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International standards and small-scale farmer behaviors: evidence from Peru

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International standards and small-scale farmer behaviors: evidence from Peru

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Abstract

The prevalence of food quality standards in international trade is constantly increasing and has a growing influence on developing countries. A wide range of literature in development economics focused on the determinants of the standard adoption and on the debate of whether international standards exclude small-scale farmers from high-value food markets. Otherwise, when exclusion is pointed out, very little is said on how problematic such forms of exclusion are. In this paper, we use the Hirschman's (1970) conceptual framework to examine which behaviors small-scale farmers adopt face to the incontrovertible standards, what happens to the farmers that are excluded from a specific certified market, and to what extent small farmers are affected to not be certified. Based on an analysis of primary data collected to examine the implication of GlobalGAP on the mango sector in Peru, we consider three main options for the small-scale farmers: "loyalty" (implementation of the standard under specific conditions), "switch" of market segment, and "exit" from the market. The last option leads farmers to sell all their production to small and volatile exporters, called golondrinos (swallows). We show empirically that some small-scale farmers (8% of the sample) comply with GlobalGAP standard thanks to the support from exporters (farming contracts which include the certification cost), while others switch of market segment by complying with the organic certification (12,5%). Organic certification substitutes for the GlobalGAP requirement in the EU market. Finally, we find a significant level of exit option (24%), especially among smaller farms, less specialized, and furthest from exporter plants. The latter seem very affected by the changes related to the GlobalGAP standard requirements: price risk on their production has increased and their bargaining power and agricultural income have decreased. They are particularly vulnerable because their level of investment (mango trees) impedes to radically change of farm activity

Keywords

standards, certification, small-scale farmer behaviors, Mango, Peru

Résumé

L'importance grandissante des standards durables pour les produits agricoles dans le commerce international a un impact de plus en plus important dans les pays en développement. Dans ce papier, nous nous intéressons aux implications de la mise en place du standard Globalgap dans la filière mangue au Pérou pour les petits producteurs locaux.

Mots clefs

Standards, Certification, Petits producteurs, Mangue, Pérou

JEL: L22, O12, Q13

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1. Introduction

The last two decades witnessed unprecedented changes in the agro-food sector through the proliferation of standards in international agricultural trade. After a period during which the states of developed countries actively implemented food safety standards (this has been exacerbated by a series of food scandals (Henson e Caswell, 1999)), voluntary standards emerging from the private sector have been developed to attend to rising consumer concerns regarding the conditions of production and trade of the goods they buy (Jaffee e Henson, 2004). These voluntary standards combine a mixture of food safety, environmental, and social dimensions, while an inherent emphasis is being given to product traceability. Consequently, standards not only affect the safety of final products, but also the whole organization of the supply chain (Hammoudi, Hoffmann *et al.*, 2009). For many farmers in developing countries, investing in agricultural niches for exportation may appear as a profitable option. However, a wide range of empirical literature dealing with the impact of rising international standards in developing countries so far has been to show that the stringent conditions tend to lead to the exclusion of smallholders and the inclusion of larger farmers (Key e Runsten, 1999; Dolan e Humphrey, 2000; Escobal, Agreda *et al.*, 2000; Reardon, Timmer *et al.*, 2003; Augier, Gasiorrek *et al.*, 2005; Vandermeer, 2006). Lack of access to human, physical, and social capital and the costs of certification are the most common factors explaining the non-compliance of smallholders with standards (Busch e Bain, 2004; Vorley e Fox, 2004). On the contrary, some less pessimistic studies find positive effects on very small farms, which are included in the high-standard market through a contract-basis with the agro-exporters (Chemnitz, 2007a; Chemnitz, Grethe *et al.*, 2007b; Maertens e Swinnen, 2009; Minten, Reardon *et al.*, 2009; Asfaw, Mithöfer *et al.*, 2010; Henson, Masakure *et al.*, 2011).

In fact, standards affect all producers differently, depending on the nature of the standard as well as the institutional environment of the country and the characteristics of farms (Chemnitz, Grethe *et al.*, 2007b). However, very little literature examines what happens to the farmers that are excluded from a specific certified market and to what extent small farmers are affected to not be certified. Moreover, exclusion from the market requiring standards may not necessarily be problematic, depending on the alternative options (market, employment opportunities...) for farmers (Belton, Haque *et al.*, 2011). Our paper is a contribution to the scarce literature analyzing the implications that international sustainability standards have on the behavior of (potentially) excluded farmers and their impacts in terms of marketing risks and income levels.

