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RÉSUMÉ – En analysant la littérature empirique, cet article interroge la contribution du commerce équitable pour répondre aux enjeux de sécurité alimentaire (SA) des ménages agricoles dans les pays en développement : quels instruments, quels chemins d'impact et sous quelles conditions. Il révèle que la régulation des conditions de vente des produits certifiés peut améliorer la SA, mais que la plupart des chemins d'impacts restent incertains car dépendant de facteurs individuels, locaux et internationaux.

MOTS-CLÉS – Sécurité alimentaire, standards volontaires de durabilité, commerce équitable, impact

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ABSTRACT – Fair trade organisations claim to make a positive contribution to the sustainable livelihoods of smallholders. Few studies have explored its impact on food security (FS). This paper highlights the instruments, pathways involved and the conditions required to improve FS through fair trade. Our analysis reveals that the regulation of sales conditions may improve FS. However, some pathways remain uncertain due to individual and contextual factors that could offset the benefits.

KEYWORDS – Food security, voluntary sustainability standards, Fair Trade, impact

HOW DOES FAIR TRADE AFFECT FARMERS' FOOD SECURITY?

A review of empirical studies

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INTRODUCTION

This paper examines how fair-trade standards could contribute to small farmers' food security. Fair trade schemes are part of the numerous voluntary sustainability standards (VSS) that have been developed. VSS are market-based instruments designed to promote sustainable development, by encouraging the adoption of good social and environmental practices in food systems. VSS have also received attention from international development institutions and NGOs. They are expected to allow farmers to become part of high value-added chains, which could increase their incomes and help reduce poverty in developing countries (Potts and al., 2014). Nevertheless, their development seems to have occurred independently of the current debate on food insecurity issues in the international community. Yet, achieving food security (FS), where “*all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life*” (FAO, 2009), is one of the *Sustainable Development Goals* (SDS) adopted by the United Nations (UN, 2015). FAO (2012) already argues that hunger eradication and sustainable consumption and production are linked and that better governance of food systems

is essential for achieving these two objectives. Among VSS, Fair-Trade standards have been developed more specifically as “*a response to the failure of conventional trade to deliver sustainable livelihoods and development opportunities to people in the poorest countries of the world*” (FTI, 2009). Fair trade standards historically focus on organized smallholders. We might expect fair trade to help achieve FS, since smallholders are not only the most vulnerable when it comes to the international agri-food markets, but also the primary victims of food insecurity.

The numerous tools designed to reduce vulnerability to the unfair market (minimum guaranteed prices, collective premiums, stability, access to credit and capacity building with technical training) are automatically presumed to resolve food insecurity for certified farmers. For instance, recently Fairtrade International (FI)¹, claimed that the Fairtrade minimum price has also proven to be “*an effective tool to protect producers from the volatility of global commodity markets, improving food security*” (FTI, 2015).

However, fair trade has multiple impact pathways that have hardly been investigated, especially in terms of its FS *impact*. Current research tends to focus more on relationships between *inputs* (intervention) and *outputs* (a tangible change that is a direct result of intervention, e.g. differential prices) or *outcome* (the short- and medium-term effects of outputs, e.g. incomes), rather than *impacts* (long-term effects, which may be direct or indirect, positive and negative, intended or unintended, e.g., food security), which is the last stage of the causal chain (Nelson and Pound, 2009). Whereas FT is supposed to contribute to sustainable development goals including food security objectives, and although food insecurity is particularly widespread among poor and smallholder farmers, this issue remains under-explored. This is due to the growing influence of contextual factors on the theory of change, from inputs to impacts. While farmers do value those intermediary outcomes, research is needed to understand the contribution of VSS to outcomes further along the causal chains (ODI, 2017).

Against this background, the aim of this paper is to highlight and discuss how fair trade contributes to farmers’ FS, considering the inputs and pathways involved and the conditions required to achieve FS.

1 The most important fair trade organization.

In the following section, we present the methodology used in this study (Section 1). We then highlight the scarcity of causal evidence relating to fair trade and FS, using a systematic inventory of available empirical studies (Section 2). On the basis of the FS framework presented in Section 3, the paper provides a map of the potential positive and negative impact pathways between fair trade instruments and household FS (Section 4). The last section concludes and highlights the importance of future research.

