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Do private coffee standards 'walk the talk' in improving socio-economic and environmental sustainability?

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ABSTRACT

Private sustainability standards cover an increasingly large production area and involve an increasing number of farmers worldwide. They raise expectations among consumers about the economic, ethical and environmental implications of food production and trade; and attract donor funding to certification schemes. The sustainability impact of standards remains unclear as research focuses on either economic or environmental implications. We analyze both the socio-economic and environmental impacts of coffee standards in Uganda and show that these are not in line with expectations created towards consumers. We find that standards improve either productivity and farm incomes or biodiversity and carbon storage but fail to eliminate trade-offs between socioeconomic and environmental outcomes, even when combined in multiple certification. Our analysis is based on a unique combination of economic survey data and ecological field inventory data from a sample of certified and non-certified coffee farms. Our findings are relevant for farmers, food companies, policy-makers, donors and consumers. They imply that combining different standards in multiple certification is counterproductive; that the design of standards could improve to mitigate observed trade-offs between economic and environmental outcomes; and that this requires increased productivity within ecological boundaries, rather than a price premium and added control mechanisms through multiple certification.

1. Introduction

Private sustainability standards (PSS) – each with their own promises on improving sustainability of food production and trade – are increasingly important in global agri-food sectors (Gereffi et al., 2005; Henson and Humphrey, 2010; Lee et al., 2012). PSS focus on social, economic and/or environmental aspects, and are most important in trade relations with developing countries (Henson and Humphrey, 2010; Lee et al., 2012; Beghin et al., 2015; Reardon et al., 2009). For example, organic certification is promoted as eco-friendly production without chemical inputs. Fairtrade claims to improve farmers' lives and to offer consumers a powerful way to reduce poverty through their everyday shopping. Rainforest Alliance claims to ensure the long-term economic health of communities through protecting ecosystems, safeguarding the well-being of local communities and improving productivity. UTZ assures that coffee, tea and cocoa suppliers follow expert guidance on better farming methods, working conditions and care for nature; which leads to better production, a better environment and a better life for everyone.

But do PSS effectively provide a way to improve socio-economic and environmental sustainability of global food production and trade? Answering this question is important for various stakeholders: first for developing countries, for whom agri-food exports are critical for growth and whose farmers are often poor and operate in environmentally sensitive areas; second for consumers to know if PSS deliver what they promise and to judge if a price premium is justified; third for companies and non-profit organizations initiating and adopting standards to know the impact of the standards they promote and justify the rents they extract from agri-food chains; and fourth for donors in order to ascertain the effectiveness of financial support to certification schemes in comparison with other development projects.

There is evidence on both socio-economic and environmental implications of specific PSS. Socio-economic evidence suggests that PSS can enhance the competitive position of developing countries and exporters in international markets but that the implications for smallholder producers are complex, case-specific and should be analyzed in a

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comparative way – as recently reviewed by (Beghin et al., 2015). Evidence on environmental issues suggests that certification of tropical commodities can support biodiversity conservation but that the causal impact is still questionable – as recently reviewed by (Tscharntke et al., 2015). There are no multidisciplinary studies that concurrently assess socio-economic and environmental impacts of PSS, which are needed to understand the full sustainability implications of PSS including potential trade-offs between socio-economic and environmental benefits.

In this paper, we analyze the on-farm socio-economic and environmental implications of a double Fairtrade – Organic (FT-Org) and a triple UTZ – Rainforest Alliance –4C (UTZ-RA-4C) smallholder coffee certification scheme in Uganda. We take a unique inter-disciplinary approach using survey and field data from certified and non-certified farms. We use household- and field-level socio-economic data from a quantitative survey among 595 farm-households producing coffee on 1183 fields. We combine these with geo-referenced data on agro-ecological conditions and a field-level inventory of environmental indicators from a sub-sample of 74 fields. We use instrumental variable regressions that pass weak- and over-identification restrictions to estimate the impact of PSS on agronomic practices, coffee yield, labor productivity, coffee income and poverty; and linear mixed models to reveal the implications of PSS for tree and invertebrate diversity and carbon stocks. We use a correlation analysis to detect trade-offs between socio-economic and environmental indicators.

