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Abstract:
As consumer demand for organic food grows, organic certification is increasingly promoted in many developing countries. Organic products earn a premium price on the market compared to conventional varieties. Hence, organic production is often seen as a valuable alternative for developing countries with many smallholders. Using value chain analysis for the case of the pineapple sector in Ghana and extensive data from the European market, this paper tries to shed light on the feasibility and profitability of organic small-scale production. Even though smallholders tend to have quality problems with their fruit and large farms benefit from economies of scale, production for the export market is a realistic option for both organic and conventional smallholders. The results indicate that organic production is more profitable for smallholders than conventional production and farmers collect a fair share of the price premium on the retail level. Even more, from a theoretical perspective, organic farmers should also be more likely to get into contractual relations with exporters. The results are set into perspective with relation to the debates on small versus large farms, environmental impact, and the selection effect of standards.

Keywords: private voluntary standards, organic agriculture, trade in organic products, GLOBALGAP, value chain analysis

JEL classification: F14, L11, L15, O13, Q13, Q17

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1. Introduction

The world market for fresh pineapple has been growing rapidly during the past years. Like other tropical fruit, pineapple is grown predominantly in developing countries, where two thirds of rural people live on small-scale farms of less than two hectares (IFPRI, 2005). Pineapple is well suited for this analysis because it is a homogeneous high value crop, compared to, for instance, coffee where a lot of different varieties and quality grades prevail. Nevertheless, production of conventional pineapple is mostly dominated by big transnational companies that own large-scale plantations. As a consequence, it is difficult for small farmers to participate profitably in the market.

The market for organic pineapple is still a niche market, which is not yet controlled by a few big companies. However, not only did the demand for pineapple in general increase over time, but organically grown pineapple have also become more popular among consumers. Like other organic products, organic pineapple earns a premium price on the market compared to conventional varieties. Hence, the shift from conventional to organic production might be an opportunity for small-scale farmers to reap higher returns from their investments. If viable this would be highly interesting for development actors, as smallholders include the majority of the absolute poor in developing countries. Since the switch from conventional to organic production technologies requires costly adjustments of the land, for example, several aspects of the market need to be considered when trying to determine its profitability. One aspect is the size of the price premium and if it can persist over time. A second important aspect when studying the profitability of organic production is what percentage of the organic price premium received by retailers is actually passed on to the producers themselves and if costs differ for the two production techniques. The first aspect is studied in Kleemann and Effenberger (2010). In this paper we focus on the second aspect. In doing so, it is important to fully understand the value chain of organic pineapple and how it differs from conventional fruit. We take the Ghanaian pineapple production and its value chain as a case study. Ghana is a case in point because pineapple is one of its most important non-traditional export crops and it is a leading supplier of organic pineapple to the European market.

A few studies have recently found that certified organic agriculture is more profitable than conventional agriculture in developing countries, due to the higher price farmers receive for their product (e.g. Bolwig et al., 2009; Maertens and Swinnen, 2009). Rieple and Singh

(2010) have shown that organic production adds value throughout the production and processing of cotton. Other studies have explained the size of the premium and the willingness to pay a premium for organic products (e.g. Teisl et al., 2002; Nimon and Beghin, 1999; Bjorner et al., 2004; Plassmann and Hamm, 2009). We provide the missing link between these two strands of research by showing how the premium for organic produce at the farm level is formed and how it develops along the value chain.

The paper also sets a second focus to the specific conditions in Ghana. Fold and Gough (2008) illustrate that the export pineapple industry did provide benefits for significant numbers of smallholders in the South of Ghana between 1983 and 2005. Yet, since the introduction of a new variety a lot of smallholders have been excluded from the export pineapple value chain due to perceived high smallholder production costs and frequent contract breaching. Several cooperatives disappeared and the surviving ones were weakened (Fold and Gough, 2008). With regard to donor efforts to bring back smallholders into export production, it is central to know if this is a viable possibility. The evidence on the ability of smallholder cooperatives to compete in high-value international supply chains is mixed (see e.g. Markelova et al. 2009; Roy and Thorat, 2008; Wollni and Zellner, 2007 for positive and negative examples). By investigating the complete fresh pineapple value chain, we aim to find out if smallholders have a chance to be integrated back into the exporter value chain. In addition, within the export value chain and in line with our focus on organic production, we investigate if it makes more sense for small farmers to invest into niche markets taking the organic market as an example. This analysis informs us on the efficiency and efficacy of using certifications to further environmental protection or producer welfare. This aspect has not been studied before from both the production and market perspective, despite its importance for the growing promotion of organic certification in developing countries. To be able to evaluate the profitability of organic production for smallholders, we calculate the costs and revenues of production for these farmers and compare them with those for conventional smallholders and large farms. Our results demonstrate that, contrary to a widely held opinion in Ghana, both organic and conventional smallholders can profitably participate in the export market. Among smallholder farms, organic production is more advantageous than conventional production, and our findings suggest that in percentage terms organic price premiums are fully passed from retail level to Ghanaian farmers. From a

theoretical perspective organic farmers should also be more likely to get into contractual relations with exporters.

The rest of the paper is organized as follows. In the next section we briefly describe pineapple market trends in the world and Ghana and price developments on the conventional and organic market. In section 3 all stages of the value chain, from production to supermarket, are discussed in detail. Section 4 discusses the results with respect to three current debates: small versus large farms, the link to environmental effects and the selection effect of standards. Section 5 concludes.

2. The market for fresh pineapple

2.1. World market trends

The world market for fresh pineapple is dominated by one variety and kilogram prices are relatively uniform across fruit sizes and qualities. The fresh pineapple market has been recording exceptional growth rates: the share of fresh pineapple in the whole pineapple market has risen from 12.5 percent in the early 1960s to 26 percent in 2005 (FruiTrop, 2008). In 2007, the main consumers of fresh pineapples were the US (2.5 kg per capita per year), followed by the EU (2.1 kg per capita per year) and Japan (1.3 kg per capita per year) (FruiTrop, 2008). Measured by volume and value of net imports, the European Union (EU 27) is the world's largest consumer and has double digit growth rates. Fresh and dried pineapple in Europe comes mainly from Latin America (around 80 percent) and Africa (10 - 15 percent, Figure 1). The market in the United States is entirely dominated by Latin American pineapple. For our study of Ghanaian export pineapple production, the European market is therefore most relevant.

Africa had been Europe's major supplier of fresh pineapples until it was taken over by Central America by way of the introduction of a new pineapple variety. Up to the late 1990s, the EU market was supplied by pineapples from West Africa, especially from Côte d'Ivoire. Costa Rica, almost absent from the world market in the late 1980s, is now by far the largest fresh pineapple exporter to Europe and North America. Its share of the European market for fresh pineapple has grown from 24 percent in 2000 to 73 percent in 2009 (Figure 1). Exports from Côte d'Ivoire have meanwhile developed the opposite way. Being the European market leader in the 1970s, Côte d'Ivoire's market share has been constantly declining since then

and was around 6 percent in 2009 (Figure 1). Ghana is the second largest African pineapple exporter to Europe after Côte d'Ivoire and is expected to increase its market share (Natural Resources Institute, 2010; Pay, 2009).

The rise of Costa Rica as a market leader for fresh pineapple in Europe is strongly linked to a new pineapple variety called MD2 that was introduced by the company Fresh Del Monte Produce in 1996. This variety, grown exclusively in Latin America at that time, rapidly took over the US market. The success of the MD2 has been explained by a combination of the characteristics of this variety and commercial strategy (e.g. Fold and Gough, 2008). After some patent disputes, the wave quickly swept to Europe around 2003. Meanwhile, the formerly dominant variety, Smooth Cayenne (SC henceforth), slipped to the bottom of the price spectrum for fresh pineapple and lost market share from over 90 percent at the end of the 1980s to almost nonexistence today (Loeillet, 2004). More than 75 percent of all pineapple sold in the EU are now of the MD2 variety (Pay, 2009). In a more extreme way this development reflects the general development of fresh fruit and vegetable exports from Sub-Saharan Africa in the last 15-20 years. Exports to Europe rose, but Sub-Saharan Africa's market share in Europe EU declined, while Latin America's share increased (Henson, et al., 2010).

As one of the two most globally traded fresh tropical fruits (bananas being the other), conventional pineapples are primarily produced in large-scale plantations owned by large multinational food companies who also engage in contractual arrangements with local producers. These companies control not only the market but also the supply of pineapples to the large retailers within a tightly structured supply chain[1]. This is not yet the case for organic produce, which is mostly produced by smallholders and does not rely as much on vertically integrated supply chains. For developing countries with a significant share of smallholders in production such as Ghana, the support for diversification of exports towards niche markets (e.g. organic markets) could therefore increase the profitability of production. In niche markets, which tend to be smaller by definition, farmers can exercise more bargaining power whilst at the same time meeting the latest requirements on quality, traceability, packaging, and standards such as Fairtrade or organic, which might hold the key to good profits as our empirical analysis below suggests.

[1] In 2005 five multinationals (Chiquita, Dole, Del Monte, Noboa, and Fyffees) all integrated backwards into transport and in most cases production controlled about 40 percent of all globally traded fruit. For bananas, this share was even 84 percent (Gibbon and Ponte, 2005).