1. METHODOLOGY

Based on empirical studies, we analyze fair trade's potential and effectiveness when it comes to generating food security. We first provide a systematic inventory of empirical literature that focuses on food security in fair trade contexts (Section 2). We use electronic databases (Web of science, JSTOR and Science direct) with a combination of the key words: "fair trade" or "fair trade" and "food security" or "nutrition". We also followed a backward snowball methodology, identifying papers in reference lists that may be relevant. We then provide a comprehensive analysis of the empirical literature on fair trade in order to highlight and discuss how (along which pathways and under which conditions) the diverse fair-trade tools potentially influence food security (Section 4). To this end, we consider six reviews (Chan and Pound, 2009; Nelson and Pound, 2009; Blackman and Rivera, 2010; Terstappen and al., 2012; ODI, 2017) and identify additional papers that highlight some specific impact pathways between fair trade and FS. While fair trade includes several labels², we focus here on *Fairtrade International* (FI); and particularly on standards dedicated to small organized producers, who represent the majority of beneficiaries³.

2 Fairtrade International, Fair Trade USA, Fair For life (from the fusion of IMO and Ecocert), *Símbolo de Pequeños Productores*, WFTO, Naturland Fair.

3 Other beneficiaries are workers on estates.

2. REVIEW OF EXISTING EMPIRICAL STUDIES ON FOOD SECURITY

Despite the increased interest in quasi-experimental methods to assess the impact of fair trade in the early 2000s –which broadly reflected the international development scene– (Nelson and Martin, 2017), only three papers clearly set out to measure the causal relationship between FT and household FS (Becchetti and Costantino, 2008; Chiputwa and Qaim, 2016; Meemken and al., 2017). On the one hand, two studies show positive causality between FT and FS for fruit-growing households in Kenya and coffee-growing households in Uganda. The former shows that FT producers have better access to food in terms of quantity (measured from food expenditure) and dietary diversity (measured on the basis of a food frequency questionnaire) than non-compliant producers. The longer producers are affiliated to a FT organization, the more diverse their diet. The authors argue that crop diversification stimulates more diversified home consumption (Becchetti and Costantino, 2008), but this link has not been statistically proven. Using a 7-day recall method at household level, Chiputwa and Qaim (2016) show positive causality between sustainable certification schemes (UTZ-FI, UTZ-organic compared to UTZ and conventional) and calorific and nutritive intake. They use a model of simultaneous equations to identify two significant pathways: certification increases income and improves gender equality (in terms of control over coffee production and income). Both outcomes significantly improve household calorific and nutrient intake. On the other hand, the study of Meemken and al. (2017) concludes that there is no causality between FT and FS. Using panel data, the authors show that FT certification has a positive effect on total expenditure, but no effect on food expenditure.

Recent papers argue that while FT certification helps provide better market outlets for smallholders, FT alone fails to satisfy the food needs of producers and their families throughout the year (Caswell and al., 2012; Bacon and al., 2014; Bacon and al., 2017). These papers are summarized in Table 1 (see Appendix), which indicates the prevalence of food insecurity among farmers who adopt FT certification or the

correlations between FT and food insecurity. These studies show the high prevalence of self-stated food insecurity among FT farmers (from 63 to 97% of samples). They provide insights into the possible correlation between outputs (e.g. price differential), livelihoods (e.g. household income) and FS indicators, but fail to reach a consensus (Table 1). For instance, coffee income is not systematically correlated (positively and statistically) to a shorter lean period.

Thus, the question as to how and if FT could resolve the “hungry farmer paradox” remains unclear and has not yet been explored in-depth (Bacon and al., 2017). Based on these articles, as well as on wider empirical literature about FT, we explore the potential and effectiveness of FT schemes for generating substantive and sustained FS. To do so, in the next section we examine the theoretical outcomes required to achieve a positive impact on FS.