In this paper, we focus on small-scale producers of fresh mangos in Peru. The fresh mango sector in Peru is an interesting case, as the private GlobalGap standard (GG) – the most important standard that applies to production of fresh mangos – has become quasi-mandatory for exportation to the European Union (EU) since 2007. Kleinwechter and Grethe (2006) have studied the adoption of the Globalgap standard in the mango export sector in Peru in 2004-2005. However, they didn't explore the implications for smallholders. Yet the new context raises the question of the manner in which Peruvian small-scale farmers respond to this new predominant standard. Drawing on an adaptation of Hirschman's (1970) conceptual framework – also used by Henson and Jaffee (2008) on the food safety standard's impact – we consider three main options for mango growers in Peru: “loyalty” (implementation of the standard under specific conditions), “switch” of market segment, and “exit” from the market. We first held some qualitative interviews with experts and supply chain actors before implementing a quantitative approach aimed at identifying the producers' characteristics for each alternative option. Surveys were conducted with 223 small-scale mango producers from

October 2010 to May 2011. Data was collected in northern Peru, in the region of Piura, the main zone of mango production.

The paper proceeds as follows: section 2 provides a background of mango production and trade in Peru and the evolving international trade towards standards; section 3 develops the analytical framework used to formulate hypotheses; section 4 describes the survey and data; section 5 presents and discusses the empirical findings; and section 6 concludes the paper and reports some policy implications of the study.

2. Fresh mango sector in Peru

Production and trade

In Peru, agriculture is still a source of economic development. It accounts for 8% of the GDP and provides 23% of direct and indirect employment (Inei, 2008). Contrary to numerous exported agricultural products, mango production in Peru is also locally consumed. The cultivated area is around 28,400 ha for a production of 250,000 tons in 2010 (Minag, 2010). Peru exports around 30% of its national production (105,724 tons in 2009/2010) and is the fifth largest mango exporter in the world. Fresh mangos are by far the most important of exported mangos (87% of exported mango volumes in 2009, according to customs). Exports go to both the EU (65%) and US (35%) markets (Gerbaud, 2010).

Production is concentrated in northern Peru, in the region of Piura (around 70% of the national production and 90% of exported production). The main mango varieties grown for the domestic market are the local variety, Criollo, and the improved variety, Edward. For the export market, improved varieties such as Kent (94.5% of export volumes) are cultivated (Senasa, 2010). Piura export-oriented production is harvested between November and March. Beyond the harvesting period, the export window is linked to the targeted market and to the competition between countries. For the EU market, Peru – the second largest supplier – competes with Brazil in November and December. For the US market, Peru – the third largest supplier – competes with Ecuador in December and January (Gerbaud, 2010).

The Free On Board price (FOB, price at the exporting port) for exported Kent mangos is substantially higher than the price for mangos sold on the national market (except for Edward at the end of its harvesting season). The monthly FOB prices for exportation to the US and to the EU are nearly similar for both markets. Nevertheless, there are some monthly or annual variations due to the level of supply on the targeted market (Gerbaud, 2010). Otherwise, prices for Edward or Criollo varieties are substantially higher than those for the Kent variety on the domestic market, as Peruvian consumers do not value the taste of the latter. The domestic market alternative for Kent mangos is thus not profitable.

Access to the market

For the domestic market, mango producers generally sell their mango production through brokers who supply the market of Lima. Most producers have informal contracts with their broker where price is flexible and depends on the final demand price. These middlemen deduct a commission (around 10%) of the sale price, but are never product owners (Avsf, 2008). These types of transactions require long-term relationships and confidence between the producer and the broker (the latter is often related to the producer) (Avsf, 2008).

For the export market, the first constraint to accessing an outside market is related to the minimum volume required by the buyer (at least one container, i.e. 20 tons). This explains

why small-scale producers (on average hardly producing 20 exportable tons) have to form an association in order to get export market access. The second constraint is that the mango exporters must meet commercial quality requirements. Quality characteristics like color (red), appearance (no scratches) and size (at least 450 g) are essential. Lastly, although there are not any compulsory Peruvian public norms on good practices for domestic mango production, export-oriented producers require a phytosanitary certificate from the SENASA (Servicio Nacional de Sanidad Agraria del Peru) – the public agency in charge of inspection, control, and eradication of the fruit fly.

Non-tariff measures and constraints from the US and EU markets

For both the US and EU markets, exports are required to respect the Codex Alimentarius and maximum pesticide residual levels (MRL). Nevertheless, some differences exist between the market requirements. The most demanding norm for exportation to the US relates to a public norm: a hydrothermal treatment is required to kill fruit flies; the mangos undergo a hot water treatment in a certified processing plant. For this, the APHIS-USDA (U.S. Department of Agriculture's Animal and Plant Health Inspection Service) allocates personnel to each treatment plant so as to monitor the hydrothermal process during the fresh mango season. The high costs of initial investment in certified plants and treatment supervision are charged by the exporters, which explains why there are so few treatment plants in Peru: there are nine certified treatment plants, but only six are working (two in the Sullana area and four in the Tombogrande area). Otherwise, the US private standards required by importers are most frequently specific to manufacturing or processing plants: the GMP (good manufacturing practices) and the BASC (certified good handling and shipping practices). Concerning production, the most widespread private standards in mango production are those for organic certification. Contrary to the US, Europe does not require hydrothermal treatments. Mangos exported to Europe are cleaned and then packed in 20 existing packing plants in Peru. Most of them are also located in the Sullana and Tombogrande areas. Beyond the Codex Alimentarius and the MRL, barriers to trade in the EU are therefore much more relative to private standards: at the plant level, the HACCP is essential; at the production level, Globalgap has been becoming almost mandatory since 2007, and organic certification has spread.

