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New insights on the use of the Fairtrade social premium

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Abstract. Fairtrade standards differentiate themselves from other sustainability standards such as Rainforest Alliance and UTZ by demanding that buyers pay to farmers at least a minimum price and a Fairtrade social premium – a sum that is paid to cooperatives in addition to the agreed price to be used in projects to strengthen the cooperative and to benefit the community in the villages more broadly. The latter is often mentioned in the literature as one of the key mechanisms through which Fairtrade engenders changes in the small farm sector. However, no previous study has explicitly analyzed what the social premium is used for, which factors affect the decision-making processes, and whether farmers, workers, and the local communities more broadly benefit from projects implemented with the premium money. In this article, I use multivariate statistical techniques to analyze how patterns in the use of the premium are related to cooperatives' organizational characteristics. To illustrate the potential benefits of the social premium to the local community, I use regression analyses to evaluate the effects of certification and educational projects financed with the social premium on household education expenditure. I find evidence that living in a village where an educational project was implemented has a positive effect on education expenditure among farmers, but does not have an effect among rural workers.

Key words: certification; cooperatives; Fairtrade premium; social premium; sustainability standards

JEL codes: O12, Q01, Q12, Q13

1. Introduction

Developing countries in Latin America, Southeast Asia, and especially Africa still face major challenges to achieve the Sustainable Development Goals (SDGs) by 2030, despite some progress in recent years (Moyer & Hedden, 2020). In the absence of government funds, mobilization of necessary financial resources for investment in public goods via the private sector can have positive impacts (Aust et al., 2020). Given the potential of the agricultural sector to deliver broad scale economic growth in developing countries (Christiaensen & Martin, 2018), initiatives that foster the development of global value chains, are an important private-sector-led option to support rural development and overall economic growth (World Bank, 2020a). In this context, sustainability standards emerged as a mechanism to ensure that farmers in developing countries have access to higher value markets and receive a better price for their produce while addressing consumers' concerns about social injustice and environmental degradation (Ladhari & Tchetgna, 2015).

Fairtrade standards use mainly three mechanisms to foster sustainable development. The first are the standards themselves. These standards provide guidance, for instance, on how to develop democratic governance structures within small producer organizations and how to implement agricultural practices that are environmentally friendly and less dangerous to farmers and workers (Sellare, Meemken, & Qaim, 2020). The second is the minimum price, which aims to mitigate the risks related to price volatility in international markets (Fairtrade, 2016). Whenever the international market price drops below the minimum price established by Fairtrade, buyers must pay the latter.[1] The third mechanism is the Fairtrade social premium[2], which is a sum of money paid in addition to the agreed price for cooperatives, farmers, and workers to use in projects to address their social, economic, and environmental needs (Fairtrade, 2019a). These projects include but are not limited to direct payments to farmers, investments in operations and production, and improvements in community infrastructure. Decisions related to how the premium is spent are supposed to take place in a democratic arena, with structures in place to ensure that individual and collective interests are heard (Loconto et al., 2019). As such, the Fairtrade social premium has a significant potential to be used as a means to privately finance community-led investments in infrastructure.

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[1] The minimum price for conventional cocoa beans in 2020 is 2,400 USD/MT.
[2] Fairtrade refer to it simply as "Fairtrade premium" while the term "Fairtrade social premium" is more often used in the academic literature.

The social premium has been pointed out by many studies as one of the main mechanisms through which Fairtrade benefits farmers and workers (Jena & Grote, 2017; Meemken et al., 2017; Sellare, Meemken, & Qaim, 2020; Van den Broeck et al., 2017; van Rijn et al., 2019), but it has not received explicit focus in the literature. Little is known about what exactly the premium money is used for, how the decision-making processes take place, and if the projects implemented actually benefit certified farmers, workers, and the local community more broadly. The lack of attention dedicated to these issues can be at least partially explained by the data that researchers work with. Most studies use data from household surveys only, where farmers and workers are sampled from a few purposefully selected cooperatives or commercial farms. The two exceptions in the literature are the studies by Meemken et al. (2019) and Sellare et al. (2020). Without data from a sufficiently large number of cooperatives, it is impossible to make generalizable statements about how cooperatives spend the premium and to analyze to what extent the use of the premium is associated with the organizational structure of the cooperatives. A better understanding of these issues can help us learn to what extent cooperatives are willing to invest their money in public goods and support them to implement such projects effectively.

In this paper, we use data from 1,000 farmers and rural workers (cooperative workers and farm workers) sampled from 50 cocoa cooperatives of Côte d'Ivoire to address the following research questions: 1) What is the Fairtrade social premium used for? 2) Are there associations between the organizational structure of cooperatives and how the premium money is used? 3) Who benefits from the projects implemented with the Fairtrade social premium?

We start by describing how cooperatives have spent the premium and then use principal component analysis (PCA) to analyze if the organizational structure of the cooperatives is correlated with the allocation of the premium into different kinds of projects. To illustrate how the local community might benefit from the social premium, we discuss in more detail about projects focused on child education. We analyze whether (i) being certified and (ii) living in a village where an education project was implemented have effects on household education expenditures by using regression analysis with instrumental variables to account for self-selection into certification

2. Fairtrade, the social premium, and child education

According to Fairtrade International, in 2016, more than 150 million euros have been paid to small producer organizations as social premium (Fairtrade, 2018), while the cocoa sector alone received 44 million euros in 2018 (Fairtrade, 2019b). Around 40% of all Fairtrade certified

cooperatives choose to invest part of the premium in community infrastructure and services (Loconto et al., 2019). The literature on Fairtrade certification often mentions these projects aimed at improving community welfare. These include investments in child education, promotion of health campaigns, improvements in the infrastructure of health clinics, construction of roads and bridges, installation of clean water facilities, construction of tanks and latrines (Darko et al., 2017; Dragusanu & Nunn, 2018; Jena & Grote, 2017; Meemken et al., 2017; Ruben & Fort, 2012; Valkila & Nygren, 2010).

The wide range of projects and investments supported through the Fairtrade social premium suggests that certified producers and workers, as well as the local community in general, can benefit from the social premium. However, some studies have been critical of the social premium, and have pointed out that not everyone benefits equally from these projects and that there are problems in the decision-making processes. Cramer et al (2017), for instance, noted that often the poorest did not benefit from community projects as they were not granted access to certain facilities. Other studies have pointed out that even when farmers and workers do benefit from these projects, the processes through which they are implemented are marked by patronage and exclusion (Dolan, 2010), and many farmers undervalue investments that are made to benefit the community as a whole (Ruben & Fort, 2012).

Earlier studies have highlighted how the effectiveness of projects financed with the social premium and the processes through which decisions are made often depend on the organizational structure of the cooperatives (Valkila & Nygren, 2010). More precisely, premium management structure and the form of participation can directly affect what the premium money is spent on. A formal separation between the premium decision-making processes from ordinary business decisions might support more investments in social projects. However, embedded decision-making can lead to a prioritization of projects aimed at improving the cooperatives themselves (Loconto et al., 2019). This relationship between the organizational structure of cooperatives and the use of the social premium has been neglected in the literature.

