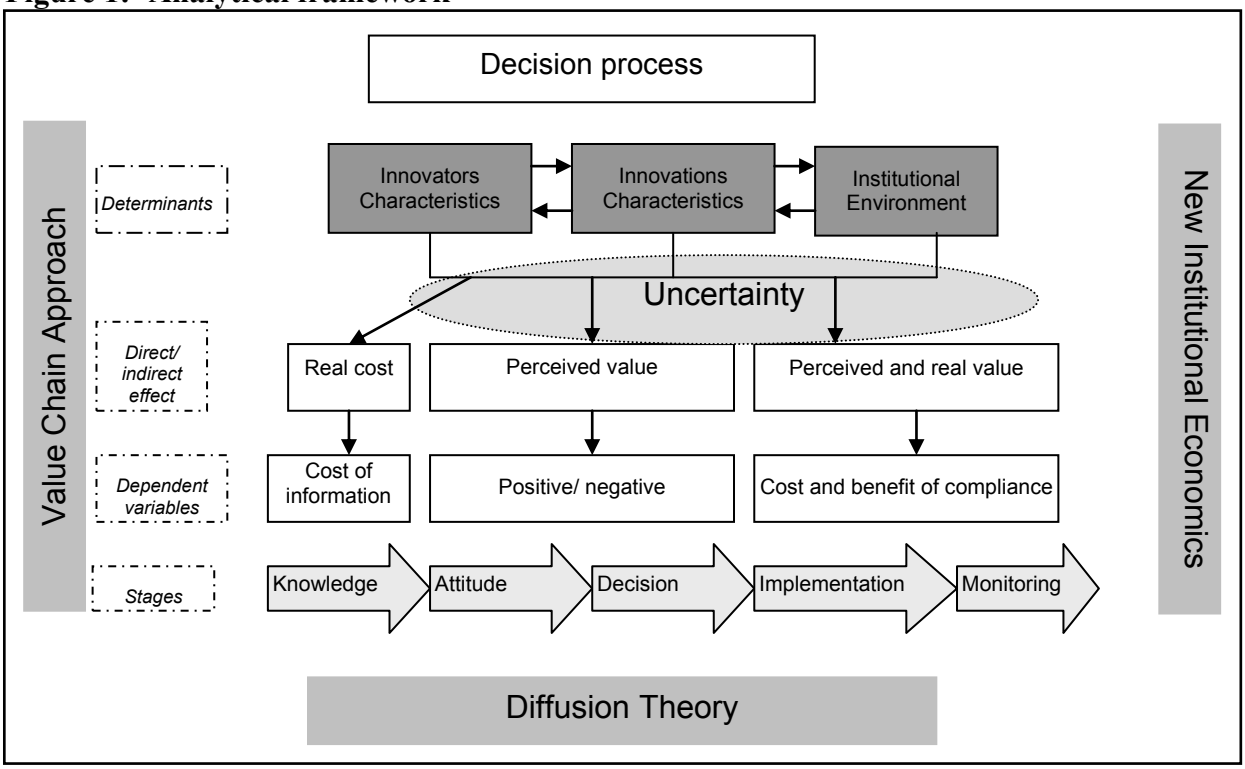
[27] A social system is a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal (Rogers, 2003: 23).

3 Methodology and Data Collection

3.1 The Analytical Framework

The theoretical discussion has explored the explanatory potential of diffusion theory for the analysis. However, with respect to the shortcomings discussed in Section 2, the perspective of the decision model has been modified in order to make it easier to recognize the interlinkages between the decision-making unit and the institutional environment.

Figure 1: Analytical framework



Source: own illustration

Figure 1 shows that the decision process is, to a large extent, not directly affected by the determinant variables, but also indirectly through the perceived value of the standard. The perceived value of compliance can be considered as belief in the costs and benefits related to the innovation (Frambach and Schillewaert, 1999, DeSarbo et al., 1998). The perceived value of compliance must offer some kind of social, institutional or economic incentive for the decision-making unit to consider adoption seriously. Imperfect information may lead to a difference between the perceived value and the real value of compliance. This difference is called the error cost (Ogus, 1992).

The decision process is determined by uncertainty, since the decision-making unit can never be informed about all the causal linkages in the decision situation, and it bases its decision on

assumptions of future developments (e.g. market development). The extent to which the decision-making unit experiences uncertainty as an impending factor for the decision process mainly depends on personal characteristics and the complexity of the decision.

Each stage of the decision model is represented by a dependent variable which is determined directly or indirectly by the three groups of determinants, as Figure 1 shows. At the knowledge stage, the dependent variable is represented by the cost of information. These represent the costs incurred by the decision-making unit in order to receive a certain level of information which is sufficient to formulate an attitude towards the standard. The level of knowledge needed to formulate an attitude may differ tremendously among producers, however. At the attitude stage and the decision stage, the dependent variables can turn out to be positive or negative. Both stages are affected indirectly by the determinants through the perceived value of compliance. On the implementation stage, the dependent variables are the cost and benefit of compliance. The producers face at this stage for the first time the real cost of compliance (except for the cost of information during the knowledge stage). The benefit of compliance is seldom immediately apparent, since investments in food quality standards are of a long-term nature. The same takes place at the monitoring stage. This is partly affected by the real costs and benefits of compliance, as well as the perceived costs and benefits related to future market development.

3.2 Data Collection

Research data were collected in 2006 by conducting semi-structured interviews with 63 Moroccan tomato producers in the region of Souss Massa (which was chosen because more than 70% of total tomato exports come from this zone). The survey concentrates on the EUREPGAP standards, since EUREPGAP has turned out to be the most important private certificate at the farm level in trading relations with EU partners.

The total sample was taken out of a population of around 600 producers which supply at least partly the export market (APEFEL, 2006) of which around 207 are EUREPGAP-certified (EUREPGAP, 2006). To guarantee a sufficiently high number of EUREPGAP-certified producers, the total sample was split into two sub-samples: one certified (30 interviewees) and the other not certified (33 interviewees).