3. FOOD SECURITY FRAMEWORK

In the early 70s, FS referred to the physical availability of food at national and global level. However, Sen (1981) demonstrated that food could be available without necessarily being accessible to every individual. He introduced the notion of “food entitlements” and made the link between the concepts of hunger, access and poverty. Food entitlement is a person’s ability to command food using what he owns, the possibilities of exchange that are offered to him and what is provided free. We consider four types of food entitlements as a type of *outcome* that could contribute to FS (Sen, 1981).

(i) Mixed production-trade based entitlements refer to the use of resources to produce food and non-food goods for sale in order to generate on-farm income. The income generated from cash crops depends on (i) production factors, such as the resources used for cash crop production (natural resources, land, finance, time), agricultural skills, yield, quality and type/number of cash crops grown; and (ii) marketing factors,

such as prices, price stability, volume sold, payment methods, stability of outlets, access to credit and insurance.

(ii) Exchange-based entitlements are derived from the sale of assets (determined by the terms of exchange) or the wage (determined by the terms of employment). In farming contexts, employment possibilities include off farm (farm work on estates or neighbouring farms) and non-farm employment. In the case of these two food entitlements, physical access to markets is essential so that individuals can buy the food they need. Access depends on adequate infrastructure (roads, market location, etc.) and whether transport to reach the market takes a reasonable amount of time.

(iii) Production entitlements refer to the farmers' capacity to use their resources to produce sufficient and diverse food for home consumption (crops and varieties). Natural resources (quality of soil, water, etc.), capital investment (land, finance and time) and the farmers' agricultural skills affect production entitlements.

(iv) Transfer entitlements consist of food aid and gifts from social aid (social programs organized by NGOs, government, cooperatives) or the household's social capital (family, friends, neighbours).

Intra and inter-annual stability is essential so that food entitlements are ensured "at all times" as underlined in the definition of FS. FS also depends on the empowerment of women (Alkire and al., 2013). Women's access to and control of resources for food, as well as their involvement in cash crop production choices has an impact on production entitlements and mixed production-trade entitlements, respectively. A rise in income is not always associated with greater FS, when there is a shift in the control of income to the detriment of women. Women are responsible for distributing food in the household, but are often excluded from managing cash crops (Anderman and al., 2014). On-farm income has a greater impact on food access when women have control over it (Duflo and Udry, 2004). Lastly, the time available to women (after domestic and productive tasks) is a determining factor for the family's FS. Figure 1 illustrates pathways from outputs to FS impacts.