Among the projects that are often implemented with the social premium, those related to education are of particular importance. Child labor is a well-known issue in the production of many tropical commodities (Akoyi et al., 2018; Ruggeri & Corsi, 2019; Van den Broeck et al., 2017), especially in the cocoa sector (Luckstead et al., 2019; Nkamleu & Kielland, 2006). Despite Fairtrade prohibiting child labor, its effects on education are not very clear, as it creates an income and a substitution effect that might affect education adversely. The income effect

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relates to households experiencing income gains from participating in certified value chains and facing lower volatility in terms of income. These benefits might encourage higher investments in education and thus positively affect education (Gitter et al., 2012). The substitution effect describes a potential increase in the opportunity cost of a child's time in school (Becchetti et al., 2013; Gitter et al., 2012). Besides these two effects, Fairtrade can also affect education through investments of the social premium. A large number of studies mention investments of the social premium in projects focused on child education, such as building schools, providing financial assistance to cover school-related expenses, or supporting awareness campaigns about the importance of child education (Akoyi et al., 2018; Dragusanu & Nunn, 2018; Karki et al., 2016; Meemken et al., 2017; Ruben & Fort, 2012).

Seeing community-led investments to improve schools and having access to information about the importance of child education can encourage households to use a larger share of their income for education-related expenditures. Most studies that look at the effects of Fairtrade on education find positive relationships. Meemken et al. (2017), for example, found that Fairtrade certification increases education expenditure by 64%. Similarly, Gitter et al. (2012) concluded that Fairtrade participation contributed to a 0.7 year increase in schooling for girls, while Becchetti et al. (2013) found that Fairtrade increases schooling ratio (the average ratio between potential and effective schooling) by 2.6%. Akoyi et al. (2018) also found that Fairtrade increases the likelihood of children being enrolled and they explain that this positive effect is likely the result of increased awareness and higher investments in child education. It is important to note, however, that none of these studies explicitly analyze whether these effects on child education are the result of higher incomes from certification or from community projects paid by the social premium.

3. Materials and methods

3.1. Study area

This study was conducted in the Southeast of Côte d'Ivoire, an area that includes the traditional cocoa belt of West Africa. This area was purposefully selected because of its high number of Fairtrade certified cooperative and non-certified cooperatives. Since the late 1970s, Côte d'Ivoire has been the leading cocoa producing country, currently accounting for over 40% of the global cocoa production (FAO, 2020). The cocoa sector, marked by smallholder farmers, has been one of the major drives of the economic growth of Côte d'Ivoire, but this economic

success has not translated into higher equality. Around 50% of the rural population still lives below the poverty line (IFAD, 2017) and the families that rely on cocoa production for their livelihoods face serious threats to production, such as a myriad of pest and diseases, degraded soils, and old trees, all of which keep yields low (Wessel & Quist-Wessel, 2015).

The rural population faces several other challenges. According to data from the World Bank (2020b), around 64% of the rural population does not have electricity in their homes and 44% still practice open defecation. Access to water services is very deficient, as 43% of the rural population does not have access to basic drinking water services, while only 10% have access in their homes to basic hand-washing facilities, including soap and water. These figures show that the region still faces serious problems related to the provision of basic services.

Côte d'Ivoire has more than 600 cocoa cooperatives (MADR, 2017). Out of these, in 2017, 152 were Fairtrade certified, with a total of 129,783 registered members (Fairtrade, 2019b). These cooperatives vary substantially in terms of size and many of them have registered members living in several villages. Their headquarters, however, are usually located in bigger towns. Together, these cooperatives sold over 150,000 MT of cocoa as Fairtrade certified, which has generated more than 26 million euros in Fairtrade social premium. This represents 70% of the social premium that has been paid to the world's cocoa sector in that year (Fairtrade, 2019b).

3.2. Sampling and data

For the empirical analyses, we use primary data collected between May and June 2018 from 500 farmers and 500 rural workers (cooperative workers and farm workers) randomly sampled from 50 cocoa cooperatives. With the help of local extension agencies, Fairtrade International, and other international organizations, we compiled a list of all cooperatives in the Southeast of Côte d'Ivoire. From this list, we randomly selected 25 certified cooperatives and 25 non-certified cooperatives. We conducted an interview with the leader of each cooperative using a structured questionnaire, in which we collected detailed data about the organizational structure of the cooperative, including number of members and employees, volumes of cocoa commercialized, provision of services to members, assets owned, among others.

For the 25 certified cooperatives, we also collected data on the use of the Fairtrade social premium. More specifically, we asked the cooperative leadership to list all projects financed with the social premium that had been implemented between 2013 and 2017. For each project, we collected information about the purpose of the project, the total amount that was spent in

West African Francs (CFA), the names of the villages where the projects were implemented, and whether everyone in the villages could benefit from the projects or if they were exclusive to those associated with the cooperative. Cooperatives often have members in many different villages and the catchment area of these cooperatives tend to overlap. Therefore, projects with public goods characteristics can benefit farmers from multiple cooperatives.

In addition to the cooperative leaders, from each cooperative we randomly sampled and interviewed 10 farmers, 5 cooperative workers and 5 farm workers (locally known as *aboussant*). We designed specific questionnaires for each group of respondent in which we captured data on socioeconomic characteristics, agricultural production, off-farm employment, among others. In all questionnaires we included identical modules to capture information about life in their villages. We asked respondents to name the top three issues that should be addressed in their villages and how satisfied they were with the provision of basic services (e.g. health and education) in a scale from 1-10. By calculating the village mean of these variables, we obtain a rough picture of the perceived quality of the infrastructure and services available in the villages.

3.3. Classification of projects and education expenditure

The Fairtrade social premium can be used in a broad variety of projects. Since cooperatives have to report on what exactly the social premium was used, Fairtrade International keeps records of all the projects that are implemented and classifies them into five major categories: (i) services to farmer members; (ii) investment in producer organizations; (iii) services to communities; (iv) services for workers and their families; and (v) training and empowerment of worker. These are further disaggregated into minor categories and subsequently into sub-categories (Loconto et al., 2019). Although their categorization is certainly useful for internal monitoring purposes, we found that neither their major, minor, nor sub-categories fit well to our data, either because the total number of projects was too small in any given category or because the total amount spent was not substantial. Therefore, for our analyses we let the data guide the process of categorization. Table 1 shows the ten categories that we used and describes what kind of project falls into each category.

Table 1. Classification of projects financed with the Fairtrade social premium

Project categories	Description
Ag. Inputs	Purchase of fertilizers, pesticides, protective clothes, machetes and other tools
Cooperative	Purchase of land, computers, vehicles, and other assets; construction / improvement of storage rooms, and headquarters' facilities; strengthening of the financial capacity of the cooperative
Credit	Provision of credit
Direct payments	Cash payment to farmers
Education	Construction / improvement of schools; promotion of education campaigns; provision of financial support for families to pay for education-related expenses
Health	Construction / improvement of health care centers; promotion of health campaigns
Other community infrastructure	Construction of radio towers, latrines, improvement of housing, purchase of generator
Roads / Transportation	Construction / improvement of roads and bridges
Water	Construction of wells and hydraulic pumps
Miscellaneous	Provision of training for farmers and the cooperative staff; payment of certification fees; finance of reforestation and waste management projects

As explained in section 2, several sources report that the social premium is often used to finance projects related to child education and these kinds of projects are even more relevant in the cocoa sector of West Africa, where child labor is a well-known issue. Therefore, we want to focus on education projects to illustrate whether the social premium can benefit the local community in the villages. In our analyses, we will use household education expenditure per child as a proxy to educational quality, which has been used before in other studies that look on the effect of certification on child education (Becchetti et al., 2013; Meemken et al., 2017). This variable is defined as the total amount of money that a household spends in one year with child education, such as uniforms, school materials, and fees. This value is then divided by the number of children in schooling age (between 6 and 18 years) present in the household. In our data, 288 respondents reported not having any children in schooling age; hence they were omitted from the analyses.