A questionnaire was developed for the two sample groups which contains a qualitative as well as a quantitative part. The questionnaire was developed with respect to the theoretical framework discussed in subsection 3.1 and aims at collecting data on the determinants of the decision process.

The analysis of the data consists of two major steps. First, data were analyzed in order to identify any driving or impeding determinants in the decision process. In a second step, the

analysis sought to identify particular differences among the two groups of compliers and non-compliers.

Before turning to the discussion of the results in Section 5, the following section will briefly provide an overview of the structure of the Moroccan tomato sector.

4 The Moroccan Tomato Sector

4.1 Economic Importance and Structure of the Moroccan Tomato Sector

Horticulture is one of the most relevant segments of the Moroccan agricultural sector. In addition to its economic importance, the sector is also socially important, accounting for a high share in rural employment (WTO, 2003). Within the horticultural sector, tomato production plays an important role. The Moroccan tomato sector has a dual structure. Production for the domestic and export markets is usually separated. While tomatoes for the export market are always produced in technically highly advanced production systems in plastic greenhouses, tomatoes for the national market mainly stem from open field production.

Nevertheless, interlinkages exist on both sides. Tomatoes originally produced for the export market but which are not of sufficient quality are finally sold on the national market. And greenhouse producers which mostly supply the domestic market sell their products to the export market whenever there is demand (Chemnitz and Grethe, 2005).

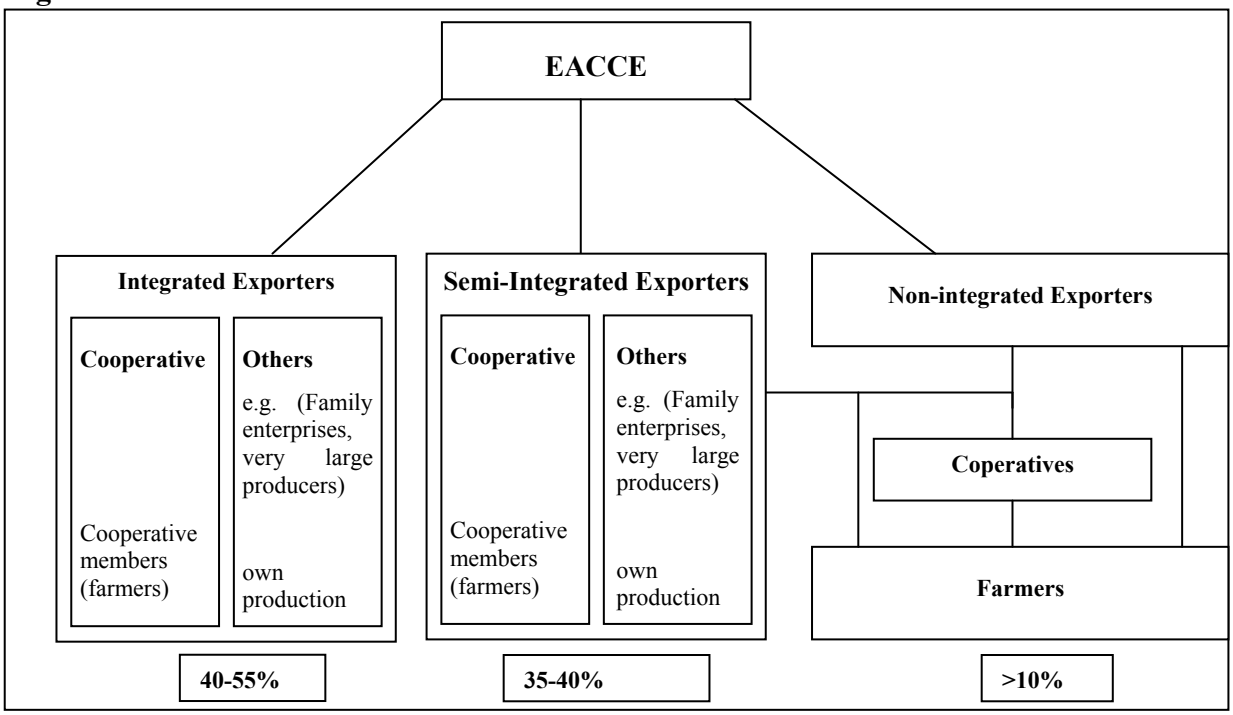
While open-field production for the domestic market takes place all over the country, the production of greenhouse tomatoes is mainly located in a regional cluster in the south Atlantic coastal strip in the region of Souss Massa. About 64% of the area is located in the region and 74% of total production originates there (APEFEL, 2002).

Tomatoes rank second on Morocco's export list of agricultural goods, with an annual export value of € 118 million in 2003 (FAO, 2007). On average, in 2003/04 and 2004/05 Morocco exported 228,738.50 tons of tomatoes, of which 207,158.50 tons were destined for the EU (EACCE, 2007).

Around 30% of tomato producers are small scale farmers who cultivate less than 5 ha. Their production area represents only about 10-15% of the total production area for early tomatoes. The majority of the producers cultivate an area between 5-20 ha. Farms belonging to this group cultivate around 50% of the total tomato area. Only 10-15% of the farms are larger than 20 ha, but they represent around 40% of the early tomato area (Chemnitz and Grethe, 2005).

The production and marketing chain can be subdivided into three major levels: the production or farm level, the packing level, and the exporting level. The Moroccan export sector shows a highly integrated value chain (Chemnitz and Grethe, 2005).

Figure 2: Structure of the Moroccan tomato sector



Source: Chemnitz and Grethe, 2005.

As shown in Figure 2 the largest part of production, between 40 and 55%, is produced in completely integrated export structures. These may either take the form of producers of various sizes, which are organized into farmers' cooperatives at the packing station level, or in enterprises which contain all levels of the production and marketing chain (Chemnitz and Grethe, 2005). The second important organizational form of the sector is that of semi-integrated exporters. These are large enterprises which have their own private packing stations where they process products from their own farms. In addition, these enterprises process and sell tomatoes from other producers on a commission basis (Chemnitz and Grethe, 2005). The least important organizational form of the sector is that of the non-integrated exporters, which represent less than 10% of the exported early tomatoes. These exporters take the tomatoes on a commission basis or buy them from several different small and medium-sized producers. There are around 12-15 exporter groups in the sector, of which the largest three export around 70% of total tomato exports (Chemnitz and Grethe, 2005).