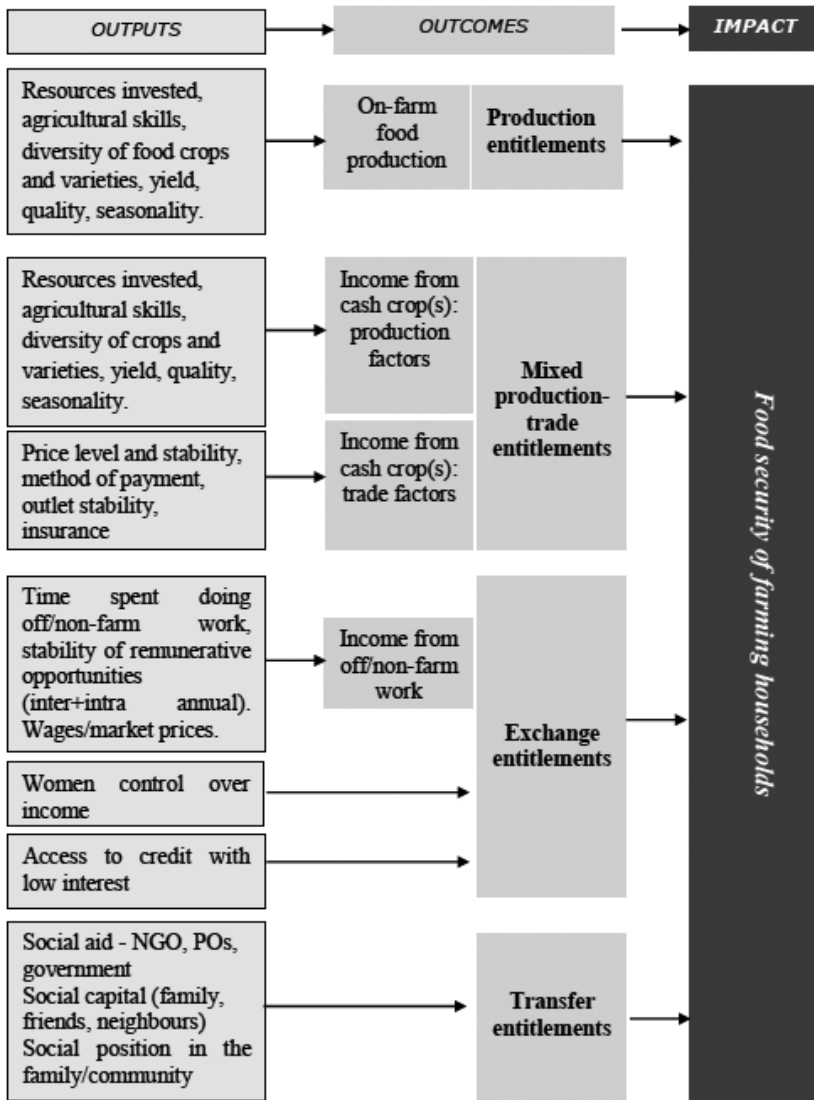


FIG. 1 – Analytical framework illustrating FS pathways at a farm household level (Source: Authors).

4. RESULTS

FI claims to contribute to food security through the “*Fairtrade Minimum Price*” mechanism: “*Fairtrade Minimum Price has proven to be an effective tool to protect producers from the volatility of global commodity markets, improving food security*” (FI, 2015). This tool is a Free on Board (FOB) guaranteed minimum price for producer organizations (POs) that complies with FT standards. This is the lowest price possible that a buyer pays for a certified product, which allows producers to cover the average cost of sustainable production. When the market price is higher than the minimum price, the market price is applied. In theory, the minimum price (which is a fair trade *input*) can stabilize and increase farm gate prices (*output*), farm incomes (*outcome*). This reduces vulnerability to price fluctuations, improves farmers’ purchasing power, *mixed production-trade based food entitlements* and, thus, access to sufficient and diversified food (*impacts*).

In this section, we highlight eleven factors that provide the basis for discussion about whether the market regulation and prices for certified cash crops (*inputs*) improve household incomes and *mixed production-trade based food entitlements*. Figure 2 summarizes these factors.

4.1. FARM GATE PRICE BENEFITS (*OUTPUTS*) AS A RESULT OF FT PRICES (*INPUTS*)

Five factors determine how regulated prices for certified cash crops (guaranteed minimum price) affect the farm gate price differential.

First, the level of the price floor seems crucial (factor 1, Figure 2). Bacon (2010) indicated that Fairtrade International (FI) coffee price floors dropped by 40% between 1988 and 2008 in real terms (i.e. taking inflation into account). Jaffee and Howard (2016) renew Bacon’s analysis and show that the real minimum price of FI coffee in 2014 was only a third of its 1988 value. Thus, the minimum price is actually worth less than before. Some stakeholders, especially POs’ networks, consider that this price is still insufficient in the light of the social challenges that FI strives to address. In addition, minimum guaranteed prices are fixed in US dollars, which means the exchange rate fluctuates.

Second, the minimum guaranteed prices differ according to the fair-trade standards (factor 4, Figure 2). For instance, the minimum

price for FI or for FTUSA Arabica coffee is US\$ 140 per pound, while the label *Símbolo de Pequeños Productores* (SPP) offers US\$ 160. The POs' capacity to sell coffee to the best bidder from among the fair-trade certified importers is a determining factor.

Third, additional costs should be taken into account for both POs and farmers (factor 2, Figure 2). In general, the price floor is defined as “free on board”, which equates to the export price guaranteed to POs. POs charge farmer's administrative fees for certification and trading or processing costs, which determine the farm gate price, in other words, farm gate prices are PO-dependent. The collective premium, which is one of the most important fair-trade inputs, can help POs reduce administrative costs and positively influence farm gate prices. Buyers must pay a collective premium to FT-certified POs. This is a fixed price per unit of production (for example, + US\$ 0.20/lb of coffee). The producers themselves decide democratically how the collective premium should be used. In addition, the requirement for buyers to pre-finance harvests by up to 60% of the sale contract can reduce the marketing costs and, thus, increase the price paid to producers.