2.2. The organic market

Data on the European pineapple market was collected in January and February 2009 and in summer 2009 through structured interviews with traders, wholesalers, and retailers and a pilot survey of European fruit importers. Additional data comes from Eurostat, International Trade Centre's market news service, and CIRAD's market news service.

Most organic pineapples for the EU market are produced in Ghana with an increasing amount coming from Costa Rica (CBI, 2008). Unfortunately, there are no official trade statistics for organic products and there is no data available for the development of volumes and values of the world pineapple market divided according to conventional and organic products. However, it is estimated that up to 40 percent of total pineapple exports from Ghana are organic and/or fair trade certified[2]. This figure includes fresh, fresh-cut, and dried pineapple, as well as pineapple juice.

Trade in organic food products differs from trade in other food commodities due to the organic certification requirement. Certification according to regulation (EC) 834/2007 and (EC) 889/2008 is a prerequisite for any producer wishing to export organic produce to the European market. Organic certification requires producers to adopt certain environmental standards, e.g. to refrain from using synthetic inputs. The rapid growth of the organic food and drinks sector with an average growth rate of 13 percent between 2002 and 2006 creates niche market opportunities. The market value was estimated at 46 billion USD in 2007, double the value of 2000, and is expected to increase to 67 billion USD by 2012 (UNCTAD, 2008; Willer et al., 2008). In the EU, it is now between 2.5 and 6 percent of total food sales, and up to 30 percent for specific products. The organic pineapple market has grown even more. It is assumed that the permission to use ethylene for flower induction in organic production in 2005 (in the US already in 2002) played an important role for the high growth rates in the organic pineapple and pineapple products market. Taken as a whole, Europe is the largest market for organic products, and although the available data is very sketchy and often outdated, it is assumed that this holds also for the organic pineapple market. According to estimations by the Sustainable Markets Intelligence Center (CIMS), the European market for fresh organic pineapple was about five times the size of the US market

[2] The Ghanaian pineapple producer and processor Blue Skies was the first exporter of organic cut pineapple to the United Kingdom in 1998. Later, Waitrose became the first retailer in the United Kingdom to sell whole organic pineapples, supplied by Blue Skies, in 2005 (Pay, 2009).

in 2004. This difference is expected to be even larger today, because of the permission to use ethylene mentioned above.

2.3. The pineapple sector in Ghana

In Ghana, the pineapple industry is the most developed horticultural sector. Pineapple is a non-traditional export crop grown mainly in the Greater Accra, Central, Eastern, and Volta regions. According to the Ghana Living Standards Survey (2009) 170 627 households (2 percent of all households in Ghana) grow pineapple, but not all of them on a commercial basis. Ghana's pineapple production is estimated between 120 000-150 000 tons annually. The current structure of the Ghanaian pineapple industry is characterized by rapid changes due to changing regulations and the shift of international demand from the formerly dominant SC variety to the MD2 variety. As shown in Figure 2, pineapple exports started in the 1980s, increased rapidly after 2000, and decreased after 2004 due to the slow uptake of the production of the new variety. This fall was accompanied by low prices that have stabilized again since 2007. Pineapples from Ghana are almost entirely directed to the EU. Currently the pineapple industry is trying to gain back market share in Europe.

Between 2003 and 2007 on average 63 percent of Ghana's pineapple production was exported. An estimated 30 percent thereof was used for processing (juice, dried, fresh-cut) whilst the remaining was exported as fresh pineapple. Most fruit is shipped to the EU by sea (about 90 percent); some fruit is exported by air (about 10 percent). Ships usually land in Belgium (35.3 percent in 2007) or France (41.8 percent in 2007) and the pineapple is transported to other European countries from there.

Even though the Ghanaian agricultural sector is smallholder-based, the main private pineapple exporters are large-scale plantations that also offer contract farming to smallholders (so called outgrower schemes). Very few purchase from spot markets, i.e. from smallholders without contracts (Fold and Gough, 2008). Exporters with own plantations use external purchase to dampen the risks from unexpected EU demand fluctuation (Suzuki et al., 2008). This system may act as an alternative to full vertical integration. The shift to the MD2 variety has driven a lot of farmers, in particular smallholder-based cooperatives, out of the export market due to initially high costs of investment into the new variety and prevalent contract breaching from both sides during the breakdown of pineapple exports.

An exact determination of the amount of pineapples grown by smallholders in Ghana is not possible. In 2008 the share of smallholder production in exportable pineapple was estimated to be 40-45 percent (UNCTAD, 2008). According to the Sea-Freight Pineapple Exporters of Ghana (SPEG), today 39 percent of exports of pineapple are produced by smallholders. During the shift to the new MD2 variety many smallholders have lost, and up to today not regained, their access to the export market. Efforts by the government and donors are under way trying to re-link smallholders to the export market for fresh and processed pineapple.

5453 hectares in Ghana where planted with organic pineapple in 2008. In addition to smallholders, there are two relatively large farms that produce organic pineapple for fresh export and several processing firms.

To understand the profitability of organic production for smallholders compared to conventional and large-scale farms, as a starting point, potential revenues might be evaluated by looking at the development of the price premium for organic pineapple. This is the focus of the next section.

2.4. Evolution of prices for conventional and organic pineapple

The evolution of prices over the last ten years for conventional pineapple is characterized by a high starting point of the price for the MD2 variety and its strong downward trend after 2002. The other varieties have also experienced a downward trend in their prices on the European market due to their decreasing popularity and oversupply of these varieties compared to MD2 on the world market. Recently pineapple prices for all varieties and from all origins have stabilized (Kleemann and Effenberger, 2010). Up to the year 2000 Ghanaian pineapple was highly priced due to a perceived high quality of the fruit, but prices fell with the increasing dominance of the MD2 variety and are now increasing again[3].

Organic certification is a value-addition method. In fact, organic products are usually sold at significantly higher prices than conventional products. This reflects the value added by the organic nature of the production of the product (UNCTAD, 2006). According to CBI (2008) organic products generally fetch price premiums of between 15–30 percent, and numerous

[3] According to information obtained through interviews with fruit importers in Germany in September 2009 and Ghanaian producers in February 2010, the reason was that Ghanaian producers initially had difficulties with the cultivation, and thus the quality, of the MD2 variety. This depressed the prices for Ghanaian pineapple in general.

scientific studies have also shown the existence of price premiums for organic products (e.g. Bjorner et al., 2004; Teisl et al., 2002; Nimon and Beghin, 1999).

Concerning potential benefits of organic farming for producers, an important question is if such price premiums can be sustained in the long run or if they will also vanish, as in the case of the MD2 variety. Premiums have been declining for some organic food products due to increasing competition in the organic sector as well as economies of scale in shipping, processing and distribution as a result of increased levels of trade (Didier and Lucie, 2008). Whether this is a temporary development or a long-term trend depends on the nature of the value added by the organic certification label.

Using average monthly wholesale market prices in USD per kg from several European destination countries from the International Trade Centre's market news service and several European fruit trading companies, we describe the price premium over the period September 2007 to June 2010. Figure 3 illustrates that, over this period, price premiums have fluctuated between 0.0 USD and 1.17 USD with a mean of 0.76 USD. The price premium does not seem to decline.

However, not only the growing demand and the willingness to pay a premium for the product make organic cultivation attractive for producers. Some studies explain the growing interest in organic agriculture in developing countries also by the fact that it requires less financial input and places more reliance on the natural and human resources available (e.g. Willer et al., 2008). Hence, it is worthwhile to analyze if switching from conventional to organic production might indeed result in higher profits for farmers. The analysis of price premiums is the first step, but to evaluate the standing of organic smallholder farms in the market, an analysis of the whole value chain is necessary. This is done in the next sections.

3. Value chain analysis for Ghanaian pineapple

Value chain analysis studies how value is added in different stages of production through analyzing the costs and organization of these activities (e.g. Azqueta and Sotelsek, 2007). The aim is usually to identify areas of inefficiency or ineffectiveness through a systematic categorization of activities and their associated costs and then to identify where value could be increased. Here we use this technique to find out whether it makes sense at all to integrate smallholders into the pineapple export value chain and if the organic pineapple

value chain is a better option for smallholders. We use value chain analysis because it focuses on international business organization and profitability contrary to other forms of agricultural production-consumption systems analyses[4].

In the literature a distinction is made between 'buyer-driven' and 'producer-driven' value chains. In traditional producer-driven value chains, the producers (in this case the farmers) dominate the industry through concentration of knowledge and capital. Agricultural value chains, including pineapple, are increasingly buyer-driven.[5] This means that the buyer exercises control over the chain even in the absence of ownership (Humphrey, 2006). Buyer-driven value chains usually have low barriers of entry in production (Gereffi, 1994). In buyer-driven chains, the buyers, e.g. European retail chains or fruit multinationals, can dictate the adherence to their standards as a requirement to enter the export value chain. Certification to such, so-called private voluntary standards, is therefore primarily an export marketing tool (UNCTAD, 2006) and can be seen as a form of product upgrading. It is only worth going to the trouble of obtaining certification if the price obtained for the certified product exceeds any extra certification, production and management costs incurred compared to the local market price.

3.1. The post-farm gate value chain

The data for this section was gathered from personal interviews with (26) farmers, exporters, exporter associations, and government agencies in Ghana in 2009 and 2010 and (14) structured interviews with traders, wholesalers, retailers, and fruit importers in Europe. The data on local production and marketing was collected during two visits to Ghana in March 2009 and from January to March 2010. Interviewees were selected for their expertise and knowledge of the different stages of the pineapple value chain. A semi-structured format was adopted, in that certain information (prices, market knowledge, farm/company size, and demographic and personal data) was obtained from all interviewees.