Export-oriented organizations and stakeholders

In Peru, about 28,400 ha are cultivated for mango production, 70% of which are located in the Piura region. In 2009, 1,627 producers received phytosanitary certificates from the SENASA and were thus allowed to export their mangos. Among these producers, 75% are smallholders (less than 20 ha of total land), 20% are medium farmers (from 20 to 50 ha), and 5% are large-scale farmers (more than 50 ha). They account for 30%, 30%, and 40% of exported produce, respectively. Larger farmers are generally vertically integrated into exporter enterprises and thus export their own mango production. However, there is large variability in mango production from year to yearⁱ. Thus, these exporters generally complete their own production by purchasing from smaller farmers. Small-scale producers may thus have annual contracts (written or oral contracts, but hardly enforceable). Through these contracts, they steadily delegate harvests to the exporter (or a third party assigned to harvest on behalf of the packing plant), since it becomes very difficult to gather daily workers. In addition, in many cases, producers hardly have any access to credit to pay workers. A disadvantage of that service is the high level of mangos discarded during the harvest – the discarded mango rate is on average 20%. Exporters are also in charge of carrying out transportation to the processing plant. Prices are rarely fixed and pay is often delayed.

Nonetheless, for a monthly adjustment strategy, exporters do not implement farming contracts with smallholders.

In 2009-2010, there were 106 fresh mango-exporting companies (Senasa, 2010). While the production is highly atomized, there is a rather medium concentration of exports in few exporting companies: the top 10 represent 46% of the total export volume. However, when compared to the figures from 2005-2006 (Fulponi, 2007), this concentration in the mango-exporting sector has decreased these last five years, revealing a still very attractive and expandable market. Furthermore, the sector shows a relatively low entry barrier for small exporting companies. Therefore, the sector actors complain about the high number of small and very volatile exporter firms (60% treat less than 500 tons per year) that enter the market for short run market opportunities. These sporadic exporters are called “*golondrinos*” (meaning “swallows”). These firms are subjected to the most border rejections. On the other hand, larger exporters mostly rely on their own production (from 50 to 250 ha) and still tend towards increased vertical integration, even though land has become very expensive nowadays. They are generally targeting both the EU and US markets. They have easily enforced quality, traceability and certified production – in particular GG. They own packing or treatment plants or subcontract for the packing and treatment process.

International standard schemes for fresh mangos

The GG guideline ensures good agricultural practices focusing first on food-safety, but also a number of issues concerning environment quality, worker safety and hygiene, and traceability on the farm. The certificate includes some initial investments (such as toilets, canteens for workers, water taps, safety equipment, and storage facilities for agricultural inputs and outputs, respectively) that require substantial financial capital to upgrade the farm. It also entails annual costs for external inspection by a certification body. Finally it requires that the producer know how to read, write, and keep records – which means a high level of human capital. Producers have two options to obtain certification under the standard: they can apply individually or apply collectively for a producer group certificate. Forming producer groups may reduce costs at various levels (lower cost for external inspection, shared investments...) (Narro, Roy *et al.*, 2009; Asfaw, Mithöfer *et al.*, 2010; Belton, Haque *et al.*, 2011). However, the mango-producing sector is little organized. Furthermore, the cost of compliance may appear particularly high since GG certification does not include the price premium. The size of an individual enterprise may thus appear as the major determinant of the standard’s adoption. According to our first qualitative interviews, the minimum profitable size to individually implement GG is around 20 ha.

Organic production represents 1% of the total mango production in Peru (3,000 tons in 2007). According to Promperu data from 2007, 36% of organic mangos are exported to the US and 64% to Europe (that is almost the same as the conventional mango market). Organic certification focuses on food-safety, environment quality, and traceability on the farm through agricultural practices that do not involve chemical inputs. The certificate includes few initial investments, but entails annual costs for external inspection by a certification body – meaning a minimum level of financial capital– and requires that the produce be able to read, write, and keep records – meaning again a minimum level of human capital. Again, producers have two options to obtain certification under the standard: they can apply individually or apply collectively for a producer group certificate. The organic certification generally includes a better price that could compensate the cost of certification and a possible lower yield.

3. Analytical framework and hypotheses

An analytical framework

Given the scarcity of an adequate amount of literature to analyze the implications that international sustainability standards have on the behavior of farmers, we propose to draw on the simple conceptual framework developed by Hirschman (1970), who analyzed the economic and political behavior of firms, organizations, and states facing a declining situation. Henson and Jaffee (2008) then used this framework in the specific case of food safety standards to analyze the strategic responses of developing countries.