4.2 Prevalence of Legal and Private Food Standards in the Moroccan Export Sector

Since Moroccan exports concentrate on the European market, production is mainly determined by the legal and private requirements of EU buyers. While food safety, hygiene, traceability, social and environmental requirements are comparatively new, marketing standards for tomatoes for the EU market have been in place since the early 1970s. EU Regulation 1035/72 (OJ L118, 20/05/1972) clearly specifies the size, color and caliber of

tomatoes imported to the European market. To date, the EU's acceptance of the maximum residue levels (MRL) of pesticide products and its requirements for traceability are of specific importance for the sector. The so-called umbrella regulation 178/2002 (OJ L 031, 01/02/2002) lays down the general principles and requirements of EU food law on all stages of production, processing and distribution. The most relevant articles for the Moroccan export sector are Articles 11-14 about food safety requirements, and Articles 14-20 about traceability requirements which came into force on 1 January 2005. Since January 2006 the umbrella regulation has been complemented by Regulation 882/2004 on official food and feed controls (OJ L 165/1, 30/04/2004). Finally, Regulation 90/642 fixes maximum levels d for pesticide residues in and on fruits and vegetables (OJ L 350, 14/12/90).

However, private food quality initiatives are increasingly becoming more important than the legal food standards. In the Moroccan tomato export sector, the most important private certificate at the farm level is the EUREPGAP standard.[28] The normative documents representing the EUREPGAP standard include aspects of integrated pest management, traceability, hygiene measures and MRLs.

The importance of EUREPGAP to the EU market varies among individual member countries. According to several interviewees, the UK and the Scandinavian countries require the highest quality standards. Most retailers in these countries demand, in addition to EUREPGAP certification, private certificates from the particular buyer (e.g. Tesco's "Natures Choice" and Marks & Spencer's "From Farm to Fork"). By contrast, interviewees characterized the French, German, Spanish and Swiss markets as being in a state of transition; retailers prefer buying EUREPGAP-certified produce, but are still prepared to buy non-certified products when no EUREPGAP-certified products are available.

In Morocco, the number of certified producers has increased tremendously in recent years. To start off, some producers were certified in 2002 but, in the following two years, only a few other large producers followed (APEFEL, 2006). The rapid increase in certification only started in 2005. Today, around 207 out of 600 producers are certified (EUREPGAP, 2006). An unpublished survey conducted by APEFEL (2006) announced that in quantitative terms, Morocco could supply more than three-quarters of its exported tomatoes as EUREPGAP-certified. The largest ten exporters[29] can supply 140,000 tons of EUREPGAP-certified tomatoes and own nearly 1,000 ha of certified greenhouses (APEFEL, 2006). Hence, a tremendous gap exists in the Moroccan export sector regarding the certified quantity and the number of certified producers.

[28] The most important standard for packing stations is the BRC (British Retailer Consortium) certificate.

[29] These could take the organizational form of cooperatives or enterprises.

Various interviewees indicated that most very large exporters tend to be EUREPGAP-certified, whereas the picture is more heterogeneous for medium and small producers. The following section analyzes why producers finally decide to comply – or not to comply – with the EUREPGAP standard.

5 Compliance with Food Safety Requirements: Results of the Survey

5.1 The Information Stage

The cost of information reflects the monetary and physical efforts the decision-making unit has to undertake to receive a certain level of information that is needed to formulate an attitude towards the standard. Information costs can be split into two groups: 1) costs for initial awareness information; and 2) costs for knowledge information (Rogers, 2003).

Awareness information captures all the efforts the decision-making unit has to make in order to find out about the possible options for a decision, and it has to feel the need to enter into a decision process. Regarding compliance with food quality standards, the "awareness information" is defined as the first knowledge that a producer has of the existence and importance of a standard. This information on food standards may be transmitted to the producer by several means such as extension services, trading partners, mass media, as well by personal relations with other participants in the sector. The more communication about a certain standard is included in the communication structure of the sector, the less individual efforts producers have to make to find out something about it. However, the awareness information proves to be the first major burden of compliance in many cases, especially for producers that tend to be less included in information channels, that have less access to modern sources of information, and that are unable to find out information by themselves.