Figure 4 describes the post-farm gate value chain for Ghanaian pineapple. It is focused on fresh and processed export production and therefore excludes farmers that produce primarily for the local market. Smallholders can either sell to larger exporting farmers, local

[4] Commodity systems analysis focuses on national labor organization and relations, commodity chain analysis focuses on worldwide temporal and spatial relations, and filiere analysis focuses on national political regulation and institutions (Raynolds, 2004).

[5] The governance structure of the fresh pineapple value chain is analyzed in more detail in Faure et al. (2009).

or exporting processors, or market women. Prices for fresh and processed export produce are the highest. Therefore only fruit that does not meet fresh export standards is sold to local processors or market women.

The organic and conventional pineapple value chains are at first sight very similar. The need for certification could be assumed to be one of the main differences. However, more than 80 percent of all fresh conventional pineapples are certified under GLOBALGAP[6]. GLOBALGAP certified fresh fruit and vegetables have a 76 percent market share on the European market. In a survey of fruit and vegetable exporters, all respondent companies in Ghana indicated that all of their buyers had requested GLOBALGAP certification and all of them eventually complied with the requirement (PIP, 2009). Thus, GLOBALGAP certification has become a quasi-requirement for export of conventional fresh fruit. Certification under GLOBALGAP can therefore be considered as reactive upgrading. Contrarily, organic can be classified under proactive upgrading. It is a formal requirement for organic sales in Europe. Hence, the existence of certification does not differ between the organic and conventional value chains, but the nature of certification differs. The need to undergo certification and auditing procedures poses no disadvantage for organic producers when conventional farmers need to undergo comparable procedures.

As explained above, conventional pineapples are primarily produced in large-scale plantations owned by a small number of transnational companies. A few multinational companies control the supply of pineapples to the large retailers within a tightly structured supply chain, such as in Costa Rica, the world market leader in fresh pineapple. This is not yet the case for organic produce, which is based to a larger extent on smallholders and medium-sized exporters. Between 11 and 40 percent of organic products are sold through specialized organic foods shops in Europe (Willer et al., 2008). The survey of the European market in this study confirmed the existence of two prevalent regimes. A specialty niche market regime is characterized by high prices, high quality and low volumes, and comes with organic, fair trade, or similar certification requirements. A supermarket regime combines lower prices and large volumes. In this regime GLOBALGAP is a standard requirement, and there is certain space for organic and/or fair trade certified pineapple. Naturally this regime is favorable for large-scale farms. Several exporters in Ghana mentioned that organic

[6] GLOBALGAP is a private standard founded in 1997 as EurepGAP by European retailers. It is a business-to-business standard with the aim to establish one standard for Good Agricultural Practices (GAP). Many of the large European retail and food service chains, producers and suppliers are members (www.globalgap.org).

premiums are higher for small volumes, which supports the notion of the two regimes. The export value chains reflect these regimes. The majority of organic exporters from Ghana sell directly to organic specialty shops or supermarkets. In the conventional value chain most exporters sell on consignment to intermediaries (Suzuki et al., 2008), which then sell to supermarkets. This difference is still existent despite the trend in Europe towards direct sourcing by supermarkets and the increasing number of fruit multinationals that are opening up their own organic product lines.

Smallholder cooperatives are linked to exporters that deal with retailers (supermarkets, specialty shops) and/or intermediaries. In the conventional chain a common set-up is one characterized by an intermediary with links to a retailer, who in turn is linked with a limited number of preferred suppliers (exporters). In both value chains, but more so in the conventional chain, the typical exporter in the developing country is also a producer for a fraction of his exports. The rest is bought from his contracted smallholder cooperatives or middle-sized farms. Some exporters do not engage in production at all, but only buy from producers with whom they have developed a relationship of trust. Exporters ensure that the product meets the private standards' requirements and quality standards set by the intermediary or retailer and the volume and delivery schedule set by the foreign buyer. They thus have a key role in integrating small and medium-sized producers into export markets (Fulponi, 2007), in addition to managing volumes and guaranteeing quality and food safety. Because this role is central, we study exporters, in addition to producers, in more detail below.

We take into account three farming models: small-scale organic, small-scale conventional and large-scale conventional. Small-scale farmers are supported by donors and NGOs because they are assumed to be the weakest part of the chain and the one with the highest potential poverty impact. We therefore focus on this group. More precisely, we analyze if small-scale organic producers can be integrated into the international value chain at all and if they do better in the organic than in the conventional market in order to assess the potentials and intervention points for this group of farmers. For simplicity, since there are many types of processing, we reduce the analysis to fresh export only when studying post-farm gate costs and prices.

3.2. Production

Pineapple production takes 12-18 months from planting to harvest, depending on the soil quality, water availability, and other input use. Organic production can take the same time or longer than conventional production. This depends on the variety, water and fertilizing regime. Many organic smallholders in Ghana use no or very little organic fertilizer and no organic pesticides. Weeding is then mostly done by hand. For the local Sugarloaf variety a field trial has shown that organic fertilizers such as cocoa husk or compost give better results in terms of ripeness after a certain number of months, levels of PH and acidity, crown size and fruit weight. This might not be true for other varieties, but shows that production is not necessarily faster and more efficient when using chemical inputs[7].

When the fruit is almost ripe, each fruit is inspected by the buyer for its Brix value[8], shape, color, and size. If it satisfies the quality standard, the fruit is harvested. Conventional pineapple is degreened shortly before harvesting using a chemical to achieve uniform color of the fruit. Degreening is not allowed in organic production. Harvest takes places all year round. Pineapple is an off-season fruit on the European market with peak seasons for exports from October to December and from February to April/May and low exports and low prices in the rest of the year.

There are several factors that influence the production cost structure in addition to the organic or non-organic production method, in particular the variety planted and the size of the plantation. Therefore we distinguish between varieties, farm sizes, and production methods in the production cost calculations. Multiple data sources were used for the study of production costs. It consists of both secondary data from 11 prior studies that document data from one or several smallholder cooperatives or large farms and primary data that were gathered during interviews with 10 producers during two visits to Ghana in March 2009 and from January to March 2010. Of these producers 20 cultivated MD2, 8 SC, 8 were considered large and 20 small. 11 produced organic certified pineapple and 17 conventionally. From the remaining 3 studies only non-production data was taken, such as postharvest costs. The data on costs and prices was averaged over categories. Most interviews were in person and a small number were conducted over the phone.

[7] The same is true for pests and diseases. As an example, due to the use of ethylene instead of calcium carbide for flower induction, the PH-level of the soil on organic fields is less favourable for a common root rot called phytophtora.

[8] The Brix value measures the percent of sugar solids in a product, providing an approximate measure of sugar content. It gives an indirect estimate of the degree of fruit ripeness.

In general MD2 has higher production costs than SC or Sugarloaf varieties (Tables 1 and 2). Sugarloaf, the variety that is traditionally produced in Ghana, is not included in the calculations because it is very rarely exported fresh. In particular costs for suckers, sucker treatment, fixed inputs, and labor are lower in SC production. In addition, MD2 has been found to be a more sensitive crop that is more susceptible to pests and diseases compared to SC. In order to achieve the same yield MD2 is fertilized up to twice the number of times as other varieties. Farmers perceive SC (and Sugarloaf) to be easier to produce, because these varieties have been produced in Ghana for many years and therefore there is ample local knowledge on production. Nowadays SC is often processed into juice, fresh cut or dried before exporting. The switch from the SC to the MD2 variety caused major structural transformations in the pineapple sector in Ghana (see section 2). Even the farmers that successfully managed the change had initial difficulties. Exportable yields were lower and investment costs very high. When the MD2 variety was first introduced in Ghana, costs for MD2 suckers were up to 70 percent of production cost. Today the prices for MD2 suckers have decreased and vary around 20-30 percent of production cost. It is only necessary to buy suckers in the first year. Afterwards they can be extracted from the existing plants, but with decreasing quality of the planting material over time. Therefore costs that include costs for suckers can be interpreted as initial costs, whereas all other costs occur every planting period[9].

In Table 1 we compare small and large-scale production for MD2 and SC. For simplicity of exposition, we use only data from conventional farms in this table. There are two columns for conventional MD2 production. This is because the data comes from two very differently managed cooperatives. Therefore, we did not want to average over two such different production management systems. Also, there are only two relatively large organic MD2 pineapple farms in Ghana. Of both data is very erratic. This is however not a big issue as our main interest is in small farms. In this table, we are interested in the possible advantages large-scale production due to economies of scale (bulk purchasing of inputs, mechanization, etc.) and modern, professional farm management. On the other hand, family labor, which is typically employed on small farms, is habitually characterized through higher intrinsic motivation and dependability and may be cheaper to employ (Swinnen et al., 2010). We

[9] Land preparation costs are also higher in the first year of a plantation, if virgin land has to be converted into farmland. However, since this also happens when a plantation is extended or shifted we cannot assign this cost clearly to the initial investment cost.

assume that this applies in the same way to both organic and conventional farms. Production on larger farms is known to be more input intensive, whereas smallholders often practice low-input production. This is reflected in considerably higher costs for chemical inputs (i.e. fertilizer, pesticides, fungicides, and herbicides). Economies of scale are evident in fixed inputs and planting costs. Nevertheless, overall production costs are lower on small-scale farms due to lower input and supervision costs and cheap and easily available family labor[10].