Hirschman compares strategic options by various organizations and describes strategy types through the concepts of “exit”, “loyalty”, and “voice” (Hirschman, 1970). The “voice” option involves complaining or negotiating through lobbying. Concerning food standards, Henson and Jaffee (2008) argue that “voice” could be understood as protesting against new standards, for example, at the WTO level when standards are judged unfair or as a protectionist barrier. The “loyalty” option involves the organization’s participation – this could be interpreted in the food sector as an alignment with the standard’s requirements (Henson and Jaffee, 2008). Lastly, the “exit” option involves ceasing participation – this could be interpreted in the food sector as choosing not to comply with the standard in a particular market, i.e. switching customers or particular markets if alternative profitable markets exist or, if no alternative is available, definitively stopping the activity. Moreover, Henson and Jaffee (2008) propose another dimension to Hirschman’s framework related to when option is implemented: ex-ante “proactive” behaviors (anticipating standards) or ex-post “reactive” behaviors (waiting and adapting). The most negative approach is thus a combination of “exit” and “reactive” behaviors.

As Chemnitz *et al.*, (2007) and Henson and Jaffee (2008) have already highlighted, the ability to implement the various options will depend on several factors at the country, market, and firm levels, as well as the specific food standards.

Specificity of the case study

In our paper, we question the implications of the restructuring of the mango supply chain by growing private standard requirements, GG in particular, on small-scale producers. The farmers we surveyed are export-oriented (they grow the Kent variety, which is not valued locally), but may not be certified since they do not have enough land (they own less than 20 ha).

We have to specify the above framework according to the relevant options for our case study. The need for contextual analysis is obvious. For instance, because we focus our analysis on small-scale farmers in Peru who are very fragmented and little organized, the “voice” option does not appear relevant and most of these smallholders have “reactive” behaviors. We thus specify three main alternative options available to small-scale export-oriented farmers:

(i) Loyalty: As we mentioned above, producers have two options to obtain certification under the standard: either by applying individually or by applying collectively for a producer group certificate. In the case of small farmers who hold less than 20 ha, the loyalty strategy at the individual level seems difficult due to the fixed costs of compliance. The only option is thus that farmers organize themselves within producer organizations so as to comply collectively with standards. Yet the length of the mango harvest (three months) seriously limits the opportunities for the development of efficient collective action.

(ii) Switchⁱⁱ: Producers will continue to export to the EU and the US indifferently since they adopt organic certification. Organic certification substitutes for the GG requirement in the EU market.

(iii) Exit: They will no longer export to the EU and will target the US or domestic markets instead. This means that the “auspicious” export window is reduced for these producers, perhaps implying that the farmers replace their usual exporter. In extreme cases, the farmers may uproot their Kent mango trees (intended for export) and replant new orchards with Edward or Criollo mango trees for the domestic market (targeting the higher segment of the domestic market).

We must mention that non-certified producers do not yet face total exclusion from the EU market as a whole since EU importers can buy non-certified products when no GG produce is available. Consequently, some small-scale producers still have not chosen an option (later, they will be included in a control group named “continue”). Moreover, these alternatives are not totally exclusive, but we assume that the third is probably more frequent.

Besides, the above analysis framework does not give any idea of the benefits or disadvantages for small farmers to adopt one type of marketing behavior. We will thus additionally formulate a research hypothesis on the impacts of these options on income and marketing risk for farmers.

Research hypotheses

It may be necessary to introduce some hypotheses to test the impacts of marketing options on prices and marketing risks. We think that GG’s introduction may have ambiguous impacts on non-certified smallholders.

First, when some small-scale producers choose the “loyalty” option (i.e. compliance with the GG standard), one could expect positive results on income and marketing stability:

(iv) Price and Stability: GG certification does not involve the price premium, but since it could increase market access when the EU export market is favorable, we expect prices to increase. Besides, since GG compliance often leads to stronger vertical coordination through farming contracts, we expect producer-exporter relationship stability to increase.

Second, the “switch” option may have positive results on the income and marketing stability for small-scale producers:

(v) Price and Stability: Organic certification involves the price premium, which could balance the costs of compliance. It could also increase the security of market access due to product diversification. Consequently, we expect price and market stability to increase.

Third, the “exit” option may have negative results on the income and marketing stability of non-certified smallholders:

(vi) Price: Non-certified producers switch to supplying the domestic market, where the price for Kent mangos is substantially lower than on the international market.

(vii) Risk: Non-certified producers switch to supplying “*golondrinos*” (unknown buyers). This is likely to increase their marketing risk (unstable relationships, insecure markets, low prices, etc.).

However, the demand for certified products may have indirect positive results on the income of non-certified producers:

(viii) Price: Conventional product demand from the US may mostly be satisfied by the supply chain responses of non-certified producers. In addition, the bargaining power of these

producers compared to small-scale exporters, such as *golondrinos*, may increase. Consequently, we could expect non-certified producer prices to increase.

(ix) Hired labor: The increase in certified exporters' own production increases the need for hired labor. Consequently, we could expect a higher labor demand for non-certified producers at the village level.