3.4. Data analysis

3.4.1. Principal Component Analysis (PCA)

Agricultural cooperatives can be very heterogeneous in their characteristics and rather complex in terms of how they benefit their members. Characteristics that would be beneficial to their members at first glance can actually result in negative outcomes. Some studies have shown that inclusiveness and marketing performance, for example, are negatively correlated (Bernard &

Spielman, 2009), while others have shown that cooperatives that provide too many services to their members can become less competitive in the market because of their higher coordination and management costs (Tadesse et al., 2018). Therefore, to group cooperatives together and understand how different characteristics are related to each other can be challenging given the high number of factors one would have to take into account.

Principal component analysis (PCA) is an appropriate methodological tool to analyze how cooperative characteristics are correlated with the use of the Fairtrade social premium. PCA is a technique for multivariate statistical analysis that allows us to deal with high-dimensional data by converting a larger number of correlated variables into a set of linearly uncorrelated variables, i.e. the principal components, also referred to as dimensions (Abdi & Williams, 2010). Furthermore, this technique allows us to use biplots and circles of correlations to visualize the data in a two-dimensional space and thus easily interpret how the variables are correlated with one another and to what degree the observations are (dis)similar.

In order to run a PCA, we first have to select the active individuals and active variables that will be used in the computations. In our case, these are respectively the certified cooperatives and the characteristics of these cooperatives. Out of the 25 sampled certified cooperatives, 3 were excluded from the analysis because they had not yet implemented any project using the premium. The choice of variables was made taking into consideration different aspects of these cooperatives that might play a role in determining how well they function. Therefore, we chose variables that describe the cooperatives in terms of their governance structure, human, physical, and social capital. The complete list of variables can be seen in Table 3.

In addition to the active variables, we can use supplementary variables to enrich the interpretation of the analyses. Supplementary variables do not influence the calculation of the principal components but can be plotted onto the two-dimensional space and interpreted in relation to the active variables. In our case, the supplementary variables are the share of the social premium that the cooperatives spent on the different kinds of projects, which were categorized according to Table 1. The PCA and all corresponding graphical representations were carried out in R using the FactoMineR package, which by default standardizes the variables used in the analysis (Lê et al., 2008).

3.4.2. Regression analysis

To analyze the effects of Fairtrade certification and education projects on household expenditure with child education, we estimate separate regression models for the full sample, farmers, cooperative workers, and farm workers of the following type:

$$\log(1 + EE_{ijlk}) = \alpha + \beta FT_{jlk} + \gamma EP_{lk} + \delta \boldsymbol{X}_{ijlk} + \theta \boldsymbol{W}_{jlk} + +\varphi \boldsymbol{V}_{lk} + \omega \boldsymbol{D}_{k} + \varepsilon_{ijlk} \qquad (1)$$

EE_{ijlk} represents our outcome variable, the education expenditure per child for household i in cooperative j, village l, and district k. To reduce the effect of outliers and facilitate de interpretation of the results, we log-transform the outcome variable. However, around 10% of the observations in our sample have reported zero expenditure with education, despite having school-aged children in the household. Since the natural logarithm of zero is undefined, to retain these observations for the analyses, we add a one to the outcome variable before taking the logarithm. FT_{jlk} and EP_{lk} are our dummy variables of interest; the former represents if the respondent is Fairtrade certified (i.e. if member of a certified cooperative in the case of farmers and if works for a certified employer in the case of workers) and the latter if the respondent lives in a village where an education project financed with the Fairtrade social premium was implemented. Previous studies have reported that Fairtrade certification has positive effects on child education and attributed such effects to the use of the social premium. With our model specification, we can analyze if (i) participating in certified value chains and (ii) living in a village where an education project was implemented with the social premium have an effect on child education. If the coefficients β and γ are positive and statistically significant, we can conclude, respectively, that certification and the social premium have positive effects on education expenditure.

In all regression models we control for vectors of household, cooperative, and village-level variables that might influence the certification status of respondents and expenditure with education, here represented respectively by $\boldsymbol{X}_{ijlk}$, $\boldsymbol{W}_{jlk}$, and $\boldsymbol{V}_{lk}$. It is noteworthy that since we did not collect village-level data, the variables in $\boldsymbol{V}_{lk}$ were constructed calculating the village mean of variables captured in the farmer and worker questionnaires that proxy the perceived quality of the infrastructure and services provided in the villages. Furthermore, we include a set of district dummies $\boldsymbol{D}_{k}$ to control for differences at a larger geographical scale. In all estimations the error term, ε_{ijlk}, is clustered at the village level. For these regressions, we excluded the respondents that did not have any children between 6 and 18 years old in the household.

Therefore, we used a total of 712 observations: 433 farmers, 147 cooperative workers, and 132 farm workers.

Whether cooperatives, farmers, and workers participate in a certified value chain is not determined at random. Although we control for a broad range of variables that might simultaneously influence (i) cooperatives' and households' ability and willingness to participate in a certified value chain, and (ii) expenditures with education, it is possible that we do not capture all factors. Therefore, we estimate the models above using an instrumental variable (IV) approach to test and control for endogeneity. We use three instruments that have been used in other studies conducted in the same setting (Meemken et al., 2019; Sellare et al., 2020): (i) the share of Fairtrade certified farmers in a 5 km radius[3], (ii) the distance to the closest Fairtrade certified cooperative; and (iii) the mobile phone provider of the cooperative leader. These instruments are further explained and tested for validity below.

The first instrument captures social network effects at the household level. We argue that the more certified neighbors a farmer has, the more likely he or she is to learn about the benefits of joining a certified cooperative. Our data indeed shows a positive correlation between the number of certified neighbors a farmer has and own certification status, which indicates that our instrument is relevant. However, for an instrument to be valid it is important that it does not affect the outcome variable other than through the treatment. One could expect that areas with a higher concentration of certified farmers are more likely to receive information about the importance of child education. However, child labor is a well-known issue in the cocoa sector and both the government and NGOs have implemented campaigns throughout the country to raise awareness about child labor and the importance of child education.

Our second instrument is defined as the distance from the respondent's house to the headquarters of the closest Fairtrade certified cooperative. Farmers who live close to the headquarters of a certified cooperative are more likely to learn about Fairtrade and join this cooperative. Similarly, the closer a farm or cooperative worker lives to the headquarters of a certified cooperative, the higher is the likelihood to work for a certified employer. Although living closer to the headquarters of a certified cooperative could mean easier access to information about child education, as explained above, child labor and child education are issues that the local population is very aware about, regardless of where they live.

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[3] For the analyses in which we use data from workers, we do not consider the location of the own household. Instead, we use the cooperative mean of the share of certified farmers in a 5 km radius.