Table 2 contains production costs for MD2 and SC on small farms only. We can see that the total costs for organic MD2 production is higher than that for conventional production, whereas for SC production the opposite is true. As explained above, MD2 is a relatively new variety in Ghana and knowledge on organic production is still largely lacking. This is very likely one reason for the higher cost. It is noteworthy that the production of one kilogram organic SC comes at almost half the cost of one kilogram conventional SC.

In detail, suckers, planting, and labor turned out to be more costly on organic farms, whereas in particular sucker treatment, and fertilizers and pesticides are less expensive. All of the organic cooperatives covered in the survey use some organic fertilizer, but we are aware that there are organic-certified farmers that do not use any organic inputs. Generally organic fertilizer use is less costly than synthetic fertilizer[11]. Ghana imports all its synthetic fertilizer, which raises the price compared to organic fertilizer that can be sourced locally. Consequently, the high cost of fertilizer is owed to the high international and domestic transports costs. Own compost and manure, processed organic fertilizer or debris from local processing of agricultural products, such as cocoa husk, is used in organic production. As large amounts may be needed, transport is often the biggest cost. Currently the use of leftovers from processing is a popular option. However, if more and more farms switch to organic, it remains to be seen if enough organic material for widespread organic production is available in the country.

In a survey of Sub-Saharan fruit and vegetable exporting companies, the impact of private voluntary standards certifications was identified as the second most important factor

[10] If labor for farm activities and supervision would be measured at market rates, small farms may have higher production cost. This is the case in a recent study for Ghana, which states that the production costs of large farms are 38 percent lower than those of small farms (Natural Resources Institute, 2010).

[11] In one example a conventional cooperative has reduced the cost of fertilizer inputs by 175 USD per acre by replacing chemical fertilisers partly with organic fertiliser purchased from a local processing factory (Natural Resources Institute, 2010).

affecting export business over the period 2000 to 2007, after freight costs (PIP, 2009). So far we have ignored the costs for such certifications. Developing-country products are mostly certified by foreign certifiers that have their headquarters in the target markets. This is true for all prevalent certifiers in Ghana. Both organic according to EU regulation (EC) 834/2007 and (EC) 889/2008 and GLOBALGAP have group certification options for organized farmer cooperatives. The costs of certification are the costs of implementing the standard, i.e. compliance costs, and the costs of the actual certification, i.e. fees and costs for certifying agencies. Costs can also be broken down into initial costs and recurring costs. The differences in (recurring) actual certification costs are minimal between GLOBALGAP and organic certification (they may even be carried out by the same certifiers). Therefore we do not distinguish between them here. The recurring certification costs vary depending on the size of the group and/or the farmland to be certified, the crop, the certifier, and the country where the certification is conducted. According to Fulponi (2007) the recurrent costs borne by the producer vary between one and four, in some cases up to 15 percent of the farm gate price received (1 percent in Chile and Ghana, 4 percent in South Africa and between 4 and 15 percent in Peru).

Depending on the initial situation of the farm, the highest costs are often the initial costs of compliance. According to Asfaw et al. (2009), the non-recurring investment cost for GLOBALGAP certification borne by individual farmers account for approximately 30 percent of their total annual crop income. 90 percent of this is the cost for initial compliance, e.g. infrastructure and equipment that farmers must have as a pre-condition for implementing standards. Most certifications favor larger farmers[12]. As donors frequently support the initial certification, we assume that the farmer only has to pay for the recurrent costs[13]. Everything else is assumed to be borne by a donor or exporter. As for the yearly certification fees, there are two dominant models. Either the smallholder group itself pays for the renewal of the certification or the exporter pays for it and deducts his costs from the fruit price that is given to the farmers. As we do not know exactly how much the farmers in our sample had to

[12] The bureaucratic conventions imposed may be more difficult to install and follow on traditional small farms and economies of scale in certification fees and indirect costs for investments that are necessary (Raynolds, 2004). Empirical results show that resource poor farmers with limited access to information and services are less likely to adopt standards and are potentially marginalised in the export market.

[13] In an example from Kenya, Graffham et al. (2009) show that farmers in the horticultural sector pay on average 36 percent of nonrecurring and 14 percent recurrent costs.

invest in certification, we try to approximate. Taking the results from Fulponi (2007), we estimate these costs at 1 percent of total production costs (Table 2).

Figure 5 exemplarily compares the production costs for MD2 on small farms in detail. SC and large farms are not included for reasons of space. The Figure displays the percentage contributions of detailed production cost factors to the total cost of production. It is evident that suckers and fertilizer constitute the most important cost factors for MD2 production, adding up to over 40 percent of production cost. Other important cost factors include plastic mulch, which is generally used for MD2 but not always for SC production. The reason for this seems to be historical. Irrigation costs are very low as pineapple in Ghana is rarely irrigated and only some of the organic farms have reported some cost for dry season irrigation. Labor for fertilizer and insecticide application are also considerable cost factors. In organic production labor need for weeding is high, as expected, in particular in the rainy season. Another minor difference between conventional and organic production is the cost of the substance used for flower induction. Organic regulation currently allows only calcium carbide, whereas ethylene gas is usually used in conventional production. Calcium carbide is considered to be more expensive. However, as Figure 5 illustrates this difference is minimal (about 2 percent) in relation to the total cost. The spraying of chemicals for uniform color shortly before the harvest (degreening) is also not allowed in organic production. For conventional production it was repeatedly reported to be quite expensive due to its labor intensive nature. Unfortunately, we cannot show this using Figure 5, because only the cost of the chemical itself and labor in general is reported. Moreover the decision to degreen depends on importer requirements and exporters frequently do that on behalf of small farmers. Therefore the costs for degreening might have been underreported when collecting data from the cooperatives. Overall, organic production is cheaper than conventional production for smallholders (on average 0.085 USD per kg as compared to 0.093 USD per kg). Finally, Fairtrade minimum prices are interesting for comparison, because they are cost-based, with the price being calculated on the basis of estimated costs (on average in a given country) of production and processing according to Fairtrade standards. For Ghanaian pineapple these are currently 0.205 USD per kg (excluding the Fairtrade premium of 0.03 USD pr kg) for conventional pineapple for processing and 0.285 USD per kg for organic fruit (Table 7).

3.3. Yields and sales

We now study the variation in yields and prices achieved. Table 3 shows, as expected, that planting densities and yields are higher on large farms than on small farms regardless of the variety. Comparing organic and conventional small farms, Table 3 demonstrates that planting densities are lower on organic farms except for one case, where planting densities are the same. Yields are given in kilograms (kg), because pineapple prices in the following tables are measured in USD per kg. They are lower on organic farms both in absolute terms and in relation to the number of plants per acre, i.e. fewer plants reach the harvest stage and their weight is lower on average. The most common explanation for this phenomenon is that the fertilization regime is better developed on conventional farms and that pest outbreaks can be dealt with better. Converted into metric tons (mt) per hectare (ha), conventional yields are between 76 and 96 mt/ha for SC and between 71 and 86 mt/ha for MD2. This is within the range of country average estimations by the Ghanaian Ministry of Food and Agriculture (MOFA) (50-80 mt/ha for SC and 60-72 mt/ha for MD2) and also with international standards. Yields for organic fruit are 16 percent lower with 62 mt/ha for SC and 59 mt/ha for MD2. As pineapple is a perishable non-staple crop, own consumption is very limited; even for very small farms it is usually below two percent of harvest and includes mainly slightly damaged or overripe fruit. Weights of pineapple are important because first exporters only take fruit above a certain weight (often 1.2 kg), and second prices are often paid per box and weight determines how many pineapple fit into one box (commonly there are 6 to 10 pineapple per box of approx. 12 kg).

The local and export market prices reported in Table 4. They are comparable with prices identified in several other reports/studies and by industry experts. Farm gate prices range from high to low in the following order: fresh and processed fruit exporters, market women, local processors. The export price given in table 4 is the weighted average of the fresh export and processers' price. SC is almost exclusively grown for processing; hence SC export prices reflect exporting processors' prices, whereas MD2 is usually sold fresh with only rejects sold to processors. Generally, the fruit that does not meet export quality standards is sold to local processors or market women. Selling to processors has the advantage that fruit in various stages of ripeness, size, and also bruised fruit can be sold, whereas market women select the best fruit and leave the rest. Therefore large farms often prefer selling to processors what they cannot sell on the fresh export market, despite higher prices offered by market women.