(x) Income: The increase of price for conventional mangos and the increase of hired labor may increase the total income of non-certified producers.

4. Survey and data

Survey and method

This empirical study was led in the framework of the EU NTM-Impact Project (www.ntm-impact.eu), whose objectives include the analysis of the impacts of non-tariff measures (NTMs) from high-income countries – governmental regulations and private standards – on developing countries. Between October 2010 and May 2011, we undertook a survey of 223 mango producers in the main mango region of Piura, where over 90% of exported mangos originate. We focus our analysis here on small farmers with less than 20 ha and who represent 20-30% of mango exports and 70-80% of all mango producers. We randomly selected 19 villages located in the two main areas where exporters' plants are found – Sullana and Tambogrande. Within these villages, producer surveys were chosen randomly among the farmers growing Kent mangos (i.e. export-oriented) with holdings of less than 20 ha (i.e. small farmers for whom individual GG certification might be unprofitable). Surveys were conducted on a face-to-face basis. The data collected through the questionnaire include: farm and household general characteristics, household assets, mango production and marketing behavior, mango standard certifications (organic and GG), other activities, changes and perceptions since GG is required by exporters. According to the surveys, producers no longer know where their mangos are exported to because large exporters generally export to both markets. The producer does not choose an export target, but rather an exporter.

Data analysis

To describe the sample of producers, descriptive statistics are applied. To describe factors that may have influenced the farmers' marketing behaviors and determined perceived impacts of standard requirements, an analysis is performed using t-test and Chi²-testⁱⁱⁱ. In this paper, we do not show a causal effect of GG certification on producers, but rather we depict the characteristics and perceptions that characterize the different types of producers in the alternative options. Finally, estimating a regression model tests the hypothesis concerning the impact of these options on the price received for mangos. In addition, we also control for other factors considered to be relevant, such as the variables of farm and household characteristics and relationships with buyers. The dependant variable of the regression is the logarithm of the highest price received by the farmer. We do not know the volume sold at this price, but since farmers generally harvest once or twice per season and that the discarded mangos could not have received the highest price, we can assume that it was a sizeable amount of the farmer's production. We think that it could be a good proxy of the producer's bargaining power and final income (given the volume of mangos).

Characteristics of farmers and marketing behaviors

Within our sample of 223 producers, the average farm size is 8 ha, 3.3 ha of which is dedicated to mango production (85% of land dedicated to mango production is for Kent mangos, followed by traditional mango varieties for the domestic market and personal consumption). 80% of respondents say that mangos are the most important product grown in terms of cash flow. Most small-scale producers are also day laborers at other farms (13%) or have extra agricultural income (14%). On average, they have grown mangos since 1997, but most of them started after 2000, when exportation raised dramatically. Their distance from the nearest plant (treatment or packing plant) is around 14 km.

(i) Loyalty: 31% of farmers surveyed have heard about GG certification and only 8% (18 cases) are GG certified. GG certified producers are scarce, as we expected for smallholder farmers. The average certification date is 2009 (from 2007 to 2010). The compliance cost is US\$ 2,000 per year (without any variability among respondents). The certificate is paid sometimes by the producer himself, but mostly by the exporter if the farmer is under contract or by a producer organization (half of GG producers are members of an organization, 22% of the total sample). Initial investments (such as toilets, canteens for workers, water taps) are more often paid for by the producers thanks to a rural credit bank.

(ii) Switch: 12.5% of producers are certified organic (28 observations). The average certification date is 2007 (from 2004 to 2010). The annual cost of certification is around US\$ 2,000/year and is mostly paid for by the producer himself or a producer organization (in few cases by the exporters).

Nine producers are both GG and organic certified.

(iii) Exit: 9% of producers declare to have increased their volumes sold to the domestic market since 2007 (33% have decreased and 54% have experienced no change). All producers grow varieties for the domestic market (an average of 15% of their total mango crop surface), but they have not increased these areas nor decreased the Kent variety areas. Otherwise, 33% say that they have increased their volumes sold to unknown traders since 2007 (29% have decreased and 35% have experienced no change). Unknown traders are generally *golondrinos*^{iv}, i.e. exporters with a very volatile existence, taking advantage of a particular market opportunity. We already know that most producers (85%) work with unknown traders each year, particularly to sell any Kent mangos rejected by their usual exporters. 34% of producers declare selling low volumes to these traders and 42% of producers declare selling a high volume to these traders each year. 56% of producers who declare huge volumes to unknown traders say that these volumes have increased since 2007 – the latter (24% of the total sample) are considered among the “exit” option below because they no longer know to whom they are selling their mangos.

5. Results and discussion

At the producer level, we compare the three options proposed above: loyalty (GG adopters), switch (organic adopters) and exit (selling mangos to unknown traders) behavior categories according to some selected variables.