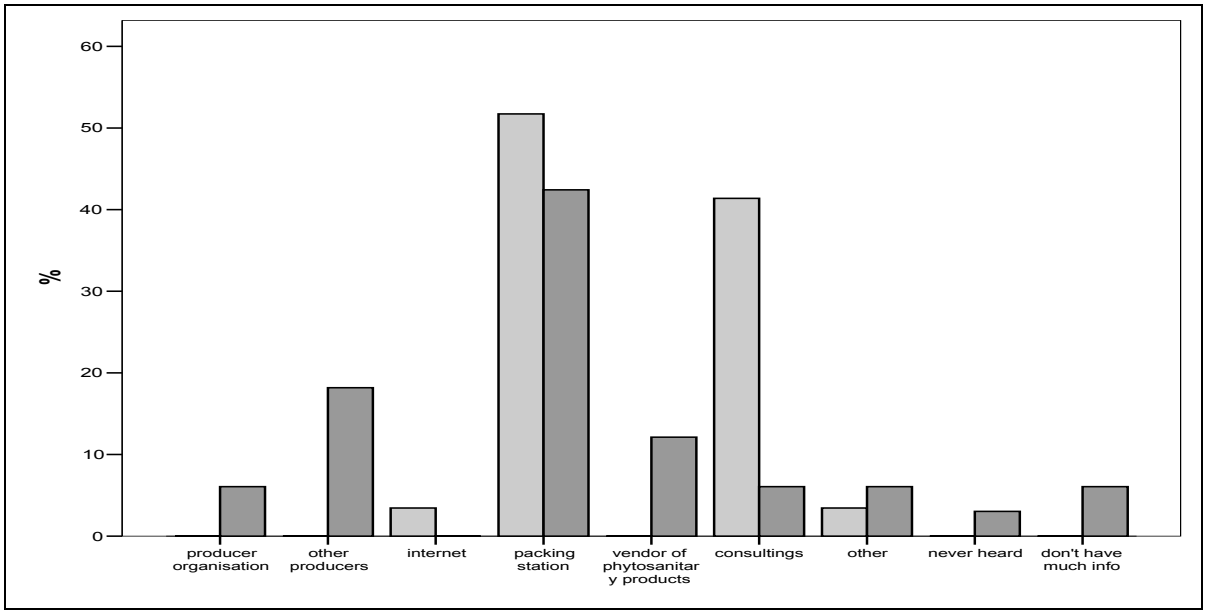
The survey results show that knowledge of public standards such as MRLs and Traceability has been widespread in the sector for more than five years. The picture is slightly different regarding knowledge of the EUREPGAP standard. Even though all interviewees bar one knew of EUREPGAP, most (30%) indicated that they had only known about it for a year. A further 27% had known about EUREPGAP for two years, and 17% for three years. Finally, most interviewees (70%) knew nothing about more specific standards such as "Nature's Choice" (Tesco) or "From Farm to Fork" (Marks and Spencer).

These results indicate that public standards as well as EUREPGAP are part of the communication structure of the sector, and that information on the existence of standards is communicated horizontally within the sector. Both the certified and non-certified interviewees indicated that the group of "other producers" was the most important source of initial information on the standard. As the second important source of information, certified producers mentioned packing stations, while non-certified producers mentioned the vendors

of phytosanitary products. This difference suggests that there are structural differences between certified and non-certified producers, with the former tending to receive information from downstream actors along the value chain, while the latter tend to receive information from horizontally involved participants.

The two groups differ further vis-à-vis the principal source of information on EUREPGAP, as Figure 3 shows.

Figure 3: Principal sources of information on EUREPGAP for certified and non certified producers



□ certified producers, □ non certified producers.

Source: own elaboration

Nearly all certified producers indicated that packing stations or consulting organizations were their major source of information. The group of non-certified producers also stated that packing stations were their principal source of information on EUREPGAP, followed by the categories of other producers and phytosanitary vendors. However, even though both groups reported that packing stations were their most important source of information, non-certified producers possess less information on EUREPGAP. This can be interpreted in two different ways: either certification leads to better knowledge of the standard, or the certified producers possessed better knowledge of the standard to start with, which finally was the main reason why they decided to become certified.

One reason why certified producers tend to receive more detailed information on EUREPGAP from downstream actors can be found in their higher level of vertical integration in the value chain.

Table 1: Producers' integration in the value chain

	Owner of a station	Not the owner of a station	Total
Certified	22	8	30
Non-certified	6	27	33
Total	28	35	63

Source: own calculations.

As Table 1 shows, 73% of certified producers are involved at the higher chain level. This might take the form of being a member of a cooperative or being the owner of a company.

Packing stations employ quality managers who accompany the compliance process of their members. Consequently, the costs of information are indirect at the farm level. The certification process was not supported according to any of the interviews without the integration of the producer in the downstream level.

Certified producers which do not receive support from the packing station internalize the generation of the needed knowledge for the certification process by hiring consultant organizations. These supply "packages" contain consulting for the entire upgrading process, including all relevant steps up to the final external audit. Complete "EUREPGAP packages" cost, depending on the size of the farm, between 2,000 and 3,000 €.

To conclude, the results of the survey show that the costs of obtaining initial information on the EUREPGAP standard are relatively low as the standard is commonly encountered in the daily communication of the sector. More specific information on the standard, however, has to be generated internally by the producer, either by hiring a production level consultancy or at the packing station level.

5.2 The Attitude Stage

The information stage is followed by the attitude stage, in which the decision-making unit forms an opinion on the standard. This reflects how it experiences the potential benefits and perceived value of compliance, which are mainly affected by how the decision-making unit perceives uncertainty regarding its knowledge of future costs and benefits.

This depends on the personal characteristics of the decision-making unit as well as on the external influence on the producer. The way that non-certified decision-making units experience the costs, benefits and risks of the standard and the feasibility of becoming a certified producer plays an important role in the process of formulating an attitude, especially since small producers often lack the possibility to receive information from various different sources (Fairman and Yapp, 2004).

Table 2: Benefit of the EUREPGAP standard as experienced by non-certified producers

Benefit of EUREPGAP	Number of responses
Better prices	3
Preferential supplier status	0
Better commercialization	6
Other benefits	2
No known producer with a direct benefit	22

Source: own calculations.

As Table 2 shows, non-certified producers believe the benefit of the EUREPGAP certification to other producers to be relatively low, with only 11 interviewees aware of someone who had benefited from certification. The most important benefits for certified producers according to non-certified producers are "better possibilities for commercialization". Only two interviewees however indicated that they knew someone who receives better prices due to certification.

In contrast to this rather negative experience of their colleagues' certification, nearly all non-certified interviewees had a positive attitude towards certification. Except for one interviewee, all producers underlined their willingness to be certified whenever given the chance to do so.

The most important motivation for certification is the fear of losing future market share, a concern stressed by 29 out of the 33 non-certified interviewees. However, the risk of losing market share in the future seems to be relatively abstract to most non-EUREPGAP certified producers, with 88% indicating that they had never faced or heard of any sanctions because of their non-compliance. As depicted in Table 3, only three producers indicated that they face disadvantages in the near future because of non-certification. One of them receives lower prices, while the other two will be excluded from the packing station if they fail to start the certification process in 2007.

Table 3: Sanctions in case of non-compliance

	Changing the producer	Better prices	No sanctions	No answer	Total
Certified	22	0	7	1	30
Non-certified	2	1	29	1	33
Total	24	1	36	2	63

Source: own calculations.