For small-scale farmers, the opposite is true, because of close connections, often through family links, to the village markets. It became clear during the interviews that coordination of harvesting and sales with smallholder groups is often a problem for exporters, whereas the coordination of exports among larger farms is not. Therefore large farms can sell a bigger part of their fruit on the export market than small-scale cooperatives (Table 4). The only cooperative that achieved 80 percent export sales left the impression during the interviews that it is very well organized with a very strong and committed leader. In another survey of done by the author in 2010, the average export percentage among organic and GLOBALGAP certified smallholders was 56 percent of harvest. Even more, large farms export up to 90 percent of their produce as fresh pineapple. Smaller farms do not only send a lower percentage to the export market, of this lower percentage a considerable amount goes into processing for export. This is a clear sign of inferior quality of small farmers' produce. Significantly higher prices for fresh export pineapple compared to the local market can be explained by high quality requirements, the need for certification (see section 3.1.) and the need to avoid side-selling by contracted cooperatives. In addition, this difference could also be an indicator of fruit quality. Pineapples from small farmers often experience gaps in the cool chain, in particular at the farm level. This may reduce the shelf life of the fruit and thus the price that is paid on the European market which reflects back to the export stage. However, the price difference may be underestimated because exporters often offer services to their contracted cooperatives, for instance the payment of certification fees (e.g. GLOBALGAP or organic), degreening or harvesting of fruit or the provision of loans, which they deduct from the price paid for their fruit. Although we tried to account for these factors during the data collection, we are aware that this is not always successful when the value of these services is not clear or smallholders do not relate their fruit prices directly to these services.

When comparing organic and conventional fruit it is evident that export prices are significantly higher for organic fruit, whereas prices on the local market are similar. On average organic export prices are 55 percent higher than conventional ones. Although we have experienced interest in and appreciation of chemical-free fruit in Ghana during our study period, the market for these products is based on trust, not on certification. Despite these disadvantages that are associated with organic production, the profit from organic

production is more than twice as high as from conventional production due to higher prices and lower or similar production costs.

3.4. Ghanaian pineapple in the international market

Next, we look at fresh export postharvest operations depicted in Table 5. For simplicity and because post-harvest operations do differ between varieties, we now restrict our analysis to the dominant variety on the world market, MD2. The focus is on the exporter who buys fruit from small-scale farmers or cooperatives. In value chain analysis, all inputs and outputs carry forward their inherited value, in this case the price, from the previous stage, in this case the field production. We do not include possible own production of the exporter here, because we are interested in the role of the smallholder. If the exporter would have his own (large) farm, he would be able to buy MD2 from smallholders at a cheaper price than his own production cost. For SC, the prices would be the same as his production cost. Of course this disregards supply conditions and transaction costs.

Farmers sell their fruit at the farm or at the exporter's pack house (we call this "factory gate"). Some large exporting farms have a fully integrated supply chain with cooling and packing facilities on site. Other small and medium-sized farms either sell their fruit to these large farms (factory gate), or, in case medium-sized farms have packing but no cooling facilities, send their packed produce to the harbor for pre-cooling. The average cost for the transport to the exporter that was reported by farmers corresponds to the average price difference between farm and factory gate prices. Therefore we do not distinguish between the two options and assume that the exporter buys all fruit at the farm gate. The fact that market margins are the same as the cost of transporting the fruit from one place to another also indicates market efficiency at this stage. At the packing house, the fruit is washed, graded according to sizes, waxed, and packed. Postharvest costs do not differ for organic and conventional fruit except for waxing, which is only done on conventional fruit. Imported packaging material - cardboard boxes fitting approximately 12 kg of pineapple - are expensive in Ghana. Currently no qualitatively satisfactory local supply exists. The actual postharvest loss is on average very low, because fruit with inferior quality is sold to the local market or for processing at a lower price. As we do not have exact numbers, we assume on average 5 percent postharvest loss. Times needed to port are generally the same for organic and conventional fruit, but the time span between harvest and cooling varies a lot among

smallholders, from harvesting directly into a vehicle to be sent to the pack house up to leaving the fruit one day on the side of the field. The transport from the smallholder to the exporter is in most cases done in small pickups or non-cooled trucks. This transport adds to the time that the fruit spends before entering the cool chain and is therefore likely to deteriorate the quality of the fruit. Hence, we have to be aware small farmers, have higher postharvest loss due to storage and transport problems, but this happens usually at the farm and hence before the factory gate stage and has been taken account of in the previous section.

Handling at port and export bureaucracy is done by the Sea Freight Pineapple Exporters of Ghana (SPEG) or another professional agent. Most pineapple leaves the producing country free on board (FOB), which means the transport cost is paid by the European importers. The EU importers normally have the power to decide the FOB price (Suzuki et al., 2008). Overall postharvest operations amount to 74 percent of the FOB price for conventional fruit and to 60 percent of the FOB price for organic fruit. Hence at this stage, the part of the value added that can be assigned to the farmer is higher in the organic value chain. For comparison, farm gate Fairtrade prices are on average 76 percent (conventional) and 52 percent (organic) higher than in our examples. Fairtrade FOB prices are 22 percent (conventional) and 27 percent (organic) higher than our average prices (Table 7).

Sea- and air-freight costs are the same for organic and conventional fruit, because they can be transported in the same vessel, and even the same container. Costs for shipping comprise 20-30 percent of the import prices[14]. Freight times to Europe are again the same for all; 10-12 days to Antwerp and 9-10 days to France. Airfreight is an alternative, although the proportion of air freighted pineapple from Ghana has been decreasing over the last 20 years and is now dominated by very perishable products such as fresh cut pineapple and light valuable products like dried pineapple. Ghana has competitive airfreight rates of about 1.1 USD/kg. To this add 0.057 USD/kg for transport to the airport. The prices for sea- and air-transported pineapple differ greatly and hence following stages of the value chain are hard to compare. Furthermore, the market for air-freight pineapple is limited and the majority of pineapple is transported by sea (see section 2.3). We therefore focus on sea-freight pineapple. Because pineapples are seen as part of an export diversification strategy, there

[14] However, there are economies of scale in shipping for Ghanaian pineapple as a whole. Larger volumes exported from Ghana would make the sea-freight cheaper and faster, giving Ghana a competitive edge over the world market leader Costa Rica, due to its proximity to Europe.

are no export restrictions on exports of both organic and conventional pineapple from the Ghanaian side and no tariff barriers on the European side except the food safety and health requirements.

Equally to the farm-level, profits in the organic value chain are also higher at postharvest levels (i.e. exporter and importer) but not at the retail level. The lower profit at this level could indicate a higher fruit loss due to lower turnover in this niche market or a highly competitive retail market. Yet, as these costs and prices are just averages reported by several industry experts and traders, we have to take them as an indication rather than a fixed number.

3.5. Price premiums along the value chain

In the following paragraph, we compare the organic price premium that growers receive with the organic premiums that consumers pay and how this premium develops over the stages of the value chain. The prices producers receive for their products depend on international commodity prices, which are known to be very volatile (e.g. Deaton and Miller, 1996). Many studies have documented the fact that producers typically receive a small fraction of the international price. The difference is often explained by high transport and transaction cost and monopsonic rents captured by private traders or public marketing boards (e.g. Coulter and Poulton, 2001; Fafchamps et al., 2003). Nevertheless, Table 6 demonstrates that, in percentage terms, price premiums are fully transmitted to local producers. In absolute terms, mark-ups therefore build up over the value chain. As explained above, there is no local market for certified organic produce. Price premiums for exported fruit are between 20 and 68 percent. On the one hand they reflect costs that occur on different levels. This is clearly visible at the FOB level. Transport and packaging cost comprise a large part of FOB prices. On the other hand they are a sign of the valuation of the organic nature of a pineapple. After import, mark-ups stay literally the same in absolute terms. We do not expect a big difference in cost structures from this point on, but it has to be taken into account that our data on cost structures of intermediaries and retailers is very limited. At the retailing stage branding or reputation building effects possibly have influence on the mark-up.

4. Discussion of results

4.1. Integration of small farms in the export value chain

Looking at these results, the prospects for the re-integration of smallholders in the Ghanaian pineapple export sector look promising, in particular for organic farmers. However production costs are not the only relevant factor. Swinnen et al. (2010) develop a model that tries to explain under which conditions contracts with smallholders successfully take place and benefit poor farmers. According to this model, contracts are more likely to exist if the surplus - i.e. the buyer's sale price minus his costs for input supply to smallholders, production and supervision costs - is high. Similarly to Key and Runsten (1999), we found that production costs are lower for smallholders than for large farms. For labor intensive crops such as pineapple and labor intensive production regimes such as organic agriculture, the availability of relatively cheap family labor is a key factor of production costs. Consequently, smallholder participation in the export value chain is not hindered by high production costs. In addition, the alternative for smallholders is to source from very few large suppliers. Processors and exporters may not like to become dependent on a small number of sources (Swinnen et al., 2010). Besides they could buy from varying numbers of smallholders to dampen EU demand fluctuations (Suzuki et al., 2008). Finally insecure land rights could force foreigners to source from smallholders instead of establishing their own plantations.

Contractual relations of smallholder cooperatives with exporters are successfully managed in other countries and used to be common also in Ghana. During the interviews with exporters and large farmers we learned that contract enforcement costs are currently perceived as very high. In the model by Swinnen et al. (2010) this would be reflected by very large supervision costs that could reduce the surplus enough that contracts do not take place. Hence, the re-establishment of trust is necessary for successful re-generation of contract farming in Ghana.

If organic certification raises the European wholesale price more than the sum of input, production and supervision costs, contracts with smallholders should be more likely in organic value chains. The model by Swinnen et al. (2010) also states that the existence of many alternative sales outlets for the farmer reduces the likelihood of contracts. As demand for certified organic produce is almost inexistent in Ghana, organic farmers count with less

alternative sales outlets for their organic pineapple and a large price difference if they decide to sell it as conventional produce. Hence contracts with organic farmers should be more likely.