Given that an estimated 25 million smallholders worldwide (11.7 million in Africa) depend on coffee production as their main income source, that the incidence of poverty among them is high (Eakin et al., 2009), and that coffee trade has been identified as a major cause of biodiversity threats in tropical countries (Chaudhary and Kastner, 2016; Lenzen et al., 2012), sustainable coffee cultivation remains a challenge. Understanding the contribution of PSS in addressing this challenge is pertinent, given that an estimated 40% of global coffee production is certified (Lernoud et al., 2016). This requires an inter-disciplinary approach, and while studies on increased intensification of tropical commodity production analyze the trade-offs between economic and environmental outcomes (Bos et al., 2007; Philpott et al., 2008; Steffan-Dewenter et al., 2007; Teuscher et al., 2015), studies on coffee certification are mainly discipline specific and mostly from Latin-America. Socio-economic studies analyze the impact on productivity, income, poverty and food security (Bacon, 2005; Bacon et al., 2008, 2014; Barham and Weber, 2012; Beuchelt and Zeller, 2011; Méndez et al., 2010; Ruben and Fort, 2012; Ruben and Zuniga, 2011; Valkila, 2009; Valkila and Nygren, 2010; Wollni and Zeller, 2007 for studies from Latin-America; Bolwig et al., 2009; Chiputwa et al., 2015; Chiputwa and Qaim, 2016; Mitiku et al., 2017; Van Rijsbergen et al., 2016 for studies from Africa; Jena and Grote, 2017 for a study from India); agronomic studies focus on the adoption of agronomic and agri-environmental practices (Elder et al., 2013; Blackman and Naranjo, 2012; Ibanez and Blackman, 2016; Rueda and Lambin, 2013); and ecological and environmental studies analyze effects on tree cover and biodiversity (Haggar et al., 2015; Hardt et al., 2015; Perfecto et al., 2005; Philpott et al., 2007; Rueda et al., 2015) and on deforestation and forest degradation (Takahashi and Todo, 2013; 2014; 2017). Three studies concurrently analyze socio-economic and agronomic outcomes (Ruben and Fort, 2012; Ibanez and Blackman, 2016; Rueda and Lambin, 2013) and one ecological study includes a non-casual analysis of revenues and costs (Philpott et al., 2007). A meta-analysis on the social, economic and environmental effects of tropical commodity certification (DeFries et al., 2017) identifies 13 studies with a rigorous causal analysis of the impact of coffee certification and reveals that multidisciplinary studies addressing different components of sustainability or studies comparing different and multiple certification schemes are very rare. This inter-disciplinary and comparative study on the socio-economic and environmental implications of different coffee certification schemes adds insights on the sustainability trade-offs of PSS and results in findings with broad implications towards policy-makers, food companies, non-profit organizations, donors, farmers and consumers.

2. Methods

2.1. Research area

The research area covers five of the eight districts of the Mt. Elgon region in Eastern Uganda, a main coffee producing area in Uganda (Fig. SI1). The area ranges between 1200 and 2200 m above sea level, has a bi-modal rainfall pattern and volcanic soils, borders the Mt. Elgon National Park, is dominated by Bagisu and Sabiny ethnic groups, and faces increasing population pressure and land degradation problems.

Arabica coffee in Mt. Elgon is typically grown on small (1 ha) landholdings in a shade-garden system, intercropped with bananas and other food crops. Four major coffee export companies source from the region. Two companies source fresh, dried and washed coffee from independent farmers through spot-market transactions with traders and company agents. The other two companies source certified produce through contract-farming schemes. The first contract-farming scheme is a double Fairtrade – Organic certification scheme (FT-Org) existing since 2000, in which smallholder farmers organized in a network of cooperative societies supply fully-washed coffee. The FT-Org scheme promotes an organic production system and guarantees a minimum price and a social premium. The second scheme is a triple UTZ – Rainforest Alliance –4C certification scheme (UTZ-RA-4C) established in 2012, in which farmers located within a 12.5 km radius from a company washing station and organized in producer organizations supply fresh coffee cherries to one of the six washing stations across the region. The UTZ-RA-4C scheme promotes a shade-coffee system, good agricultural practices with responsible agro-chemical use, integrated crop management and stipulates requirements on forest and wildlife protection. For both schemes, the costs of certification and annual external audits are borne by the companies, who partially rely on donor funding. In the whole region 7479 farmers participate in the FT-Org scheme and 6048 in the UTZ-RA-4C scheme.

2.2. Data

Socio-economic survey data were collected in February-March 2014 from a stratified random sample of 600 coffee producing farm-households (clustered in 60 villages and 21 sub-counties), using a quantitative structured questionnaire. Strata of UTZ-RA-4C certified, FT-Org certified, and non-certified sub-counties, villages and households were constructed based on information from coffee companies. The sample includes 170 FT-Org and 130 UTZ-RA-4C certified producers, and 300 non-certified producers. Five observations were discarded due to missing information. The survey provides household-level data and field-level data for all 1183 coffee fields of the sampled households – with fields referring to coffee gardens and one farm-household often having multiple coffee gardens. Field-level data include GPS coordinates, which allowed to merge survey data with available GIS data on topography, soil and climate. Additional information was collected from semi-structured interviews with village leaders and coffee companies.

Environmental data were gathered through a field inventory on a subsample of 74 coffee fields in July-September 2014. This subsample included 18 FT-Org and 19 UTZ-RA-4C fields selected in a stratified random way with strata based on elevation and soil type. These 37 fields were pair-wise matched with 37 non-certified fields using propensity score matching (Rosenbaum and Rubin, 1983) using agro-ecological (elevation, rainfall, distance to the main road and to the national park) and socio-economic (household size and age, education, tribe and religion of the household head) information. After matching agro-ecological and socio-economic covariates are balanced between certified and non-certified fields with no remaining differences in means at the