As presented in Table 1, the average total land size of GG adopters (loyalty) is significantly lower than the control group (continue). Yet similar to organic adopters (switch),

the farmers are significantly more specialized in mango production (ratio of land). Regarding yield in 2009, there are no significant differences among the groups – the lower yield expected for organic farming is not significant. Regarding the exit option, the average size of total land is a little lower than their counterparts and these producers have a little less mango production.

Household characteristics do not show any important results in terms of our comparison, except that GG adopters and exit producers are more likely to have income from an agricultural off-farm activity. This could be explained in different ways: while it is proof of GG adopters' access to financial capital that could be reinvested in their farms, conversely in this case of exit producers this could suggest that their farm is not profitable enough to bring sufficient income. They are also less likely to own a car.

Table 1: Mean comparison analysis of producer characteristics according to alternative options

	Continue ^a (n=137)	Loyalty (Globlgap) (n= 18)	Switch (Organic) (n=28)	Exit (Do not know anymore their buyer) (n=49)
Farm characteristics				
Total land size	8,81	4,2***	6,8	7,18*
Ratio of land size under mangos	0,52	0,82***	0,65**	0,53
Ratio of mango area under Kent	0,84	0,88	0,87	0,84
Volume of mangos 2009	16,96	10,4*	10,71*	12,48*
Yield 2009	8,00	8,34	6,69	7,47
Household characteristics				
Age	55,6	51,4*	51,3**	57,7
Education	1,49	1,61	1,46	1,48
Experience	15,77	14,4	12,96**	15,57
Children (<15 years)	1,67	1,5	1,70	1,43
Mobile phone	0,64	0,77	0,64	0,65
Car	0,27	0,16	0,18	0,12**
Date of car	1995	2004*	2002*	1991
Agri. off farm Income	0,08	0,33***	0,14	0,20**
Market access and relation w/ buyer				
Distance to plant	14,9	7,8***	11,5**	14,4
Packing plant	0,68	0,94**	0,68	0,84**
Works only w/ 1 exporter	0,71	0,88*	0,73	0,37
Used to have written contract	0,15	0,66***	0,43***	0,02**
Used to have no contract	0,57	0,27***	0,39**	0,77***
Technical advices	0,5	0,77***	0,5	0,02***
Advance payment	0,18	0,44***	0,28*	0,04**
Month is important for buyer	0,27	0,22	0,14	0,39**
Color is important for buyer	0,49	1***	0,90***	0,44*
Weight is important for buyer	0,51	1***	0,85***	0,51

*Statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) level of probability*

^a Continue is the control group (i.e. the total sample without standard adopters and producers who declare huge volume to unknown traders and said that this volume has increased since 2007).

Among variables related to market access, the distance is significantly lower for standard adopters. This could suggest that standard compliance may be more the result of an exporter's decision rather than that of the farmer. This could be supported by the fact that it is the exporters who manage the harvest inside the mango farms. Other variables related to relationships with buyers, such as contracts (used to having written contracts or not) and

advance payments, differ significantly. Written contracts and advance payments attest to close relationships with the buyers. In the case of GG adopters, farmers are also more likely to receive technical advice from the buyer and the presence of nearby packing plant (namely exclusively EU-oriented) is significantly higher compared to the control group. The results lead to the same conclusion as Kleinwechter and Grethe, who have shown that vertical integration or some forms of closed vertical coordination, such as contract farming, can be seen as the most important factor influencing GG compliance (Kleinwechter e Grethe, 2006). Moreover, standard adopters' buyers are significantly more demanding in terms of commercial quality (color and weight) than those of their counterparts. Finally, exit producers have significantly less contracts with buyers; they do not benefit from technical advice or advance payments, even if a packing plant is generally and significantly more accessible for them than for the control group. For the exit option, buyers are more demanding on the month of the available production, suggesting that the buyers have shortened export windows.

From Table 2, which analyzes the farmers' perceptions of changes since 2007, the perception of farmers regarding production costs do not show any significant differences between option categories: 60% to 75% of producers declare that production costs have increased. However, within the exit option group, a significant number of producers (12%) declare that production costs have decreased. The higher production costs expected for GG and organic farming are thus not significant. On the contrary, the perception of price risk and the stability of buyer relationships show stark differences: while a significant number of organic producers declare that price risk has decreased or at least not increased, GG producers insist on the heightened stability of their buyer relationships. For the exit option group, both indicators of price risk and stability have deteriorated since 2007.

According to the categories, 11% to 21% of producers have increased the amount of land dedicated to mangos, particularly the Kent variety^v. Nonetheless, there is no significant difference between the categories. In addition, none of the producers have decreased their land allotments for mangos (i.e. uprooted mango trees). These results suggest that, for the moment, none of the producers tend to exit from the mango production activity. Since mango trees represent an investment, we could easily understand why producers do not react promptly to the market signals. Switching costs are high. In addition, both standard adopters are more likely to increase their land allotments for cocoa than the control group, and inversely the land for cereals. Cereals are annual crops for the national market. Prices vary, but farmers can switch crops yearly. Fruit trees (mainly lemon trees) mentioned by the producers surveyed are planted to sell the production on the domestic market. They represent an investment for farmers (trees do not produce the first years), but prices on the local market are more secure than on the international one. Cocoa trees represent an investment for farmers and the production is sold exclusively on the international market, generally allowing for better prices, but also higher marketing risks. Therefore, the result suggests that standard adopters are less risk-averse than the non-adopters^{vi}. With regards to the exit option, farmers have been more likely to grow cereals since 2007, which illustrates a defensive strategy.