Furthermore organic production is often claimed to be easier to learn for small-scale farmers in developing countries, because it is related more closely to traditional methods. Since, however, sophisticated organic production using positive and negative methods is quite demanding, further investigations into the learning processes are needed to verify this claim.

4.2. Standards as barriers or catalysts

In this study we focused on monetary effects on the pineapple farm in a static environment. We did not study other aspects of livelihoods such as other income sources, market risk, access to credit and inputs and inequality among rural households. For instance, the contract farming that typically comes with smallholder certification under GLOBALGAP or organic may raise rural inequality, because the already better-off smallholders are recruited. For those farmers who are certified access to inputs and credit may increase.

In addition, more research is needed in order to verify if production for niche markets in general is a more profitable alternative for small farmers in developing countries than producing for mainstream markets. Apart from prices and market access, certifications necessary for market entry are an important factor in particular for smallholders. Lack of access to financial as well as qualified human capital poses important barriers for upgrading. This is due to the high initial investment not only in buying the necessary equipment, but also in learning how to produce the product according to new standards.

Due to the large coverage and therefore potential impact there is already a debate over the impacts of GLOBALGAP and similar mainstream standards on developing country producers ongoing in the literature. The increasing standards set by developed country importers have been described both as a hindrance and as a chance for smallholder market inclusion (e.g. Henson, et al., 2010; Swinnen et al., 2010; Maertens and Swinnen, 2009; Minten, et al., 2009; Jaffee, 2003). Certification costs are often too high and investments too risky for smallholders with low access to credits. On the other hand standards might channel the development of more advanced smallholders and offer on-farm rural employment opportunities for the others (Swinnen et al., 2010). Undergoing the audit procedure may improve farming practices and use of inputs (Dolan and Humphrey, 2000; Fulponi, 2007; PIP,

2009 for Chile, Peru, Ghana and South Africa). In addition, the necessary investments for the certification can lead to productivity improvements and boost the adoption of new technologies. Certification can tie exporters to producers, because exporters invest in the certification and hence in the relationship. As the process of certification is similar for smaller niche market standards, these arguments are also valid for the latter. In our analysis we have assumed that the initial compliance costs and training (for GLOBALGAP and organic certification) are not borne by the smallholders. This is usually the case and Raynolds (2004) amongst others shows that under different circumstances smallholders would not be able to receive organic certification. Therefore the process of upgrading is dependent on assistance.

4.3. The link between environmental and monetary effects

Overall, our results suggest a positive financial effect of switching from conventional to organic production when competing on the global market for pineapple. However, evidence is so far scarce on the question if organic small-scale farming is environmentally sustainable in a developing country-small farm context. If farmers do not maintain soil fertility using organic production techniques, then organic production might be more environmental friendly in terms of chemical use but less sustainable in terms of soil fertility levels. This is reinforced if there is a selection bias where small-scale farmers that are already producing in a low input organic way by default are more likely to apply for certification. Anecdotic evidence indicates this risk in several African and Latin American countries for smallholder farms. For coffee in Costa Rica Blackman and Naranjo (2010) show what many suspect, namely that negative practices such as the use of herbicides are reduced, but the effect on positive practices such as the use of organic fertilizer is very limited. On the other hand wider environmental benefits have been shown to exist for instance in Fließbach et al. (2007), but the conditions under which they occur are not researched well yet. The use of positive organic methods may affect production costs. However, since our data does not include information on the use of production practices we cannot report on the sustainability of the farms with the cost structure presented here.

5. Conclusions

As the demand for organic products is growing, this paper has tried to shed light on the profitability of organic small-scale production in the pineapple sector using Ghana as a case study. The analysis is set up with a development perspective. Since organic food in general, and organic pineapple in particular, are strongly growing niche products with value chains that are not yet dominated by large multinationals, organic production might be a valuable alternative for developing countries with many smallholders.

In Ghana, many small-scale farmers, both conventional and organic, have been excluded from the export pineapple value chain during past world market changes. Hence, in a first step we analyzed if these farmers could be re-integrated in the Ghanaian pineapple export sector. Even though they tend to have quality problems with their fruit and large farms have advantages compared to smallholder cooperatives due to economies of scale, production for the export market is feasible for both organic and conventional smallholders irrespective of the variety produced. Contrary to initial expectations, production costs are generally lower for smallholders. Consequently the re-integration of smallholders into the export value chain is not hindered by high smallholder production costs. Besides, contractual relations of smallholder cooperatives with exporters are successfully managed in other countries. In Ghana, the re-establishment of trust and closer coordination between exporters and smallholders are assumed to be necessary for successful re-integration. Then, both organic and conventional small farms as well as exporters could benefit from a higher percentage of export sales.

Second, our results demonstrate that, in comparison with conventional smallholders, certified organic production is more profitable for smallholders and in percentage terms price premiums on the retail level are fully passed on to farmers. Even more, organic pineapple can add value at each stage of the value chain, both to farmers and further up the chain. In detail, for smallholder production of SC pineapple, the profitability of organic production is superior both in terms of production costs and the price premium received. For organic production of MD2, the profitability depends entirely on the price premium received. Overall, our results suggest a positive effect of switching from conventional to organic production when competing on the global market for pineapple.

The analysis has focused on monetary effects in a static environment. It is therefore not possible to judge on social and environmental factors from this paper. Moreover, it has

introduced the vertical dimension of the price transmission in the organic pineapple market. While the results tell us already what part of the premium is forwarded to producers, it has not been possible to investigate how changes in prices at the retail level are translated into changes in farm gate prices and if prices are transmitted symmetrically or asymmetrically. Future research might also focus on this question.

In the light of the variations in the organic premium along the value chain, it would also be interesting to investigate in further research what part of the premium can be attributed to the organic nature, what part to other product characteristics such as quality, and if unobserved transaction costs play a role in the premium in order to fully understand the dynamics in this value chain. This would also help to make predictions about the development of the organic premium on the producer level in the future and hence its sustainability over time.

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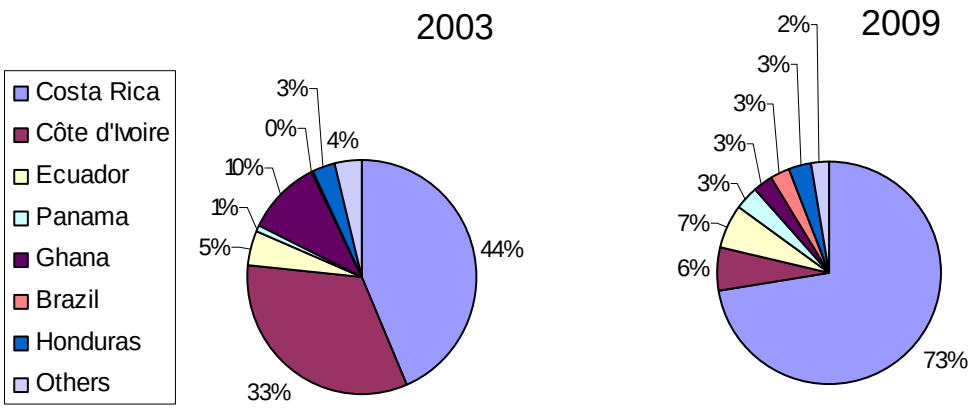
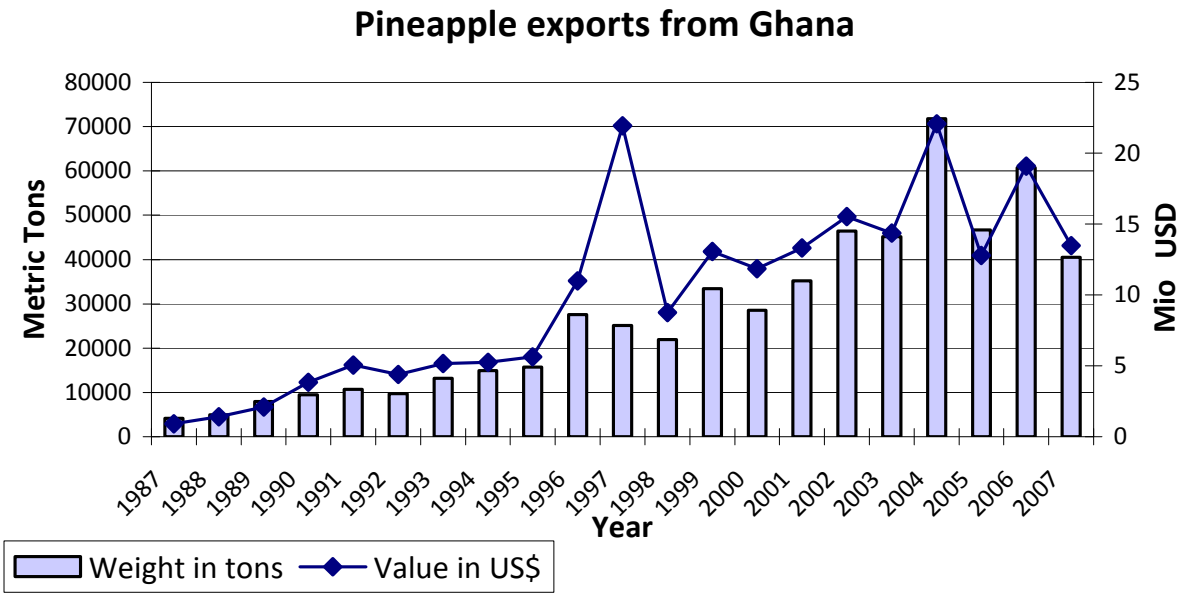
Appendix