Fourth, while FT guarantees a minimum price to producer organizations, it does not guarantee market outlets for certified products (factor 3, Figure 2). Therefore, the effect on farm gate prices depends on the bargaining power of each particular PO (ODI, 2017). The PO may be able to sell some products under a FT label, while the rest is sold at lower conventional prices. Farmers are then paid the average price for the total volume of produce sold, i.e., the price differential generated by the fair trade added value may be less than expected. Sales are limited by at least two factors: (i) the supply of FT products exceeds the market demand, with only 28% of the global production of Fairtrade International (FI) coffee sold under the FI label (FTI, 2016); and (ii) FT products do not always meet other quality requirements (Caswell and al., 2014).

Fifth, the relative advantage of FT minimum prices depends on world market prices (factor 5, Figure 2). There is a consensus and clear evidence regarding FT's genuine capacity to increase and stabilize the prices paid to producers from the sale of certified products, when conventional prices are low (Chan and Pound, 2009; Blackman and Rivera, 2010; Méndez and al., 2010; Vagneron and Roquigny, 2010). However, when conventional prices are high, competition between different markets intensifies, which may affect the sales of FT POs (Valkila and Nygren, 2010).

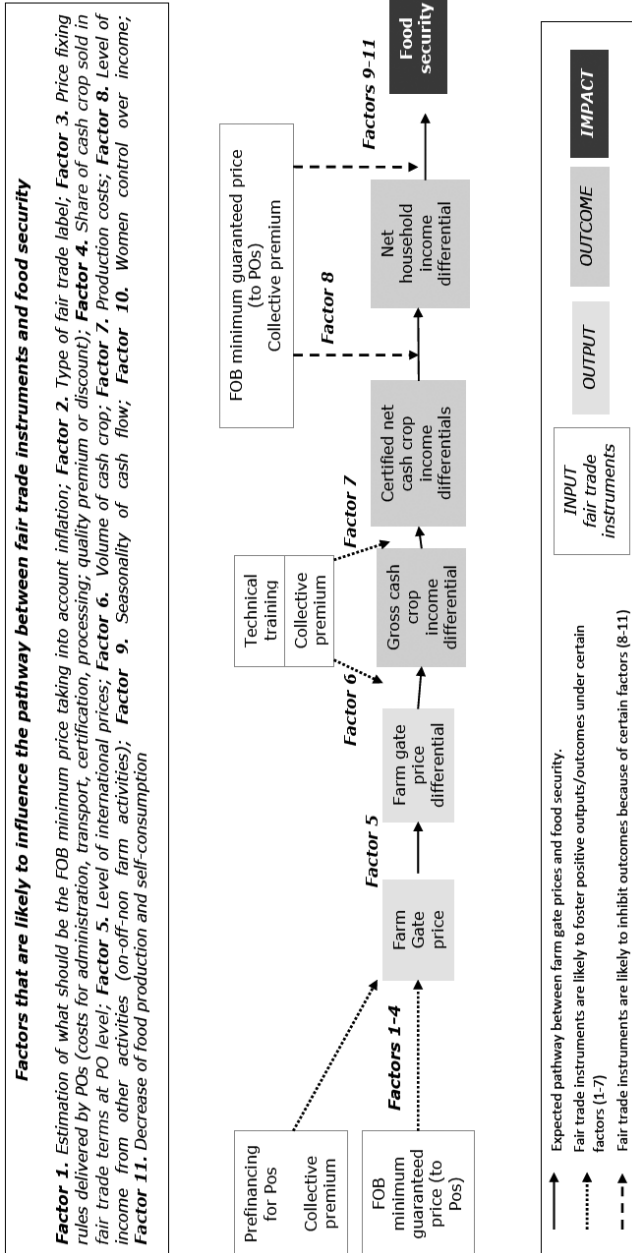


FIG. 2 – Context-dependent pathway between FOB minimum prices and food security impacts (Source: Authors).

