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Analysis

Organic certification, agro-ecological practices and return on investment: Evidence from pineapple producers in Ghana

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ABSTRACT

The recent empirical literature on economic sustainability of certified export crops shows that certification standards that enhance yields are important for improving farm revenues and household welfare. However, limited evidence exists on the impact of organic certification on the adoption of agro-ecological practices. In this study, we use unique farm-level data from pineapple producers in Ghana to examine the impact of organic certification on the use of agro-ecological practices such as organic fertilizers, organic pest and weed control, crop rotation, and soil and water conservation, as well as how using these measures affect farm outcomes such as return on investment. Our empirical results reveal that organic certification increases agro-ecological practice use, although from a very low starting point. Using a generalized propensity score approach, we show that there is a positive, but nonlinear relationship between the intensity of agro-ecological practice use and return on investment.

1. Introduction

Concerns over climate change and increasing pressure on land have resulted in increased promotion of sustainable production methods that increase yields, while protecting the environment as well as increasing the resilience of crops to climatic change (Branca et al., 2011; Erenstein, 2002; FAO, 2011; Kassam et al., 2012; Knowler and Bradshaw, 2007). Such sustainable production methods form part of organic agriculture principles, but in practice, low-input production with none, or very little sustainable soil and water management practices are frequently certified as organic in many developing countries (see e.g. Blackman and Naranjo, 2012; Bolwig et al., 2009).

To encourage the adoption of sustainable production methods, national governments, NGOs and international donors have promoted the marketing of export crops through certified marketing channels, mostly through farmer-based groups, as an attractive business model for smallholders in developing countries (Beuchelt and Zeller, 2011; Hattam et al., 2012). These sustainable certification schemes have become increasingly popular in many countries because they combine valued traits that are related to the environment, poverty alleviation, and health outcomes into a single commodity (Barham and Weber, 2012; Hattam et al., 2012). Although organic certification is currently export oriented in most African countries, this is expected to change with a rising middle class, as domestic demand for such products increases (Probst et al., 2012).[1] Consumers generally show their preferences for such products by paying higher prices to support an environmentally healthy world. However, the success of these schemes depends to a large extent on prices received and incomes earned by the farmer.[2] For example, Bolwig et al. (2009) and Valkila (2009) find in their studies that higher incomes from organic farming are entirely due to higher prices received, but not lower costs of production.

The significance of these schemes in promoting sustainable farm practices and improving the incomes of smallholders in developing countries has attracted the attention of many policy analysts over the last few years. In particular, several studies have examined the impacts of certification schemes on farm outcomes such as farm revenues, profits, and household poverty (Barham and Weber, 2012; Beuchelt and Zeller, 2011; Bolwig et al., 2009; Ninan and Sathyapalan, 2005; Pretty et al., 2006; Valkila, 2009). Most researchers find modest positive impacts of organic certification on farm revenues and household

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[1] Certification in this paper refers to EU organic regulation. Certifying agencies include IMO, Ecocert and Soil Association.

[2] As noted by an anonymous reviewer, organic production could also contribute to increased income through higher output.

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income, using various measures and econometric approaches. They attribute the positive impacts of certification to price premiums that are paid at least for part of the crop sales (e.g. Bolwig et al., 2009; ITC, 2011; Valkila, 2009), although it is usually not clear whether the effect comes from certification, contract farming, or export market access. It is important to note that some researchers have been rather skeptical on the ability of certification to lift farmers out of poverty, given the usually low revenue increases. The main reasons for this skepticism are the high certification and investment costs involved in the process (Beuchelt and Zeller, 2011; Calo and Wise, 2005; Valkila, 2009).

Despite this increasing number of impact assessment studies, very few studies have considered the environmental outcomes of different certification programs or the adoption of sustainable farming techniques following certification (Barham and Weber, 2012). Philpott et al.'s (2007) study on Mexico examines environmental outcomes by analyzing the impact of certification on vegetation and ant, as well as bird diversity in coffee farms and forests. Rather surprisingly, their findings show no differences between in vegetation characteristics, ant or bird species richness, or fraction of forest fauna in farms based on certification. Pretty et al. (2006) conduct a review of 286 interventions to show that the use of resource conservation practices increases productivity on developing country farms, albeit using best practices. Bolwig et al. (2009) studied the effect of organic contract farming and adoption of organic practices on 112 coffee producing smallholders, where organic farmers apparently use more organic practices, and conclude that there are somewhat higher revenues for farmers that adopt organic farming techniques, findings confirmed by Blackman and Naranjo (2012) who find that organic certified farmers in Costa Rica use less chemicals and adopt some environmental friendly management practices, basing their analysis on only 35 certified coffee farmers in Costa Rica.