The third instrument is defined as the primary cellphone network provider that the cooperative leader is subscribed to. In our study area there are three network providers: Orange, MTN, and Moov. All of them offer similar services at similar costs, so the choice of which provider to subscribe to is mostly a matter of the strength of the network in a particular location and which provider the others in one's own social network are subscribed to. There are economic advantages of communicating with people within the same network provider, since companies offer discounts for calls and messages exchanged between their subscribers. Our data show that cooperatives whose leader is subscribed to the network Orange are more likely to be certified. Therefore, it is likely that there is a more intense flow of information about certification within the Orange network than between networks. One could argue that the decision to become certified might have influenced the leader's decision of to which network to subscribe to. However, our data show that people do not switch their main cellphone provider often. In fact, only three out of the 25 certified cooperative leaders interviewed switched their main provider after the cooperative became certified.

Using a falsification test as proposed by Di Falco et al. (2011), we show that none of our instruments are correlated with household education expenditure (Table A1). Furthermore, we show that our instruments pass the test of weak instruments (p<0.01). As we have more instruments than endogenous regressors, we can also test whether our instruments are uncorrelated with the error term with a test of over-identifying restrictions. Hansen's J test statistic indicates that our instruments are valid. The results of these tests are shown in Table A2 in the Appendix. It is important to notice that we do not instrument the variable EP_{lk}. However, in our regression specifications, we control for variables at the village level that describe the perceived quality of education in the villages and the presence of schools. With these variables, we proxy factors that could simultaneously affect the likelihood of a given village having an education project and household expenditure with education. Nevertheless, since these variables capture perceived quality of infrastructure and services in the villages at the time of data collection, endogeneity at the village level cannot be completely ruled out. This should be kept in mind when interpreting the results.

4. Results and discussion

4.1. Village needs and participation in the premium's decision-making

As explained in subsection 3.1., despite its economic growth, the rural population of Côte d'Ivoire still faces some serious constraints in terms of access to education, sanitation, electricity, and other basic services. In our survey, we asked respondents to name the top three types of services, infrastructure, and investments that are needed in their villages to have a better overview of their main challenges.[4] We grouped their answers into the same categories that we used to group the projects financed with the Fairtrade social premium (Table 1) so that we could draw a parallel between the needs of the villages and the investments that have been made with the social premium. The answers are shown in Figure A1 in the Appendix.

Most respondents mentioned *education* as one of the main needs of their villages. Although most villages that we visited have some sort of infrastructure available that is used for schooling, these are often of very poor quality. In the smaller villages, it is not uncommon to see that the schools are simply small spaces with a rooftop but without walls, with some chairs for the students and an old chalkboard for the teacher. The second category mentioned most often was *roads/transportation*, followed by *health* in third place. The quality of the roads in Côte d'Ivoire is indeed very poor and during data collection several farmers mentioned them as one of the main constraints for cocoa commercialization.

When we look at the disaggregated data, we see a few differences in the answers between groups. *electricity* and *water* have been mentioned as major issues by around 29% and 48% of the farm workers respectively. Among farmers, these were mentioned as major issues by around 22% and 35% of the respondents, while among cooperative workers only by 12% and 27%. These figures show that there are substantial differences in the places where these groups live. Cooperative workers usually live closer to the cooperatives, whose headquarters tend to be located in bigger cities, with better services and infrastructure. Farmers usually live in villages where the provision of services and infrastructure can vary substantially depending on their size and proximity to bigger towns. Meanwhile, most farm workers live on the farms or in camps dedicated to farm workers, where basic infrastructure such as electricity and water is usually missing.

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[4] Although we specifically asked about needs of the village, around 20% of cooperative workers and 10% of farmers mentioned issues related to the cooperative in their answers.

Some of these issues related to infrastructure and basic service provision could be mitigated with the use of the Fairtrade premium, either through direct investments in infrastructure or in awareness campaign regarding education, sanitation, water treatment, etc. In fact several cooperatives use the social premium for community development projects and these tend to be highly appreciated by the members of the cooperatives (Loconto et al., 2019). In order to implement effective projects to address the most urgent needs of these villages, it is essential that farmers participate in the decision-making processes and voice their needs. The leaders of the cooperatives that we interviewed told us that decisions regarding the use of the premium are done in the general assemblies, which all farmers are supposed to attend. Nevertheless, our data show that only 48% of the certified farmers participate in the general assembly. One could argue that farmers make their voices heard by sending delegates to these assemblies. However, only 55% of the certified farmers are aware of the existence of the social premium and 35% claim to have voted on how the social premium should be used.

4.2. Projects implemented with the Fairtrade social premium

In Table 2 we show a summary of all the projects that have been implemented with the Fairtrade social premium between 2013 and 2017. As explained in subsection 3.2., for each one of the projects we asked what its purpose was, how much was spent, and whether the whole village had access to the benefits of the project (as opposed to only the registered members of the cooperative and its staff). The 22 cooperatives who had implemented projects by the time of the interview reported using the social premium to finance 96 different projects, which totaled 1.4 billion CFA.[5] The categories with the largest number of projects were *cooperative*, *education*, and *miscellaneous*, which includes projects related to training, reforestation, waste management, and certification fees. Projects related to agricultural production such as *ag. inputs*, *credit*, and *direct payments* were restricted to the members of the cooperatives, while all projects in the categories *health*, *roads/transportation*, and *water* were accessible to the whole village. Out of the 18 projects in the category *education*, five were restricted to the members of the cooperatives. The goal of these projects was to give financial assistance to families to pay for costs related to education. The projects on education related awareness campaigns and investments in infrastructure were accessible to the whole village.

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[5] At the time of the survey, the exchange rate was 1 Euro = 656 CFA.

Table 2. Use of the Fairtrade social premium between 2013-2017

Project categories	Number of projects implemented	Number of cooperatives that invested in each project category	Total value spent (in 1M CFA)	Mean value spent (in 1M CFA)	% of projects that the whole village has access to
Ag. inputs	8	7	165.2	20.7	0
Cooperative	39	17	630.4	16.2	7%
Credit	2	2	20.6	10.3	0
Direct payments	5	5	220.6	44.1	0
Education	18	12	175.5	9.7	72%
Health	2	2	43.7	21.9	100%
Miscellaneous	10	6	19.7	2.0	10%
Other community infrastructure	3	2	42.9	14.3	33%
Roads/transportation	5	5	43.2	8.6	100%
Water	4	4	60.6	15.2	100%
Total	96	22	1,422.5	14.8	29%

Despite the large number of projects on education that were implemented, these represent only a small percentage of the total premium that was used by the cooperatives. The 39 projects related to investments in the cooperative account for almost 45% of the total money spent on projects between 2013 and 2017. The 18 projects on education account for less than 15% of the total. Investments in other projects with public goods characteristics, such as *health*, *roads/transportation*, and *water*, have also received only a fraction of the total social premium, with less than 5% each. These figures point towards a mismatch between what the local population deems to be urgent needs in their villages and how the premium is being allocated to different kinds of projects. We should not immediately conclude that farmers are not being heard in the decision-making process, but this indicates the need to investigate in more detail how these processes take place inside the cooperatives.