4.2. HOUSEHOLD INCOME BENEFITS (*OUTCOMES*) AS A RESULT OF FARM GATE PRICE BENEFITS (*OUTPUT*)

The gross FT cash crop income differential depends on the volume of production (factor 6, Figure 2). Three FT requirements can help increase the volume of production.

- Certified POs must offer various technical training courses to farmers, for example, on the management of erosion, pests, fertilizers, waste and water. This could help improve agricultural resource management, decrease production risks, as well as improve the yields and quality of cash crops.
- Dependency on the cash flow from the sale of cash crops increases the cash flow stress on small farmers during the growing season, prior to harvest. The pre-financing required by FT could help POs to provide short-term credit to farmers. At farm level, pre-finance enables farmers to optimize capital investment to produce cash crops, which may increase yield, productivity and, therefore, contribute to *mixed production-exchange-based food entitlements*. When pre-finance is given to farmers just before the harvest, which is one of the worst periods of food insecurity, it can also improve FS directly through food expenditure and *transfer entitlements*.
- The collective premium can encourage farmers to adopt improved production techniques. For instance, coffee POs must use at least a quarter of the amount of premium to improve productivity and/or quality.

According to the literature, FT farmers receive more technical training than conventional producers. Their crop management is more labour intensive; they devote more time to quality maintenance and improve their farming and resource conservation practices. In the coffee sector, Vagneron and Roquigny (2010) argue that FT's economic incentives and training boosted production and improved quality. More recently, using difference-in-difference comparisons in Kenya, Van Rijsbergen and al. (2016) point to the significant positive production effects due to FT, as a result of the intensification of coffee cultivation and coffee processing. For farmers that did not use chemical inputs or improved agricultural practices prior to certification, double FT organic certification is more

likely to increase yields (Valkila, 2009). If there is no increase in yields and production, the claims about the income benefits of fair trade are misleading (Akoyi and Maertens, 2018). Nonetheless, few studies have been conducted on the causality pathways between improved farming practices for cash crop production and FS.

At farm level, no clear distinction is made between gross and net income (factor 7, Figure 2) or between income from certified crops and total household income (factor 8, Figure 2) (Nelson and Pound, 2009; Méndez and al., 2010; Vagneron and Roquigny, 2010). While gross household incomes are largely positive, net total incomes can be negative. This could be caused by increased costs (certification fee and the cooperative's administrative costs, investment, increased labour and marketing costs). The exact figures for these additional costs are not always available. Consequently, it remains unclear whether net producer income actually increases (Nelson and Pound, 2009; Terstappen and al., 2012). The review of the literature by Terstappen et al. (2012) demonstrated that 9 out of 20 studies show an increase in seasonal employment following FT certification (i.e. higher labour costs).

The second distinction is crucial, given that cash crop income may increase, but total household income may remain the same (factor 8, Figure 2), as highlighted by Vellema and al. (2015) and Van Rijsbergen and al. (2016) for the certified coffee sector in Colombia and Kenya, respectively. Indeed, while a guaranteed minimum price may encourage farmers to make long-term investments in order to secure a long-term income from cash crop production (ODI, 2017), it may also induce a specialization risk. By providing an economic incentive based on production (per kilo of cash crops), FT tends to encourage diversified smallholders to increase their cash crop production, which can lead to over-specialization. These changes represent a real threat to income levels and stability. They may weaken risk management strategies (Chan and Pound, 2009; Caswell and al., 2012) and reduce access to food by diminishing the *exchange-based food entitlements*. Over-specialization may also reduce food availability and push up local prices. The case of Bolivian quinoa is emblematic of organic FT certification. The move to export-oriented certified quinoa caused a sharp decline in the quinoa available for local consumption. This led to changes in food consumption in favour of cheaper less nutritious imported cereals (wheat) (Gendron and al., 2009).