In contrast, the analysis of those producers that were certified shows that 22 out of 30 interviewees face sanctions from their packing station in case of non-compliance. All 22 producers indicated that they risked losing market share in case of non-compliance, as their buyers would change to other suppliers.

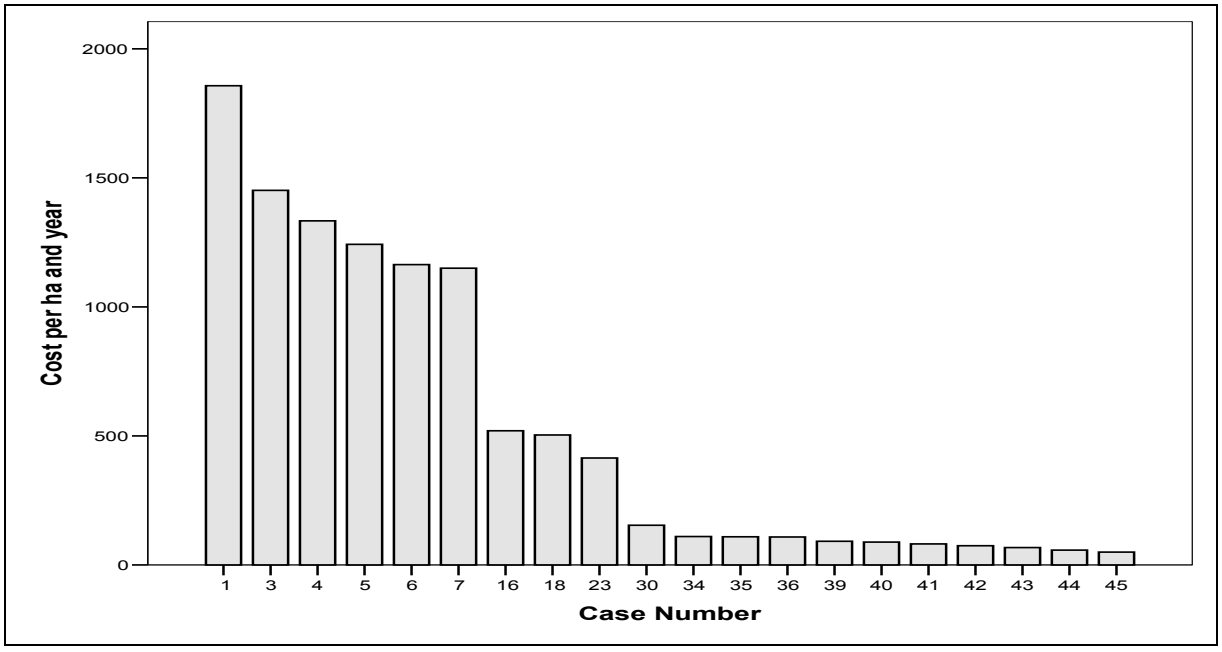
Summarizing the results of the attitude stage, the survey shows that most non-certified interviewees tend to be positive towards the EUREPGAP standard even though they experience the direct benefit of certified producers as marginal. A general concern exists that they could lose market share in case of non-compliance. However, the survey results suggest that non-certified producers experience market losses as a relatively abstract idea.

5.3 The Decision Stage

In the decision stage the producer actively undertakes activities which finally lead to a positive or negative decision (Rogers, 2003). This might entail for example actively searching for information about the standard, or developing a deeper understanding of the specific steps needed to implement the standard at farm level.

28 out of the 33 non-certified producers indicated that they had relatively concrete knowledge about the changes needed on their farm for compliance, and 20 even expressed concrete ideas about the level of investment needed.[30]

Figure 3: Perceived cost of compliance of non-certified producers per ha



Source: own calculations.

Figure 3 depicts the extremely high variance of perceived costs among non-certified interviewees. The lowest perceived cost of compliance amounts to less than 50 €/ha, and the highest at around 1,975 €/ha.

[30] It is important to outline that the survey does not assess whether the perceived cost corresponds to the actual cost.

The reasons why interviewees perceived the cost of compliance so differently varied, ranging from personal characteristics to the actual technical level of production to knowledge on the EUREPGAP standard. The survey results point to the fact that more informed interviewees indicated higher perceived compliance costs.

Even though nearly all non-certified producers tended to have a positive attitude towards the standard (as expressed by their indication to become certified if the opportunity arises), none had finally taken a positive decision in favor of certification. As the main reasons for non-certification, the interviewees indicated insufficient information on EUREPGAP and a lack of financial capacity. However, answers related to a lack of information on EUREPGAP have to be interpreted carefully, since all producers could theoretically hire a consulting organization to provide them with better information and to accompany the certification process. Consequently, the "lack of information" may also be another way of expressing a lack of financial capacity.