4.3. Cooperative characteristics and the use of the Fairtrade social premium

One common hypothesis in the literature is that how the Fairtrade social premium is used depends on the organizational structure of the cooperatives that receive this money. Our data show that certified cooperatives can be rather heterogeneous in terms of their characteristics. In Table 3 we show descriptive statistics for some selected variables that describe these cooperatives in terms of their governance structure, human, physical, and social capital. The certified cooperatives in our sample are very large and most of them have male leaders who have attended at least technical training post high school. The boards of directors have on average 9.6 members and 70% of the members own farms larger than 5 ha.[6] Regarding the

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[6] In our data, the average cocoa farm has 4.9 ha. Other sources report that the average cocoa farm in West Africa has between 3 and 4 ha (Wessel & Quist-Wessel, 2015).

decision-making processes, we presented the leaders of the cooperatives with a list of issues that are important for the functioning of the cooperative (e.g. choosing a new president, choosing the members of the board of directors, accepting new members, excluding members, hiring employees, etc.) and asked them to indicate which of these issues were decided democratically in the general assembly. On average, 39% of these issues were decided in general assemblies. Some of these variables have very large standard deviations, which indicates that these cooperatives are very heterogeneous.

Table 3. Descriptive statistics for the cooperative characteristics used in the PCA (N=25)

Cooperative characteristics	Description	Mean	SD
Board big farms	Share of members in the board of directors who own farms larger than 5 ha	0.70	0.29
Board size	Number of members in the board of directors	9.68	2.15
Business plan	Cooperative has a business plan prepared for the following cocoa season	0.73	0.46
Computer	Number of computers owned by the cooperative	6.32	3.82
Democratic decisions	Share of issues that are discussed and decided democratically in the general assembly	0.39	0.17
Edu leader	Education of the leader of the cooperative in years	15.68	2.92
Female leader	Leader of the cooperative is female	0.18	0.39
Members	Number of members registered in the cooperative	948.73	807.98
Service providers	Number of actors (NGOs, extension agencies, commercial partner, etc.) who help the cooperatives provide services to their members	2.36	1.50
Vehicles	Number of vehicles owned by the cooperative	9.32	6.78
Years certified	Number of years that the cooperative has been Fairtrade certified	4.45	1.68

We follow by analyzing the relationship between the cooperative characteristics described in Table 3 and the use of the social premium. The results from the PCA show that almost 70% of the variation in the data can be explained by the first three dimensions (Figure C2 in the Appendix). The first dimension captures mostly the assets owned by the cooperatives, their size, and how long they have been Fairtrade certified, while the second dimension is better described by the education of the leader, the share of board members who own big farms, and the existence of a business plan for the following cocoa season (Table 3). Furthermore, in Table 4 we see that investments in water ($p<0.00$) and investments in education and other community infrastructure ($p<0.10$) are also positively correlated with the first dimension. In Figure A3 in the Appendix we show a biplot of the cooperatives and the variables used in the PCA, where we can see that most cooperatives have negative scores on the first component, but positive scores on the second component. In other words, most cooperatives have low values for the variables

associated with the first component and high values for those associated with the second component.

Table 4. Correlation between variables and the five main dimensions of the PCA.

	(1)	(2)	(3)	(4)	(5)
	Dim. 1	Dim. 2	Dim. 3	Dim. 4	Dim. 5
Active variables					
Board big farms	-0.095	0.642***	0.679***	-0.020	0.125
Board members	0.595***	0.265	0.061	0.601***	0.375*
Business plan	0.193	0.852***	-0.205	-0.288	0.228
Computers	0.843***	0.142	-0.064	-0.396*	-0.074
Democratic decisions	0.420*	-0.323	0.650***	-0.271	0.303
Edu leader	0.423**	0.551***	0.324	0.204	-0.201
Female leader	0.532**	-0.026	-0.649***	-0.019	0.450**
Members	0.568***	0.396*	-0.305	0.154	-0.444**
Service providers	0.397*	-0.789***	0.065	0.119	0.060
Vehicles	0.906***	-0.211	0.067	-0.205	-0.170
Years certified	0.625***	-0.296	0.228	0.189	-0.149
Supplementary variables					
Ag. inputs	-0.211	0.137	-0.328	-0.082	0.128
Cooperative	-0.201	0.062	0.317	-0.210	0.445**
Credit	-0.197	0.157	0.070	-0.147	0.159
Dir. payments	0.199	0.079	-0.243	0.233	-0.336
Education	0.383*	-0.088	-0.218	0.094	-0.024
Health	-0.067	0.116	0.139	-0.147	-0.113
Misc.	0.051	0.045	0.260	0.040	0.121
Other infrastr.	0.388*	-0.336	0.161	0.188	-0.018
Roads	-0.198	0.356	-0.150	0.015	-0.028
Water	0.659***	0.087	-0.044	-0.333	-0.239

Note: The values represent Pearson's correlation coefficient. $^*\,p < 0.1$, $^{**}\,p < 0.05$, $^{***}\,p < 0.01$

In Figure 1 we show a circle of correlations, where we can see the relationship between cooperative characteristics (vectors in black) and the use of the social premium (vectors in blue). When two vectors are close, forming a small angle, the two variables they represent are positively correlated, while vectors that form an angle close to 180° are negatively correlated. The length of the vectors on the plot represents how well the variables are represented by the two dimensions on which the variables are being plotted. If a variable is perfectly represented by only two dimensions, its vector will touch the circle; when more than two dimensions are needed, the length of the vector will be shorter. The closer to the center of the plot a variable is, the less important it is for those two dimensions and its interpretation should be done carefully.

Among the variables that represent the share of the social premium used, the ones that are better described by the two first dimensions are *water*, *other infrastr.*, *education*, and *roads*. The first three are positively correlated with the number of assets owned by the cooperative, the share of issues decided democratically, the number of years the cooperative has been certified, and having a female leader. *Roads* is negatively correlated with these variables, as they are in opposite quadrants on the circle of correlations (Figure 1). Given that a large share of respondents indicated the need for projects related to basic community infrastructure, seeing that cooperatives with more democratic decision-making processes invest a larger share of the premium in projects related to water, education, and other community infrastructure is a welcoming finding.

Figure 1. Principal component analysis on cooperative characteristics (in black) and their correlation with cooperatives' investments using the Fairtrade social premium (in blue) (Dim. 1 and Dim. 2)

It is important to note that the variables that represent the uses of the social premium are not particularly well-projected on the circle of correlations, since most of them are closer to center of the circle than to its edges. This means that the relationship between these variables could be different if they were projected using other dimensions of the PCA. Figure 2 shows the circle