4.3. INCREASED FS (*IMPACT*) AS A RESULT OF HOUSEHOLD INCOME BENEFITS (*OUTCOMES*)

Some empirical studies have shown correlations between increased household income from cash crops and FS. For example, in Kenya, vegetable farms have improved household income and FS (food consumption and dietary quality) (Becchetti and Costantino, 2008). In Uganda, coffee farmers have managed to improve their calorific and nutrient intake (Chiputwa and Qaim, 2016).

Nonetheless, the effects of farmers may vary. Increased income may be used for non-food purposes. For instance, Meemken and al. (2017) found that while FT certification increases incomes, it has no significant impact on food expenditure (for both purchased and home-produced food) or on household nutrition among coffee farmers in Uganda. However, it shows that FT certification more than doubles non-food expenditure, in particular, for education. Priorities in household expenditure depend on the type of income flows (i.e. frequency of payments) (factor 9, Figure 2). When money is derived from a seasonal lump sum payment, it is more likely to be used for non-food expenses (e.g. education, housing) (Anderman and al., 2014). In addition, the person who has control over the income is crucial (factor 10, Figure 2). Terstappen and al. (2012) argue that, in general, women do not benefit equally from FI. Women often have less control over decisions relating to cash crops and monetary income. When FT focuses on crops that are usually managed by men, *mixed production-trade based entitlements* may be reduced because women only control a limited share of the household income. On the contrary, Chiputwa and Qaim (2016) present a Ugandan case study, where coffee certification gave women some control over income, which is traditionally the prerogative of men. This shift in income control significantly improved access to sufficient (calorific) and nutritive food (vitamin A, zinc and iron).

Lastly, increased household income from certified cash crops may fail to improve FS when over-specialization reduces home consumption (factor 11, Figure 2). Bacon and al. (2014) present a case study, where the collective premium contributes to *production-based entitlements* to achieve FS (through the collective storage of food crops). However, in many cases, the literature shows that the premium is largely devoted to technical assistance or access to credit and investment for certified

cash crop production and rarely used to address FS issues directly. Over-specialization may reduce the amount of resources dedicated to food crops (area, financial capital and time) to the detriment of *production-based food entitlements*. This could occur when certification leads to an increase in women's workload. Most studies find that women workload tends to increase given the traditional division of labour within households and the increased labour load between conventional and FT markets Terstappen and al. (2012). Saenz-segura and Zuniga-Arias (2008) and Fernandez and al. (2013) show that in conventional households, women devote less time to coffee production and are involved in other activities such as the home garden. When the certified cash crop is also consumed locally, certification may lead to the replacement of traditional varieties (usually consumed by farming households) with varieties that satisfy the demand on remunerative markets, but are of a lower gustative quality (Lemeilleur, 2013; Tobin and al., 2016). This may be detrimental to certain aspects of FS, which are linked to diversity and cultural preferences.

In summary, we find that the expected positive pathways between FT's main inputs (minimum prices, technical training, collective premium, pre-financing) and FS depend on multiple factors at different levels: global (e.g. international prices), organizational (e.g. collective premium use) and household (e.g. over-specialization).

CONCLUSION AND RESEARCH PERSPECTIVES

Fair trade certification schemes aim to provide secure and sustainable livelihoods. However, they "have not resolved the challenges of FS and poverty for small-scale farmers" (Caswell and al., 2012). This paper reveals that causality studies that focus on fair trade certification and FS are scarce and non-consensual. Indeed, impact pathways are not discussed in the literature. In this paper, we identify and discuss the potential pathways from FT instruments to FS as a preliminary step, before conducting more in-depth studies with original data. We developed an analytical framework based on food entitlement theory. Our contribution provides a map of the potential positive and negative

impact pathways between fair trade and FS, which can be used as a basis for future research.

First, we find that FT may help reduce vulnerability to price variability (minimum guaranteed price), increase the POs' capacity on the global markets (collective premium), modify the flow of household income (pre-financing at farm level) and improve cash crop production (collective premium, pre-financing at individual level and technical assistance). In turn, these outputs may generate greater mixed *production-exchange-based food entitlements* from certified cash crops. However, while FT has potential positive effects, it has many limitations, which depend on the local/international context, the governance of collective action, the household strategies and women's control over income in the household. More research is needed to identify the conditions required to enhance these positive pathways.