Figure 1: European Market Shares in Fresh and Dried Pineapple 2003 and 2009



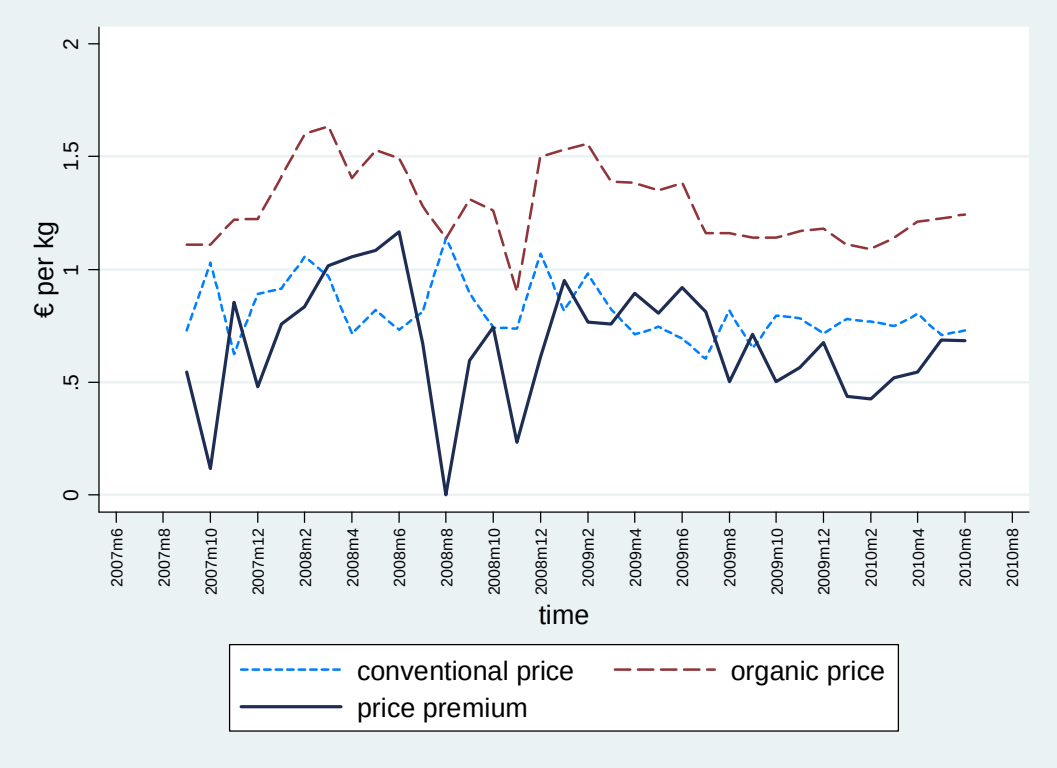
Source: Eurostat Comext
Notes: Classification: pineapple fresh or dried, 90percent sea, 10 percent air freight,
Varieties: Smooth Cayenne, MD2, Victoria

Figure 2: Volume and Value of Pineapple Exports from Ghana 1987-2008



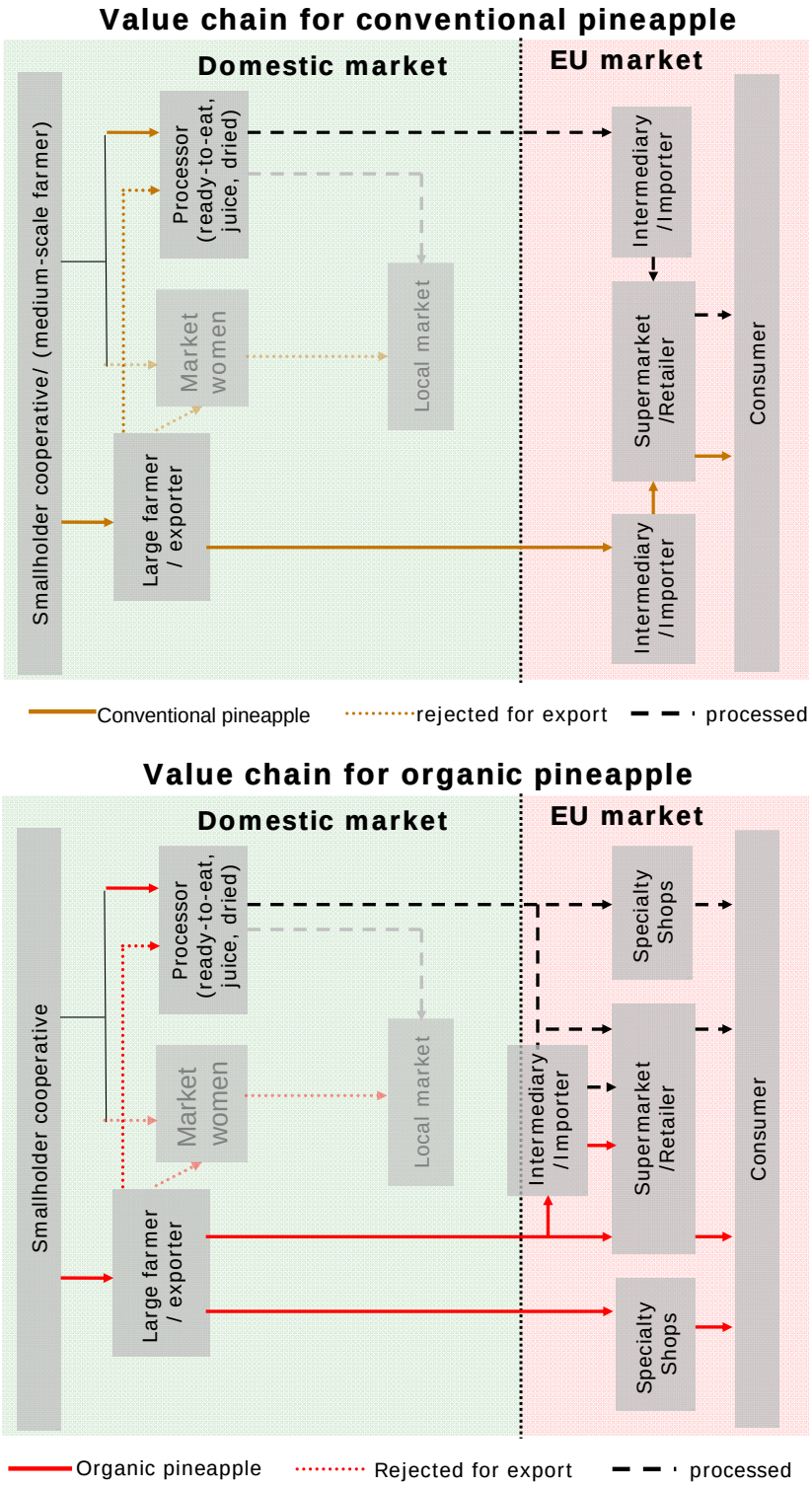
Source: Data from sea-Freight Pineapple Exporters of Ghana (SPEG)

Figure 3: The Price Premium for Organic Pineapple and the Prices for Organic and Conventional Pineapple



Notes: Prices are average monthly European wholesale prices per kilogram.
Source: International Trade Centre's market news service and European fruit trading companies.

Figure 4: The Value Chain for Ghanaian Pineapple



Source: author's own design

Table 1: Production Cost Comparison of Large versus Small-Scale Production

Production cost (USD/kg)	conv. MD2 (large)	conv. MD2 (small I)	conv. MD2 (small II)	conv. SC (large)	conv. SC (small)
Land lease		0.0005	0.0003		0.0015
Suckers	0.0229	0.0241	0.0336	0.0132	0.0122
Sucker treatment	0.0010	0.0010	0.0031	0.0010	0.0000
Land preparation	0.0315	0.0084	0.0061	0.0053	0.0108
Planting	0.0017	0.0019	0.0011	0.0012	0.0061
Chemical & organic inputs	0.0532	0.0322	0.0320	0.0666	0.0316
Labor cost	0.0205	0.0236	0.0096	0.0055	0.0042
Fixed inputs	0.0110	0.0149	0.0110	0.0078	0.0096
Certification	0.0014	0.0011	0.0010	0.0010	0.0008
Total cost	0.1432	0.1077	0.0978	0.1016	0.0768
Cost less sucker cost	0.1204	0.0836	0.0642	0.0883	0.0647