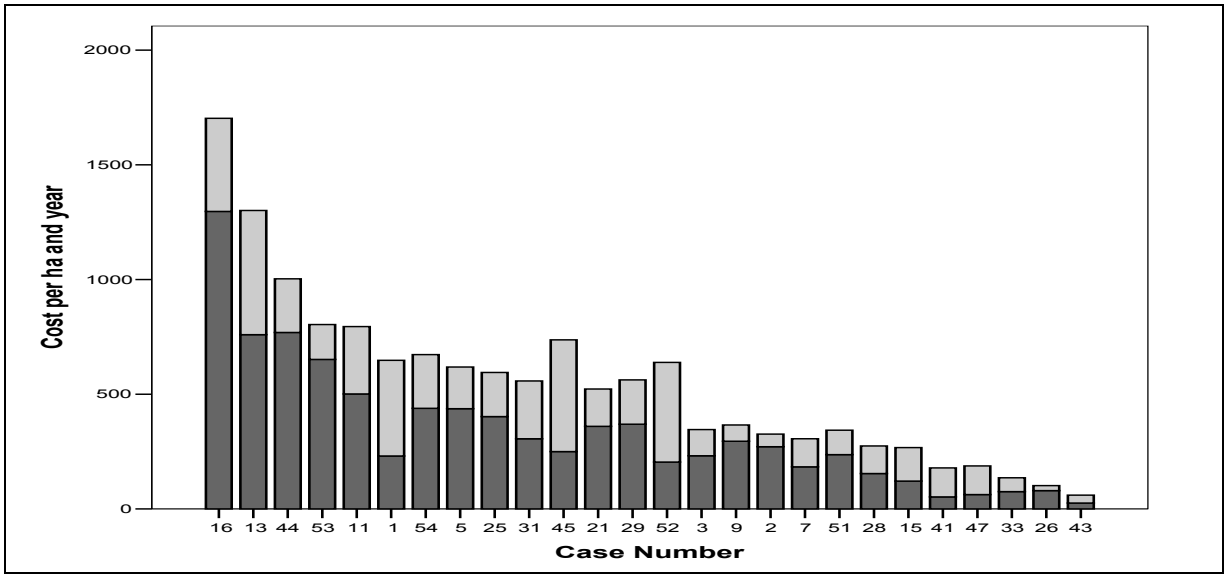
The lack of financial capacity as a reason for non-compliance seems convincing, since the largest part of short-term investment is required for technical upgrading of farms, and these costs have to be met immediately. Even though some producers receive credits from their cooperatives, access to credit remains difficult, especially for small, less organized and less educated farmers. The third obstacle to certification experienced by producers is the uncertainty they face in terms of highly fluctuating prices. This is especially true for producers without a steady relationship with buyers or packing stations. Interviewees stated that in order to become certified, they would need a firm guarantee on prices and quantity.

To sum up, most non-certified interviewees have concrete ideas on the requirements of the EUREGPGAP standard. Nevertheless, none have decided in favor of certification up till now, which can largely be attributed to their reluctance to invest owing to uncertainty about price developments and export possibilities. All interviewees found the idea of certification rather abstract, and they do not see a direct need for certification as the benefits of certification appear marginal, and there is little pressure from their trading partners (see subsection 5.2).

5.4 The Implementation Stage

In the implementation stage, producers are for the first time confronted with the real costs and benefits of the standard. Figure 4 depicts the real costs of compliance for the certified interviewees.

Figure 4: Cost of compliance per ha and year



non-recurrent cost, recurrent cost
Source: own calculations.

The costs of compliance can be broken down into recurrent and non-recurrent costs. Even though most interviewees experience non-recurrent costs as more of an obstacle, they only add a small part to the total cost of compliance. The major cost components of non-recurrent costs are investments in the technical upgrading process of the farm (e.g. in buildings and markers).[31] By contrast, the largest component of the recurrent costs of compliance is additional costs for skilled labor. Only four producers indicated that they did not employ any additional labor at all. On average, certified producers employ one or two additional skilled workers for every 15 ha. A skilled worker earns between 200 and 250 €/month. Other recurrent cost components, such as the certificate for the standard or investment in safety cloth, only add a small part to the total cost of compliance.

Figure 4 shows that the degree of variance regarding compliance costs is strong. The minimum costs of compliance are about 35 €/ha per year, while the maximum cost of compliance are nearly 1,500 €/ha per year. To explain the high level of variance, data were

[31] Time periods for depreciation rely on own plausibility considerations.

analyzed with respect to farm size as a potential determinant for cost differences among producers.

A negative correlation of -0.589[32] is identified between the variables of farm size and cost of compliance per ha and year. The survey results suggest that large-scale farms benefit from economies of scale both in terms of non-recurrent costs (-0.558) as well as in recurrent ones (-0.327). However, the degree of correlation only ranges between low and medium, which indicates that non-recurrent costs are influenced more by other determinants than by farm size (i.e. the technical level before compliance).

Furthermore, the data show a low level of correlation between recurrent cost and farm size. The largest component of the recurrent cost is additional labor costs. Even though some very small farms face relatively high additional labor costs per ha, no significant negative correlation is found between the size of the farm and labor costs per ha and year.

Another factor mentioned by Kleinwechter (2005) that has a relevant effect on the cost of compliance is the intention of the producer to which level he wants to upgrade its farm. Even though 34% of the producers indicate greater compliance in at least one category of the EUREPGAP protocol, no significant correlation is found among the compliance level and the cost per ha and year.

Analysis of how certified producers benefit shows that they experience very varied benefits from compliance. The largest number of interviewees (41.0%) indicated that certification had only brought them medium benefits[33], compared with an almost equal number who stated that they had received high to very high benefits (27.6%) or low to very low benefits (26.0%). Table 4 below breaks down the benefits and perceived benefits of certified producers according to category.

[32] Correlation is calculated by Sperman's ROH, since both variables were not normally distributed.

[33] On a scale from 1 to 8, high benefits are those that range between 7 and 8; medium benefits between 3 and 5; and low benefits 1 and 2.

Table 4: Benefits of EUREPGAP certification

Benefits of certified producers	Responses	
	Nr.	Percent
Better prices	2	3.7%
Better marketing conditions	13	24.1%
Better market access	7	13.0%
Better prices in future	1	1.9%
New market access in future	9	16.7%
EUREPGAP minimizes the risk of losing market share	22	40.7%
Total	54	100.0%

Source: own calculations

Only two producers indicated that they have received better prices since they became certified. However, both underline that certification alone does not change prices. Rather, new marketing strategies that accompany certification bring about higher prices by opening up new markets. However, several interviewees stated that, especially in the 2005/6 export season, prices had decreased tremendously, regardless of whether producers were certified or not. This finally led to the unfortunate fact that most producers that became certified in 2005 received lower prices with certification than prior to certification in 2004.

In terms of marketing, 13 producers indicated that they had better marketing possibilities with the certificate, while another 10 interviewees hoped to have better marketing conditions in the future. Most interviewees however stated that the most important benefit of EUREPGAP is that it minimizes the risk of potential market share losses. The potential of losing market share is seen as a very concrete threat in case of non-certification. As shown in Table 2 (subsection 5.2), 22 out of 30 producers fear losing customers in case of non-certification.