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of correlations using the first and third dimensions, and Figure 3 using the second and third dimensions. The relationships shown in Figure 2 are mostly similar to those shown in Figure 1 but not all of them hold in Figure 3. These results indicate that while there are certainly important relationships between cooperative characteristics and how these cooperatives use the premium, we should be careful in concluding exactly which sets of characteristics are correlated with which uses of the social premium.
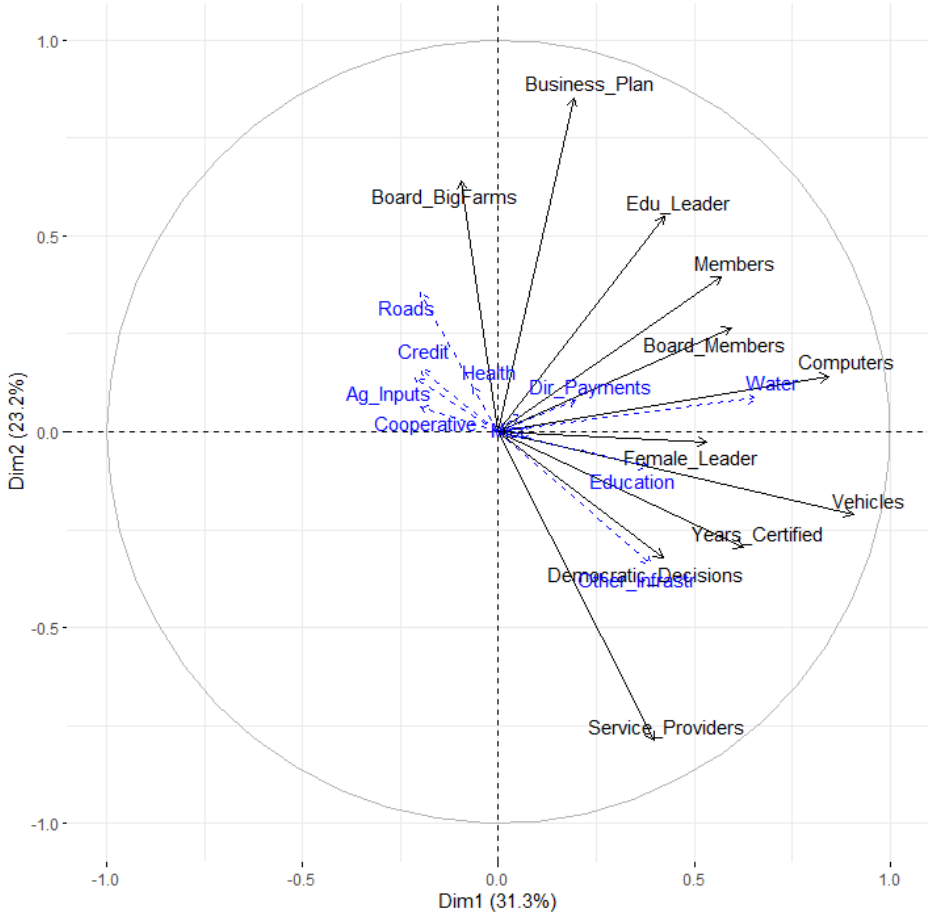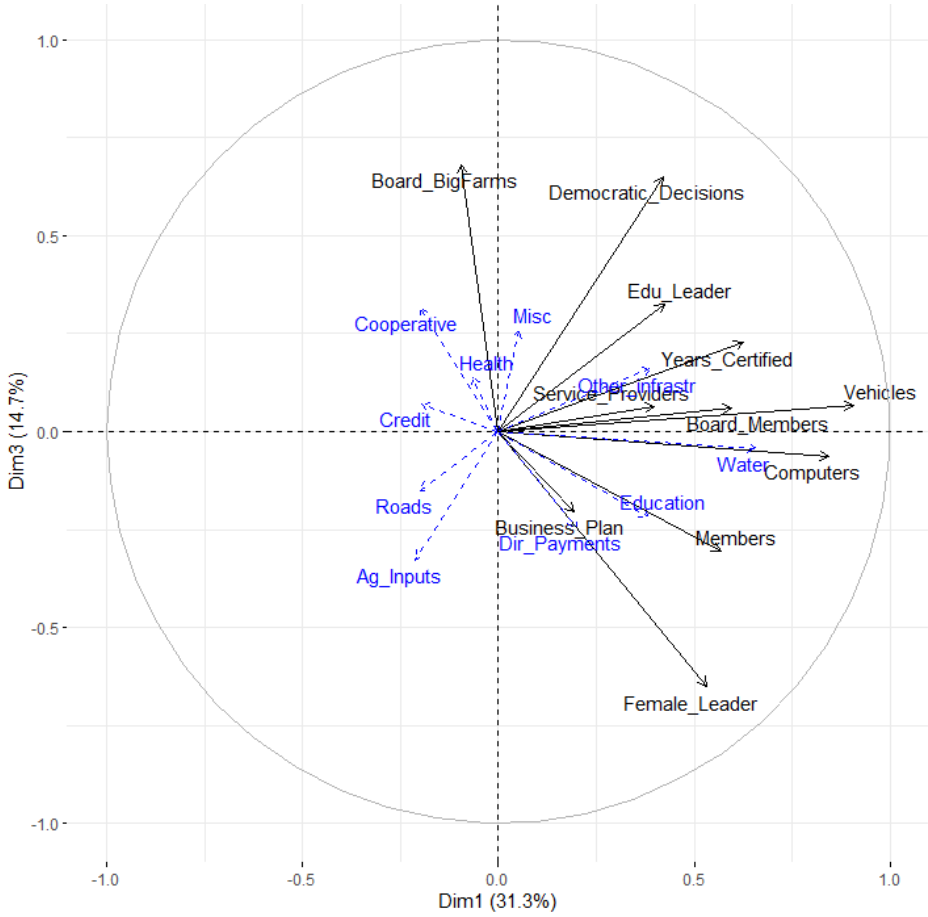

Figure 2. Principal component analysis on cooperative characteristics (in black) and their correlation with cooperatives' investments using the Fairtrade social premium (in blue) (Dim. 1 and Dim. 3)
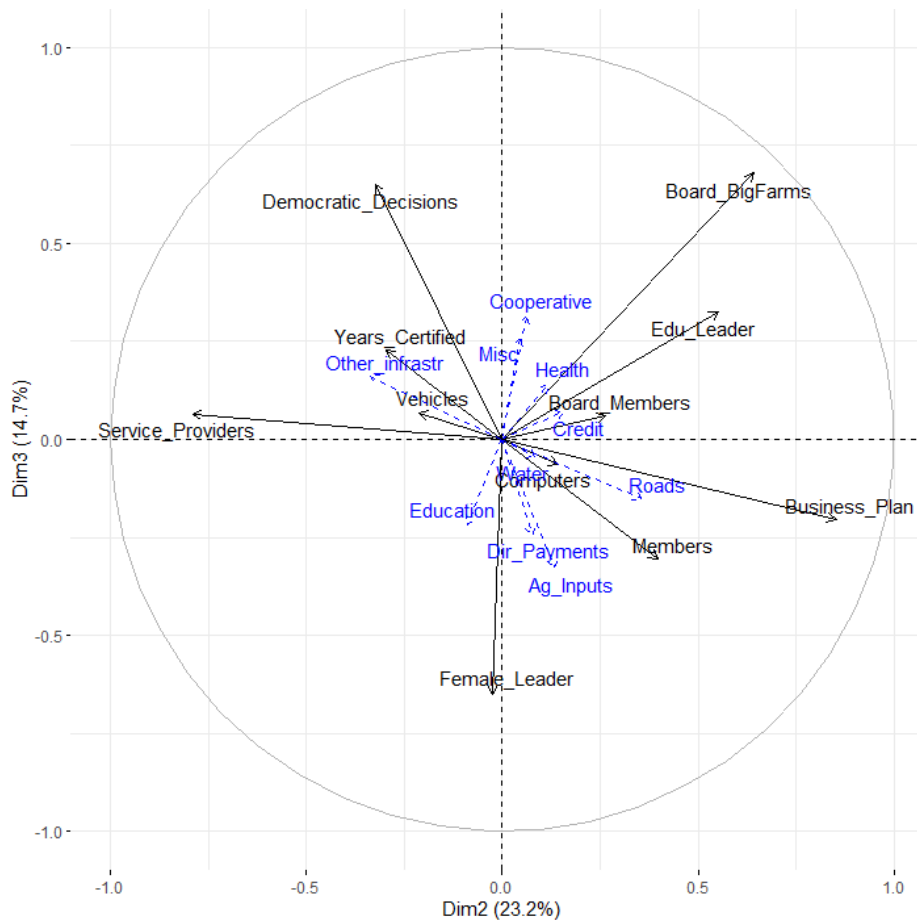
Figure 3. Principal component analysis on cooperative characteristics (in black) and their correlation with cooperatives' investments using the Fairtrade social premium (in blue) (Dim. 2 and Dim. 3)