Table 2: Mean comparison analysis of producer perceptions according to alternative options

	Continue ^a (n=137)	Loyalty (Globlgap) (n= 18)	Switch (Organic) (n=28)	Exit (Don't know anymore their buyer) (n=49)
Risks and stability in market access				
Production costs have increased	0,60	0,72	0,75	0,67
Production costs have decreased	0	0	0	0,12***
Price risk has increased	0,66	0,66	0,50**	0,82**
Price risk has decreased	0,15	0,11	0,28*	0,14
Stability of relation w/ buyer has increased	0,32	0,50**	0,43*	0,14**
Stability of relation w/ buyer has decreased	0,25	0,05**	0,25	0,37
Increased land under Kent	0,21	0,11	0,14	0,20
Increased land under cereals	0,22	0***	0***	0,35*
Increased land under fruit trees	0,36	0,61*	0,39	0,47
Increased land under cocoa	0,02	0,44***	0,21***	0
Income and bargaining power				
Off farm labor has increased	0,07	0,16*	0,21***	0**
Off farm labor has decreased	0,18	0,05	0,18	0,12
Mango prices have increased	0,37	0,55	0,57*	0,40
Mango prices have decreased	0,32	0,22	0,21	0,34
Earlier payment	0,24	0,38	0,14	0,24
Later payment	0,33	0,05**	0,28	0,24
Bargaining power has increased	0,26	0,33	0,32	0,08***
Bargaining power has decreased	0,31	0***	0,17**	0,53***
Income has increased	0,34	0,55**	0,43	0,22
Income has decreased	0,30	0,16	0,32	0,48**
Working conditions				
Labor has increased	0,49	0,77**	0,86***	0,63*
Labor has decreased	0,021	0	0,01	0
Working conditions are improved	0,26	0,72***	0,50***	0,14*
Working conditions are deteriorated	0,19	0***	0***	0,42***

*Statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) level of probability*

Among the variables related to income and bargaining power, standard adopters are more likely to declare that off-farm labor has increased. When looking at the qualitative answers for the kind of job they have adopted, they declare to have small shops. Increasing off-farm labor

may thus reflect a better financial situation for these farmers, as they were able to invest in the shop, rather than a pessimistic one (looking for extra income outside of an unprofitable farm). For the exit option group, off-farm labor has not increased. Our hypothesis that certified exporters are more likely to increase their need for hired labor and thus the demand for labor at the village level does not concern hired labor from the exit option group. Since labor contracts are for only three months, the mango season's peak, we can think that the seasonal workers are thus generally not mango producers themselves. Organic farmers are more likely to declare that mango prices have increased (57% of them) since GG farmers a large number of them declare that their income has increased and that they do not receive later payment for that. In addition, both standard adopter categories perceive that their bargaining power has not decreased since 2007, while their counterparts dramatically perceive a decrease of their bargaining power. Lastly, among the variables related to working conditions, both standard adopter categories declare that the labor has increased in their farm since they have complied with the standard. However, their working conditions have also significantly improved. Actually, mango production is low labor-intensive. Yet because they comply with the standards, farmers have increased their labor time on the farm, mostly because they have to keep records of all their farm practices. On the contrary, exit option producers declare that their amount of work has increased on the farm, but their working conditions have deteriorated.

To further investigate how the bargaining power of farmers is affected by the certification, we estimate a simple regression on the level of the highest price received by farmers in 2009 for Kent mangos (Table 3). According to the results of our model, the loyalty option (GG adopters) is positively and strongly related to receiving a better price for mangos, corroborating our hypothesis. We cannot conclude that the causality of certification on the price level^{vii}, but the result can suggest that if there is no price premium included in GG compliance, certified farmers have better access to the market when the price is high and the supply is highly competitive. In the same way, the coefficient for the switch option (organic certification) shows that produced received a significantly a better price, corroborating the fact that organic certification generally includes a price premium from the buyer. According to our initial hypothesis, the exit option (non-certified producers who no longer know their buyers) may have ambiguous effects on the price: from the Table 3 results, none of the hypotheses (positive or negative impacts on the price) are actually verified. Among the other statistically significant variables in our model, the total volume of mangos sold in 2009 is positively correlated to a higher price, as we could expect since the volume also determined the bargaining power of farmers with traders. The month of the mango harvest is also important in determining the price received. Consequently, producers for whom harvests mostly take place in January are more likely to receive a lower price. Otherwise, we find no evidence that having more experience, getting a car or a mobile phone – this could increase farmer bargaining power through better access to information —improves the prices received by farmers. Moreover, the fact that a treatment plant (i.e. easier exporter access to both the US and EU markets) is the most available plant for the farmer does not influence the price received for mangos. And finally, to be paid earlier does not damage the bargaining power of farmers.