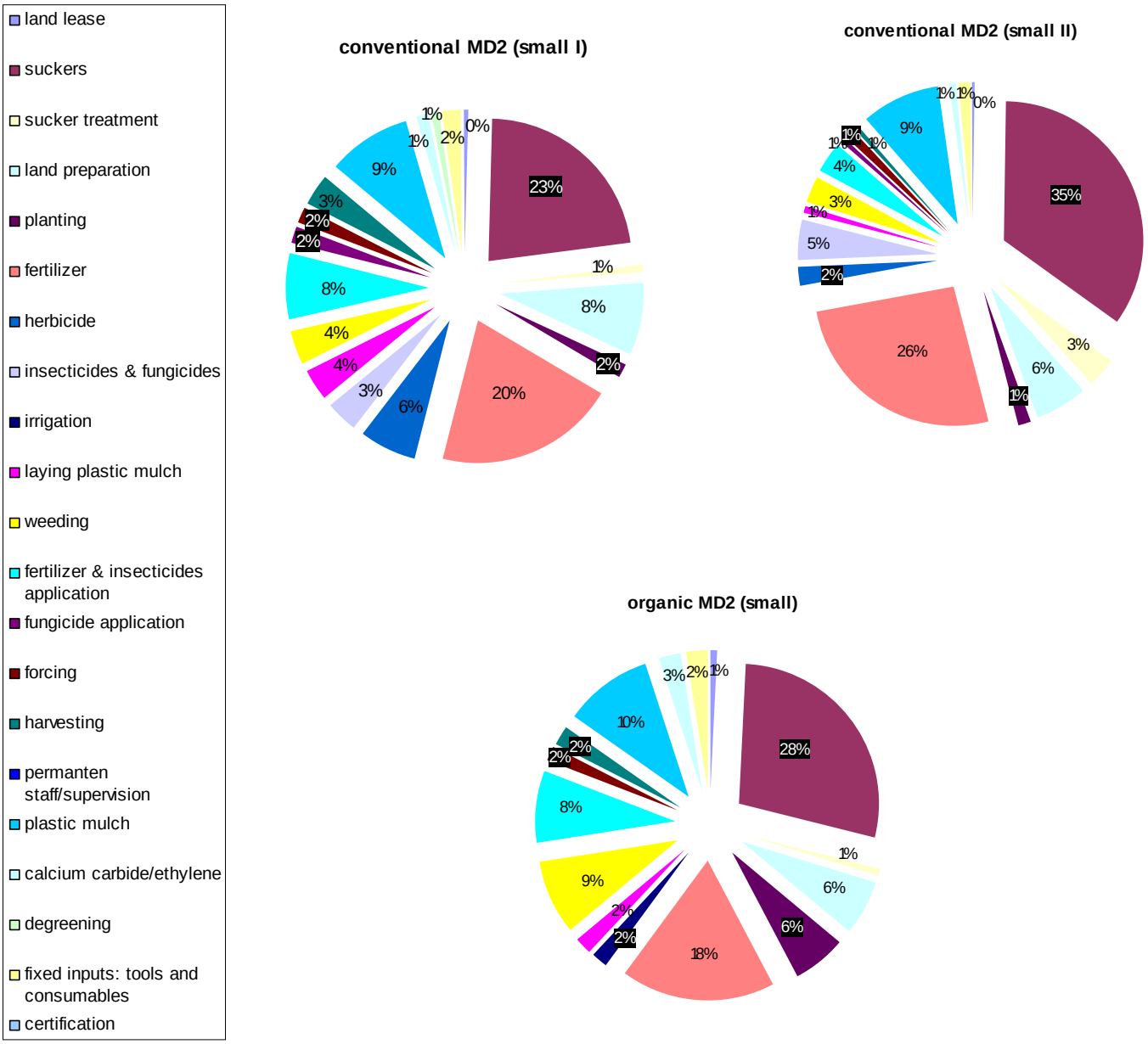
Notes: There is no data for land lease for large farms, because all of these plantations in our sample were owned by the farmer and we did not get data on the depreciation of the purchase price.
Sources: Interviews with medium or large-scale producers and cooperatives and data from prior studies.

Table 2: Production Cost Comparison of Conventional and Organic Small-Scale Production

Production cost (USD/kg)	conv. MD2 (small I)	conv. MD2 (small II)	organic MD2 (small)	conv. SC (small)	organic SC (small)
Land lease	0.0005	0.0003	0.0009	0.0015	0.0013
Suckers	0.0241	0.0336	0.0343	0.0122	0.0132
Sucker treatment	0.0010	0.0031	0.0009	0.0000	0.0000
Land preparation	0.0084	0.0061	0.0077	0.0108	0.0070
Planting	0.0019	0.0011	0.0075	0.0061	0.0066
Chemical & organic inputs	0.0322	0.0320	0.0238	0.0316	0.0008
Labor cost	0.0236	0.0096	0.0277	0.0042	0.0160
Fixed inputs	0.0149	0.0110	0.0185	0.0096	0.0028
Certification	0.0011	0.0010	0.0012	0.0008	0.0005
Total cost	0.1077	0.0978	0.1225	0.0768	0.0482
Cost less sucker cost	0.0836	0.0642	0.0882	0.0647	0.0351

Sources: Interviews with cooperatives and data from prior studies.

Figure 5: Production Cost Details



Sources: Interviews with cooperatives and data from prior studies (details of data in Table 2).

Table 3: Pineapple Yields per Acre

	conv. MD2 (large)	conv. SC (large)	conv. MD2 (small I)	conv. MD2 (small II)	conv. SC (small)	organic SC (small)	organic MD2 (small)
Plant population (#)	24000	24000	20000	24000	20900	20000	20000
Total yield of suckers planted (kg)	35000	38884	30000	33000	30760	25261.6	23800
Av. fruit weight (kg)	1.5	1.62	2	1.5	1.6	1.5	1.5
Yield % of planted	97.2 %	100.0%	75.0%	91.7%	92%	90.2%	85.0%

Abbreviations: #= number; SC= Smooth Cayenne variety.

Sources: Interviews with medium or large-scale producers and data from prior studies.

Table 4: Sales and Farm Gate Profits

	conv. MD2 (large)	conv. SC (large)	conv. MD2 (small I)	conv. MD2 (small II)	conv. SC (small)	organic SC (small)	organic MD2 (small)
Total cost (USD/kg)	0.14	0.10	0.10	0.10	0.08	0.05	0.12
Cost excl. sucker cost (USD/kg)	0.12	0.09	0.08	0.06	0.06	0.03	0.09
Export price farm gate (USD/kg)	0.15	0.11	0.12	0.10	0.10	0.16	0.23
Local price farm gate (USD/kg)	0.08	0.09	0.08	0.07	0.09	0.08	0.09
Export sales (%)	80%	80%	80%	70%	50%	50%	60%
Local sales (%)	20%	20%	20%	30%	50%	50%	40%
Av. return (average price USD/kg)	0.13	0.11	0.11	0.09	0.09	0.12	0.17
Profit incl. sucker cost (USD/kg)	-0.01	0.01	0.00	0.00	0.01	0.07	0.05
Profit excl. sucker cost (USD/kg)	0.02	0.02	0.03	0.03	0.03	0.09	0.09

Notes: The term "export sales" here includes selling to a fresh exporter as well as selling to an exporting processor.

Source: Interviews with medium or large-scale producer-exporters and cooperatives and data from existing studies.

Table 5: Post-Farm Gate Operations

	conv. MD2	organic MD2
Av. farm gate price	0.116	0.195
Transport to exporter	0.020	0.020
Sorting, grading, packaging	0.001	0.001
Packaging material	0.115	0.115
Waxing	0.008	0.000
Cooling	0.019	0.019
Postharvest loss	0.006	0.010
Transport to harbor	0.020	0.020
Port handling	0.006	0.006
Administrative costs[1]	0.170	0.170
Total cost at port	0.482	0.557
FOB price[2]	0.490	0.590
Exporter profit (FOB)	0.008	0.033
Shipping	0.302	0.302
Price at import	1.070	1.590
Local transport	0.018	0.018
Marketing	0.130	0.130
Wholesale price	1.300	1.890
Estimated profit for importer	0.082	0.153
Marketing at retail	0.310	0.310
Retail price	1.680	2.240
Estimated profit for retailer	0.070	0.040

Notes: Average costs and prices are reported.
[1] Administrative costs cover all costs at port except the handling of the good, e.g. phytosantiary checks.
[2]FOB (Free on Board) is the price of traded goods at the port of origin, excluding the cost of sea-freight and insurance. It includes transport to the harbor, customs' costs, export administrative costs, and unloading at the port.

Sources: Interviews with medium or large-scale producer-exporters; shipping cost estimates are estimates from exporters, SPEG, and prior studies; wholesale prices are from International Trade Centre; costs at destination country are from interviews with importers, traders, wholesalers and retailers; retail prices are from interviews with retailers and the author's own study in supermarkets between January and August 2009.

Table 6: Price Premiums along the Value Chain

	%	USD
Av.farmgate export price	68%	0.079
Av. farmgate local price	5%	0.013
FOB price	20%	0.100
Price at import	49%	0.520
Wholesale price	59%	0.590
Retail price	33%	0.560

Source: own calculations

Table 7: Fairtrade Prices for Ghanaian Pineapple

Product Specification	Price level	Fairtrade minimum price USD/kg	Fairtrade premium USD/kg
Pineapples (conventional, fresh)	factory gate*	0.50	0.05
Pineapples (conventional, for processing)	farm gate	0.205	0.03
Pineapples (organic, fresh)	factory gate*	0.65	0.05
Pineapples (organic, for processing)	Farm gate	0.285	0.03
Pineapples (conventional, fresh)	FOB	0.60	0.05
Pineapples (organic, fresh)	FOB	0.75	0.05

Notes: *Prices for fresh fruit are at "at the exit of the pack house", i.e. stored, cleaned, packed, and refrigerated.
Prices for pineapple for processing are shown because these were the only ones for which farm gate prices were available.

Source: Fairtrade Labelling Organization (FLO) website; Fairtrade price announcement of January 27, 2010.