4.4. Effects on education

In the previous section we have seen some evidence that cooperative characteristics matter for the allocation of the Fairtrade social premium into different kinds of projects. However, the question whether these projects are beneficial to the local communities is at least equally important. Given that more than half of the respondents indicated that improvements in education are among the most pressing needs of their communities, we want to take education as an example to further analyze the possible benefits of living in a village where an education project financed with the social premium was implemented.

In Table 5 we show descriptive statistics for variables related to child education, disaggregating them by whether the respondent is certified and whether he/she lives in a village with an education project financed with the social premium. We observe that certified households,

either living in a village where an education project was implemented or not, have higher education expenditure per child than non-certified households living in villages without a project. We find no statistically significant differences between groups for distance to the nearest primary school nor for satisfaction with education system, measured in a 10-points likert scale.

Table 5. Descriptive statistics for variables at the household level

	(1) Full sample	(2) Non-certified and no project	(3) Non-certified and project [a]	(4) Certified and no project [a]	(5) Certified and project [a]
Education expenditure per child	122.74	85.10	127.26	143.66[**]	236.55[***]
(in 1,000 CFA/child) [b]	(246.74)	(141.54)	(236.74)	(309.11)	(293.18)
Distance to primary school (km)	1.68	1.72	1.03	1.74	1.57
	(4.29)	(4.41)	(1.49)	(4.30)	(4.95)
Distance to secondary school (km)	9.37	10.76	3.09[***]	8.25[***]	12.74
	(10.79)	(12.36)	(2.95)	(9.13)	(10.88)
Satisfaction with education system	5.19	5.08	5.37	5.21	5.72
(1-10)	(2.18)	(2.07)	(2.06)	(2.28)	(2.32)
Observations	1,000	448	52	442	58

Note: Mean values are shown with standard deviations in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
[a] For the statistical testing we used ANOVA and the Tukey-Kramer post-hoc test for multiple group comparisons; p-values indicate statistical significance of differences in means between those in the base category (i.e. Non-certified and No project) and the other categories.
[b] For this variable we are using only values from the households that have children, totaling 712 observations.

In Table 6 we show the results of our regression analyses. Here we analyze the effect of being certified and the effect of living in a village where an education project was implemented on household education expenditure. We first run the analysis on the full sample of respondents, followed by sub-sample analyses using each group of respondents at a time (i.e. farmers, cooperative workers, farm workers). Then, we rerun these regressions using only data from the respondents who are not certified. This last set of regressions allows us to analyze spillover effects of the social premium on non-certified households. These results are shown in Table 7.

Looking at the model where we use the full sample, we see positive statistically significant effects for both our variables of interest. However, when we run sub-sample analyses for each group of respondents, we see that the effects on the full sample were driven by the farmer sub-group. Being certified does have a positive effect on education expenditure for farmers and cooperative workers, but not for farm workers. However, living in a village where an education project was implemented is only beneficial for farmers. These results are in line with previous findings conducted in Côte d'Ivoire that show that while Fairtrade has a positive financial effect on farmers and cooperative workers, it does not benefit farm workers (Meemken et al., 2019; Sellare et al., 2020). Studies conducted elsewhere have also reported that Fairtrade only has limited benefits to hired laborers (Valkila & Nygren, 2010; van Rijn et al., 2019). Therefore,

since certification does not have an effect on overall income among farm workers, it is not surprising that it does not have an effect on education expenditure either. While living in a village with an education project also benefits farmers, it has no effect among cooperative workers. This might be explained by the fact that most cooperative workers live in towns with better infrastructure for schooling and better access to information about the importance of investing in child education, thus having a project implemented in such places has no added benefit.

Table 6. Effects of certification and education projects on household education expenditure (log)

	Full sample		Farmers		Coop workers		Farm workers	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Certification (1/0)	0.43***	0.52***	0.35**	0.46**	0.82**	0.89**	0.33	0.29
	(0.12)	(0.15)	(0.15)	(0.18)	(0.32)	(0.40)	(0.32)	(0.38)
Education project (1/0)	0.41**	0.43***	0.71***	0.73***	-0.24	-0.21	0.52	0.51
	(0.16)	(0.16)	(0.14)	(0.14)	(0.51)	(0.47)	(0.41)	(0.37)
Observations	712	712	433	433	147	147	132	132

Note: Clustered standard error shown in parentheses. $^{*}\,p<0.1,\,^{**}\,p<0.05,\,^{***}\,p<0.01$
Regressions include household, cooperative, and village-level control variables. Full results are shown in Table A2 in the Appendix.

Focusing only on non-certified households, we do not observe statistically significant effects of living in a village with an education project, neither for the full sample nor for the sub-groups. This suggests that only households that participate in certified value chains benefit from the social premium, despite the public good nature of these education projects. However, it is important to note that the estimates are all positive in magnitude. A larger sample size might have resulted in significant estimates. Therefore, we should be careful in concluding that community development projects implemented with the social premium have no benefit at all for non-certified households.

Table 7. Spillover effects of education projects on household education expenditure (log)

	Full sample	Farmers	Coop workers	Farm workers
	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Education project (1/0)	0.31	0.39	0.42	0.79
	(0.20)	(0.34)	(0.54)	(0.52)
Observations	353	210	78	65

Note: Clustered standard error shown in parentheses. Regressions include household, cooperative, and village-level control variables. Full results are shown in Table A3 in the Appendix.

5. Conclusion

In this article, we have discussed how the Fairtrade social premium can be used to address some needs of rural communities related to basic infrastructure and the provision of services. Using

data from cocoa cooperatives from Côte d'Ivoire, we have analyzed what kinds of projects are financed with the social premium and how its allocation into different kinds of projects is correlated with the organizational structure of these cooperatives. We show that certified cooperatives are very heterogeneous in terms of their characteristics and our results suggest that larger investments into projects related to education, water, and other community infrastructure are positively correlated with having a female leader, being certified for many years, and having more democratic decision-making processes. Although we should be careful in concluding that these are the specific characteristics that are more likely to result into higher investments in projects that can benefit the local community, we observe some evidence that cooperative heterogeneity is indeed important.