Table 3: Regression estimation results

<i>Dependant variable: log. of highest price for mango in</i>	Coeff.	Std. dev.
Alternative options		
Loyalty	0.205***	0.080
Switch	0.123**	0.064
Exit	- 0.156	0.049
Farm characteristics		
Volume of mangos 2009	0.002**	0.001
Production peak in December	- 0.005	0.042
Production peak in January	- 0.119***	0.049
Household characteristics		
Experience	-0.002	0.002
Mobile phone	0.045	0.044
Car	0.067	0.050
Market access and relation w/ buyer		
Packing plant	0.042	0.049
Risks and stability in market access		
Earlier payment	-0.057	0.047
Constant	2.382***	0.141
Pseudo-R²	0.17	
	207	

6. Conclusion

This paper addresses the gap in the literature regarding the implications that international sustainability standards have on the behavior of (potentially) excluded farmers and their impacts in terms of marketing risks and income levels. Drawing on the adapted concepts of Hirschman (1970), we have used this analytical framework to compare alternative options that mango producers in Peru have been progressively following since GG exporter requirements are growing. Data collected through a representative and large number of surveys with small-scale export-oriented producers (223 surveys) show three main options adopted by these farmers. First, we find evidence that the loyalty option exists since some small-scale producers are complying with GG (8% of our sample). Exporting companies thus support these farmers in complying with the standard through farming contracts, technical advice, and by paying the annual certification costs. This support allows small-scale producers to be included in the lucrative international market (these farmers received a significantly better price for mangos). Nonetheless, farmers who are integrating into this supply chain seem to be selected according to two characteristics: they are more specialized in mango production (more than 80% of their land) and they are closer to the exporter plant. Exporters may thus decrease transaction costs by selecting productive farmers close to their plant. Second, we found farmers who adopt another option (switch option) to bypass the difficulties of complying with GG certification by implementing organic certification. Organic certification, which required less initial investment from farmers, substitutes for the GG requirement in the EU market. Third, we found a steady number of farmers who declare that they no longer know their mango buyers. These buyers are the well-known *golondrinos*, which represent 30% to 50% of the exporter companies and are very volatile. Farmers belonging to this option

group seem to be very affected by this change: a large majority (82%) declares that price risk has increased, that stability with farmers has rather not increased (compared to their counterparts), their bargaining power and their agricultural income have decreased, and last that their working conditions have deteriorated. They are particularly vulnerable because their level of investment (mango trees) impedes to radically change of farm activity. Switching costs are high. These farmers – characterized by rather low total land size, low mango volume, and never used to getting any contract farming, technical advice, or advance payments – represent 24% of our total sample.

This study aimed to contribute to the analysis of the extent to which small-scale farmers are affected by non-certification and thus how problematic such forms of exclusion are. The latter is of interest to policymakers since Peruvian agriculture is still source of economic development and represents a large source of employment. We show in this case study a significant level of exit option (which is more an exit of the stable usual supply chain than a definite market exit). Consequences of growing international standards in different agricultural sectors are thus very important to analyze in order to develop adapted policy recommendations.

Finally, to pursue this analysis it would be interesting to better understand why some farmers (the “continue” control group) are still not affected by the international standard requirements, without any changes to their way of supplying exporters. It would thus be necessary to interview their specific exporters. Otherwise, this could be due to the lack of GG enforcement, since it is known that some exporters mix certified production with uncertified production and sell it under the same brand (Fulponi, 2007). Unfortunately, it is difficult to get GG figures to compare the surface certified and the volume sold with the global standard.

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ⁱ For example, the 2008-2009 season was disastrous in terms of production (due to agronomic reasons). Numerous producers mention a reduction of around 50% of their production level.

ⁱⁱ Contrary to Hirschman's framework, in our particular case, we do not include switching customers in the exit option because "switching" here means to comply with another standard, which is related to an offensive strategy by farmers following the widespread use of GG certification.

ⁱⁱⁱ We cannot use a multivariate logistic regression model because alternative options are not totally exclusive.

^{iv} This is less likely to be a new broker for the domestic market, which does not present a profitable opportunity for the Kent variety. In addition, in the domestic market, producers are used to working with the same broker, often a relative.

^v While producers have increased land allotments for mangos since 2007, it is always with the Kent variety and never with other domestic market varieties (Criollo or Edward).

^{vi} Since cereals may require more land than fruit trees or cocoa to be profitable, we control that the land size area available for other crops in the farm was not a limiting factor for standard adopters to increase land allotments for cereals.

^{vii} We have no latent variables to control whether the price is due to the new certification or to the fact that this group of producers may have been initially more efficient.