Second, our analysis of empirical evidence also revealed that potentially unexpected and controversial outcomes in terms of *exchange or production-based food entitlements* could offset the benefits of FT or indirectly reduce FS. For years, farming and livelihood diversification strategies have been lauded as a way to reduce the economic and food vulnerability of farm households (Caswell and al., 2012; Michler and Josephson, 2015). In the context of FT, our analysis shows that potential contradictory causality pathways exist, when FT incentives are based on production. Further empirical research is needed to examine the risk of over-specialization and its impact on vulnerability to food insecurity.

This paper finds that fair trade certification is likely to positively contribute to prices and income, under certain factors. This suggests that fair trade certification may be a better market opportunities for smallholders. Yet, the assumption that such benefits have a direct positive impact on FS should be treated with caution. It is important to understand and account for trade-offs, when assessing whether fair trade helps improve living conditions, especially with regard to greater FS. Many decision makers consider that voluntary sustainability standards (VSS) are the best tools available for promoting sustainable development. However, our results suggest that economic benefits generated by VSS are not automatically reflected in terms other welfare dimensions, such as food security which are an integral part of UN Sustainable Development Goals. Further discussion is needed to redefine sustainability standards

and ensure that they complement current development policies and programs. Further research is required to fully grasp how certification schemes can contribute to farmers' living conditions such as FS, beyond economic indicators. A first proposition that should be empirically tested is whether – in a context where fair trade certification has a positive impact on certified cash crop income – households are likely to improve their access to food (Sirdey and Lemeilleur, 2019). Another proposition would be to consider the role of collective action in fair trade, when it comes to analysing its contribution to reducing food insecurity (Bacon and al., 2017). POs enable farmers to have a voice, claim their rights and pursue non-economic goals (Tallontire and Nelson, 2013), such as sustainable agriculture and food sovereignty (Bacon, 2015). Not all fair-trade standards put the same emphasis on the objectives of autonomy or sovereignty, nor view the collective action as a prerequisite for reaching development goals. We can therefore expect tiered effects according to the fair-trade labels.

Compliance with Ethical Standards

The authors declare that they have no conflict of interest.

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APPENDIX

TAB. 1 – Available empirical studies (excluding causal impact studies).

Ref.	Countries	Certification and crops	Correlations between food insecurity and livelihood factors	Statistical comparisons between groups
CIAT 2007	Nicaragua, Mexico, Guatemala	FI and/or organic coffee farmers	<ul style="list-style-type: none"> - Farmers that increased the area of coffee reduced their lean months period - Relationship between coffee production and lean period unclear - % income from coffee is positively correlated with shorter lean period 	
Jaffee 2008	Mexico	FI vs conventional coffee farmers	Positive correlation between shorter lean period and : <ul style="list-style-type: none"> - gross household income - share of home consumption 	Positive correlation between FT participation and : <ul style="list-style-type: none"> - shorter lean period - longer period of grain storage - more frequent consumption of meat and cheese
Mendez 2010	Nicaragua, Guatemala, Salvador, Mexico	FI and/or organic vs conventional coffee farmers	No correlation between lean period and household gross income Positive correlation between shorter lean period and the number of income sources	Positive correlation between FT certification and longer lean period
Bacon 2014	Nicaragua	FI and FI-organic coffee farmers	Positive correlations between shorter lean period and : <ul style="list-style-type: none"> - household income - number of fruit trees - corn production - farming area - grain storage No correlation between lean period and : <ul style="list-style-type: none"> - organic production - leadership in coop - length of membership - share of food purchased - number of household members contributing to income - crop and animal diversity 	

Bacon 2017	Nicaragua	FI coffee farmers, farmers who joined “peasant to peasant” programme, conventional coffee farmers	<p>Positive correlation between shorter lean period and :</p> <ul style="list-style-type: none"> - farm area - off-farm income - income from beans - number of fruit trees - coffee production - more than 50% of total food consumption is derived from home-grown produce <p>No correlation between lean period and :</p> <ul style="list-style-type: none"> - food crop production - farm production diversity - organic production - income from corn 	No correlation between FT participation and duration of lean period
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