The results of the implementation stage can be summarized as follows. First, compliance costs are only weakly correlated with farm size. Second, EUREPGAP functions as an additional marketing argument regarding the benefits of compliance. However, the benefits of certification depend on the marketing strategy adopted: it is not the certification itself which contains certain benefits.

6 Similarities and Differences among Compliers and Non-compliers

This section aims to analyze whether any patterns exist for compliers and non-compliers.

The survey results affirm the existing assumption that large farms are certified to a larger extent than small and medium-sized farms. The two latter groups show a very diverse picture. While all bar three of the farms in the sample larger than 25 ha are EUREPGAP-certified, no particular pattern is apparent for farms between 5 and 25 ha.

There are various reasons for the strong tendency on the part of large farms to become certified. According to the interviewees, certification primarily matters in order to fulfill the "wishes" of the trading partners. Hence, certification of large farms rather reflects the producers willingness and their understanding of the importance of the quality of their products to their trading partners. However, various interviewees of very large farms indicated that the EUREPGAP certification is probably not particularly necessary in order to guarantee the products quality as consumers in any case trust the high quality of their products as a result of the direct and constant contact that large-scale farms tend to have with their trading partners.

In contrast, certification of smaller farms which lack the direct contact to their buyers would increase their level of conformity and open up possibilities for strategic horizontal partnerships and for vertical coordination. As the picture for farms between 5 and 25 ha regarding certification is particularly varied, following discriminant analysis particularly concentrates on this group. Five main statements can be made in this regard.

1) Certified farms show a higher level of vertical integration. Discriminant analysis shows highly significant differences among certified and non-certified producers related to their level of vertical integration. While 75% of certified producers were integrated at the downstream level, only 12% of the non-certified producers were. This highly significant difference underlines the importance of vertical integration – or at least vertical coordination – in guaranteeing the information flow between producers and consumers in both directions. It seems that direct contact to clients in particular often leads to a positive decision regarding certification. This is again underlined by the fact that 81% of certified producers indicated that they had experienced sanctions in case of non-compliance, compared with only 33% of non-certified producers. Consequently, the survey results hint that even though size plays an important role, it is largely the organizational level which leads to a positive decision being taken by small to medium-sized farms.

2) Certified producers cooperate with certified packing stations. Another highly significant difference among certified and non-certified farms is the quality level of downstream actors. 79% of certified producers indicated that their packing station is certified with the

British Retail Consortium (BRC), whereas only 11% of non-certified producers had trading relations with certified packing stations. This underlines how important the consistent fulfillment of quality requirements is along the whole value chain. Several interview partners stated that EUREPGAP certification without certification of the downstream actor makes no sense from a marketing perspective.

3) Certified producers have seen their market share develop positively over the last five years. Diffusion theory assumes that innovations take place in economically increasing branches of an industry. This assumption could be verified in the survey, since 75% of the certified producers indicated that they had benefited from positive exports within the last five years, compared with only 23% of non-certified producers.
4) Certified producers employ skilled workers. At least one highly skilled person works on 88% of certified farms; by contrast, only 24% of non-certified farms employ highly qualified employees. The employment of highly skilled workers tends to be of particular importance since the compliance with EUREPGAP demands a certain level of human capital not only from the owner of the farm but as well from the employees. A certain motivation and understanding of the standard is necessary for compliance.
5) Certified producers do not possess a higher level of education. Data analysis shows no significant difference between the educational level of certified producers in comparison to non-certified producers. However, since interviews were mostly conducted with farm managers and not with the actual owner of the farm, there may be some weaknesses in the data. In addition most producers participating on the exporting sector show a rather higher level of education.

7 Conclusions

The analysis of the decision process, coupled with the comparison of the decision process of certified and non-certified producers, opens up various interesting results and possibilities for interpretation.

One of the most important results of the survey is that being small in size seems to be overvalued in the discussion, especially when talking about the technical upgrading cost of the farm. Even though very large farms tend to become certified to a larger extent than smaller ones, the results do not suggest that small producers are particularly disadvantaged in the compliance process, as farm size correlates only marginally with the cost of compliance.

Instead, the results rather point to the fact that less-organized or less integrated farmers tend to be less favored, especially as forward integration diminishes the cost of compliance. Forward

integration tends to be of particular importance because of the direct access to information on the buyers' requirements. The vertical information flow plays a major role in the motivation to become certified. This is underlined by the finding that most non-integrated producers pay little attention to the importance of EUREPGAP in maintaining market share, in contrast to their vertically integrated colleagues.

Non-integrated producers mainly depend on horizontal information from other producers regarding all market developments in the EU. However, the results indicate that there is little interest in the sector in keeping non-integrated producers in the market by providing them information on particular market developments. One reason for that might be the very regulated EU import policy for Moroccan tomatoes. Morocco is only allowed to export a preferential quota of around 200,000 tons of tomatoes per year to the EU, and even though it has the production capacity, Moroccan suppliers are keen not to exceed this preferential quota. Hence, exporters are extremely interested in aggregating much of the quota within a small group of producers. According to various interviewees, the already very limited number of non-integrated producers' products for the export market will disappear within few years. However, this trend could of course change if the EU were ready to abandon its entry price system.

Another factor which might favor the readiness of less organized producers to export would be a functioning information system on market development, prices and quality requirements in the most important export destinations. At the moment, no functioning extension service exists in the area of Souss Massa which could complete non-integrated farmers access to marketing information.

However, using the term "small" as a synonym for less organized, less educated and technically less advanced production, as is often the case when analyzing smallholders' production, tends to be false when looking at small producers participating in the Moroccan tomato export sector, where producers are often only small in relative terms, and frequently much larger in size and in capital and human capital than small or even medium-sized producers producing only for the domestic market.