With the notable exception of the study by Pretty et al. (2006), which includes some countries from sub-Saharan Africa, we find no empirical evidence on the impacts of certified organic farming on environmental outcomes in sub-Saharan Africa. In particular, the dependence of the yield impact of organic certification on the intensity of agro-ecological practice use has been hardly studied in the existing literature. Some authors have argued that organic farming in Africa mostly implies the non-application of chemical inputs, without necessarily adopting alternative soil fertility management practices (e.g. Ndugire, 2010; UNCTAD, 2008a). This is particularly so for the many small-scale farmers in Africa, who are assumed to produce traditionally, or "organically by default", using virtually no external inputs (UNCTAD, 2008b; van der Vossen, 2005). For example, farmers and extension agents in Ghana stated in our field survey that organic certification is usually only associated with abstaining from the use of chemical substances, but not the active use of alternative inputs.[3]

The smallholders who use no chemical inputs, or very low levels of external inputs normally face relatively lower economic entry barriers into organic certification programs, since they require small adjustments to meet certification requirements (UNCTAD, 2008b; Weber, 2011). This does not imply that entry barriers for export-oriented certification programs are not high, but that it is easier for farmers who do not use chemical inputs to gain access to such programs.

While access to higher-priced organic markets may provide incentives to farmers to adopt more agro-ecological practices, there are several other factors that serve as constraints to the adoption of organic farming and certification (Läpple and Kelly, 2013; Läpple and Rensburg, 2011; Mzoughi, 2011; Wollni et al., 2010). In particular, Wollni et al. (2010) point out that demand-side factors such as farmers' access to markets and transport costs, which are normally influenced by infrastructural development and remoteness from population centers tend to influence their decision making in various ways. Distance of the farm to the nearest market has therefore been included in some studies to account for the role of market access in the adoption of farm technologies (Amare et al., 2012; Wollni et al, 2010).

A number of authors have also argued that non-economic factors such moral and social concerns can be significant in farmers' adoption of organic farming (e.g., Carlsson et al., 2007; Mzoughi, 2011). In particular, Mzoughi (2011) suggests that even innovations that are both profitable and ecologically-friendly may suffer from a low diffusion rate because farmers ignore their capacity to confer moral and social benefits. We argue in this paper that farm and household level characteristics, as well as demand-side factors affect farmers' participation decisions in organic farming, and show that organic farming influences the use of agro-ecological practices.

The primary goal of the paper is to examine the effect of organic certification on the extent to which agro-ecological practices are used, as well as the impact of the intensity of use on the return on investment (ROI). We employ data from a recent farm-level survey of 386 small-scale pineapple farmers in the Greater-Accra, Eastern, and Central Regions of Ghana. These farmers are either organic or non-organic certified and produce mainly for the export market.[4] The study accounts for selection bias due to unobservable factors by using the framework of endogenous switching regression approach (Lee, 1978). The approach allows us to analyze the determinants and effects of the adoption decision of organic farming on the use of agro-ecological practices, separately for adopters and non-adopters among the sample of 386 pineapple farmers. In investigating the impact of agro-ecological practice on ROI, we use the generalized propensity score approach developed by Hirano and Imbens (2004) to control for selection bias.

The agro-ecological practices we consider in this study include application of organic fertilizers, organic pest and weed control, crop rotation, as well as soil and water conservation measures. As noted by Rigby et al. (2001), agro-ecological practices are mostly employed by farmers to ensure farm sustainability through increased yields and reduced losses, minimizing inputs from non-renewable sources, maximizing use of natural biological processes, as well as promoting environmental quality. Knowler and Bradshaw (2007) argue that the net financial impact of conservation agriculture, which involves agro-ecological practices, at the individual farm scale appears to be positive.

In Ghana as in many other developing countries, crops that are produced for export are usually intensively treated with pesticides to assure the required quality and uniformity. This is also the case for pineapple, the third most important agricultural export product of the country, after cocoa and palm oil. On the environmental side, climate change is expected to have negative effects on agricultural production, while population pressure will contribute to increased soil degradation and consequently lower crop yields (Diao and Sarpong, 2007). The Ghanaian government has attempted to address these problems through environmental protection (Government of Ghana, 2010) and has established an organic agriculture desk in the Ministry of Food and Agriculture (MOFA).

The remainder of the study is structured as follows: The next section gives an overview of the pineapple sector in Ghana and the data used in the analysis. It is followed by the presentation of the corresponding descriptive statistics. Subsequently, Section 3 presents the conceptual framework and empirical strategy employed in the analysis. The empirical results are presented in Section 4. The final section provides concluding remarks and implications.

[3] There are various definitions of smallholder. In developing countries, smallholder usually refers to farms supporting one family with subsistence farming and limited production of cash crops. We rely on the Ministry of Agriculture extension offices lists, and thereby definition, of smallholders. In addition, in our sample all farmers are certified under a group certification option, which is directed at smallholders only.

[4] Non-organic certified refers to Global GAP certification, which is a precondition for producing pineapple for export in Ghana. The Global GAP certification process shares some practicalities with organic certification, among them regular inspections and upfront training. We may therefore expect that the adoption of agro ecological practices among Global GAP farmers is likely to be higher than among non-certified pineapple farmers producing for the local market.