The survey only provides limited information regarding the impact of EUREPGAP certification on poverty in terms of excluding certain producers from the export market on poverty. As mentioned above, small producers in the export sector are only relatively small. Owing to their level of human and monetary capital, it is unlikely that these producers could fall below the poverty line if excluded from the export market. The domestic market has started to provide a market for greenhouse tomatoes, especially since the importance of higher quality tomatoes is increasing as supermarkets become increasingly common in the larger towns.

Some surveys exist that find that the production of higher products improves the competitiveness of the sector and thus increases employment (Maertens and Swinnen, 2006 and Minton, 2006). Similar to these surveys, the producers excluded from production were only small in relative terms and do not belong to the group of small scale farmers. However, while these articles find a positive poverty balance due to increasing job opportunities (resulting from increasing export capacity) for those who are "very poor" (e.g. migrant workers from other regions), this is not the case in the Moroccan tomato sector, since EU policy keeps Moroccan tomato production constant. If water were not a key limiting factor regarding increasing the production of high-quality tomatoes, the abolition of the entry price system could potentially show a positive impact on poverty in combination with producing high-quality tomatoes.

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E Final Conclusions and Future Research Needs

Results of the thesis show that the agricultural trading environment is increasingly determined by food safety and quality standards. The increasing stringency of standards leads to processes of (re)distribution within value chains. For some producers, standards open up new opportunities as they permit market access to high value market segments. At the same time, the process of (re)distributing market shares is accompanied by marginalization and exclusion as standards may impose prohibitively high barriers for certain producers in terms of the short-term and long-term efforts needed for production under certification. However, the results of the thesis did not support the existing concern of these standards establishing a particular burden for exports from developing countries and small producers within developing countries, respectively.

The results rather show how diverse the impact of standards on a macroeconomic as well as on a microeconomic level is and how complex the system of variables is which finally determines whether standards have a positive or negative impact on country, sector or producer level. The simple generalization of developing countries being a group of market share losers because of the increasing prevalence and stringency of standards is false.

In addition, the analysis showed that "being small" in terms of export quantity on the country level does not necessarily lead to a negative impact of food safety and quality standards on the export share. Results of the analysis rather hint to the fact that the public as well as private investment in SPS activities as well as a good communicational structure on food quality within the country increases the SPS capacity of, respectively and thus positively affects a successful export performance.

Results of the thesis show that the same differentiated perspective is necessary in order to understand the impact of food safety and quality standards on small producers. The generalization of small producers being particularly negatively affected by the higher prevalence of standards is far too simple. Particularly as the concept of "small farmers" as applied in this thesis is a relative one.

Results of the analysis show that on a theoretical basis, small farmers could well have a comparative disadvantage in complying with quality standards owing to their specific

endowments which hamper their ability to acquire information on the standard and to implement it. Additionally, the non-recurrent and recurrent components of the costs of compliance involved in a standard might be higher for small producers than for large farmers. And finally, from a downstream actor's perspective, working with many small farmers instead of a few large ones may be less attractive owing to higher transaction costs.

However, empirical evidence of the Moroccan case study shows that farm size only correlates marginally with the costs or compliance. The thesis shows how important the forward integration in the value chain is in order to understand the importance of food safety and quality standards for the marketing performance. To maintain market shares or even increase those in high quality markets, producers need information about the buyers' requirements. Results of the survey show the importance of vertical coordination and direct information exchange between downstream actors, buyers and producers as information on buyers' demands are rarely communicated horizontally amongst farmers themselves.

Future research needs

According to the three main research questions, the thesis chooses different theoretical as well as methodological approaches and a different set of empirical background literature. Future research needs will be analyzed separately for three different levels:

A) The impact of food safety and quality standards on developing countries exports:

The empirical evidence on the particular impact of standards on developing countries' trade flows is still limited. Available surveys are mainly case studies which analyze the impact of sanitary and phytosanitary (SPS) measures on trade flows of individual developing countries' export sectors. More quantitative research would be needed which leads to a differentiated and comparative perspective of the impact of agricultural and food standards among the group of developing countries. Further, the perspective of food quality and safety standards as a barrier and not as an opportunity is dominant within the literature. More research would be needed exploring how and in which manner countries manage to benefit from the increasing prevalence of standards.

B) The impact of food safety and quality measures on small producers:

Even though various surveys and case studies hint to the fact that small and medium farmers are being disadvantaged by the increasing prevalence and stringency of food safety and quality standards, little theoretical or empirical work has been undertaken on this subject. Few studies analyze the compliance process of small and medium producers in any detail. Even the question as to who complies with certain standards and who doesn't stays relatively unaddressed. More research would be needed which explores the impact of standards on a) small producers and b) rural development and poverty in a systematic way. Therefore it would be necessary to combine socioeconomic and institutional theories.

Many case studies report that downstream actors such as exporters are supporting small farmers in the compliance process. More empirical evidence would be needed as to why downstream actors act in this fashion, and how this affects power and value-added distribution along the value chain.

For some countries and sectors, there is some empirical evidence on the exclusion of small farmers from high-standard markets. More evidence would be needed of how problematic such forms of exclusion are. Only a few studies explicitly address the household effects of alternative income possibilities when certain groups of farmers lose market share because of the increasing prevalence of standards.

C) The compliance decision process with food safety and quality standards at the producer level

For a better understanding of the impact of food safety and quality standards on different producer groups, two questions are of major importance: 1) Which producers comply with the respective standard, and which do not; and 2) why do some producers comply while others do not? More empirical evidence would be needed for a deeper understanding of these questions. Furthermore, a detailed understanding of the compliance decision process as well as of the different variables affecting this process is still quite limited with respect to SPS measures. However, various articles and studies are available which analyze farmer's decision behavior from an innovational perspective within other contexts.

Currently, surveys argue that small producers are negatively affected by standards due to the higher costs of compliance. This argument follows the theoretical background of the economies of scale. However, more research would be needed which analyses a) the cost of compliance for different producer groups systematically and b) which puts more emphasis on other (socioeconomic and institutional determinants) which are important for the decision-making process.