To illustrate the possible benefits of projects financed with the Fairtrade social premium, we used data from cocoa farmers, cooperative workers, and farm workers to analyze the effects of certification and education projects on household education expenditure. Our results suggest that while being certified has a positive effect on education expenditure among farmers and cooperative workers, only farmers benefit from living in a village where an education project financed with the social premium had been implemented. It is not surprising that cooperative workers do not benefit from education projects, given that most of them live in places with better infrastructure and better information about the importance of child education. However, the fact that we do not see an effect among farm workers might be due to financial constraints to spend more on child education.

Our study has two limitations that should be addressed in follow-up research. First, because we have cross-sectional data, we cannot observe time trends in how the social premium is used. There is likely a dynamic interaction over time between how the cooperatives develop and what they spend the social premium. To further explore the relationship between cooperative characteristics and the use of the premium, it would be important to have panel data and preferably count with an even larger number of cooperatives. Second, our analyses of the effects of education projects on household education expenditure should not be interpreted as causal. Although we control in the model specification for some variables at the village level, these were subjective measures, calculated using data from the farmers and workers surveys. Better data and more robust econometric approaches should be used in the future to estimate the causal effects of projects financed with the Fairtrade social premium.

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A. Appendix

Table A1. Instrument falsification test

	(1) OLS Full sample	(2) OLS Farmers	(3) OLS Coop workers	(4) OLS Farm workers
Share of certified farmers (5km radius)		0.34		
		(0.77)		
Share of certified farmers (5km radius; coop mean)	0.70		0.63	-0.90
	(0.54)		(1.20)	(2.20)
Phone operator of coop leader (1=Orange)	-0.17	-0.07	-0.39	0.05
	(0.23)	(0.28)	(0.79)	(0.56)
Dist. to the closest certified coop	0.12	-0.09	-0.91	0.55
	(1.05)	(1.84)	(2.32)	(5.05)
Education project (1/0)	0.16	0.30	0.25	0.96
	(0.22)	(0.31)	(0.63)	(0.72)
Resp. = coop. worker	-0.50**			
	(0.20)			
Resp. = coop. farm worker	-0.64***			
	(0.24)			
Female (1/0)	-0.75	-0.54	-1.66**	0.00
	(0.47)	(0.54)	(0.61)	(.)
Age	0.17***	0.17**	0.29***	0.17
	(0.05)	(0.08)	(0.08)	(0.22)
Age squared	-0.00***	-0.00*	-0.00**	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Education (yrs.)	0.07***	0.06**	0.12**	0.10
	(0.02)	(0.02)	(0.05)	(0.07)
Risk aversion (1-10)	0.03	0.06	-0.12	0.13
	(0.05)	(0.06)	(0.07)	(0.11)
Household size	-0.04	-0.06**	-0.09	0.01
	(0.02)	(0.02)	(0.07)	(0.07)
Dist. to input mkt. (km.)	-0.03	-0.03	-0.01	0.03
	(0.02)	(0.02)	(0.15)	(0.07)
Dist. to road (km.)	-0.00	-0.00	0.00	0.02
	(0.01)	(0.01)	(0.01)	(0.02)
Dist. to the closest primary school (km.)	0.02	0.01	-0.47*	0.03
	(0.02)	(0.03)	(0.27)	(0.08)
Dist. to the closest secondary school (km.)	0.00	0.00	-0.02	0.02
	(0.01)	(0.01)	(0.02)	(0.02)
(Log) Total value of assets 10 yrs. ago	0.10	0.15	-0.01	0.11
	(0.08)	(0.11)	(0.12)	(0.22)
Satisfaction w/ education (village mean)	0.04	-0.06	0.47	0.58
	(0.18)	(0.20)	(0.58)	(0.67)
Satisfaction w/ life (village mean)	0.45**	0.42**	-0.13	0.20
	(0.17)	(0.17)	(0.61)	(0.81)
Satisfaction w/ health (village mean)	-0.29	-0.30	0.35	-1.22*
	(0.21)	(0.32)	(1.11)	(0.60)
Age of the coop (yrs.)	-0.03*	-0.03	-0.05	-0.02
	(0.02)	(0.02)	(0.05)	(0.05)
Share of decisions made democratically	-1.45***	-0.82	-3.81***	0.61
	(0.47)	(0.82)	(1.23)	(1.62)
# service/inputs/training providers	-0.05	0.04	-0.33	0.11
	(0.08)	(0.12)	(0.29)	(0.35)
District=Lacs	-0.05	-0.09	-0.99	-0.77
	(0.37)	(0.60)	(1.30)	(1.12)
District=Lagunes	-0.36	-0.44	-1.03	-0.43
	(0.22)	(0.31)	(0.72)	(0.57)
Constant	-2.67	-2.68	-3.51	-1.98
	(1.92)	(2.84)	(6.51)	(9.16)
Observations	353	210	78	65

Note: Cluster robust standard errors shown in parentheses. $^{*} p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$

Table A2. Effects of certification and education projects on household education expenditure (log)

	Full sample		Farmers		Coop workers		Farm workers	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Certification (1/0)	0.43***	0.52***	0.35**	0.46**	0.82**	0.89**	0.33	0.29
	(0.12)	(0.15)	(0.15)	(0.18)	(0.32)	(0.40)	(0.32)	(0.38)
Education project (1/0)	0.41**	0.43***	0.71***	0.73***	-0.24	-0.21	0.52	0.51
	(0.16)	(0.16)	(0.14)	(0.14)	(0.51)	(0.47)	(0.41)	(0.37)
Resp. = coop. worker	-0.30*	-0.30*						
	(0.17)	(0.17)						
Resp. = coop. farm worker	-0.54***	-0.54***						
	(0.16)	(0.16)						
Female (1/0)	-0.24	-0.26	-0.36	-0.36	-0.40	-0.42	0.00	0.00
	(0.30)	(0.29)	(0.34)	(0.32)	(0.50)	(0.43)	(.)	(.)
Age	0.18***	0.18***	0.18***	0.18***	0.23***	0.23***	0.16	0.16*
	(0.03)	(0.03)	(0.06)	(0.05)	(0.07)	(0.06)	(0.10)	(0.09)
Age squared	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education (yrs.)	0.06***	0.06***	0.03	0.03*	0.09**	0.09***	0.12**	0.12***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.04)	(0.03)	(0.05)	(0.04)
Risk aversion (1-10)	0.06**	0.06**	0.05	0.05	-0.04	-0.04	0.14*	0.14**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.08)	(0.07)
Household size	-0.04**	-0.04**	-0.04**	-0.04**	-0.05	-0.06*	-0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.03)	(0.05)	(0.05)
Akan ethnicity (1/0)	0.23	0.24	0.12	0.12	0.30	0.30	0.39	0.38
	(0.18)	(0.17)	(0.24)	(0.24)	(0.55)	(0.49)	(0.48)	(0.44)
Dist. to input mkt. (km.)	-0.00	-0.00	-0.02	-0.02	-0.04	-0.04	0.02	0.02
	(0.01)	(0.01)	(0.02)	(0.01)	(0.05)	(0.05)	(0.03)	(0.03)
Dist. to road (km.)	0.00	0.00	-0.00	-0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Dist. to the closest primary school (km.)	0.01	0.01	0.02	0.02	-0.01	-0.01	-0.01	-0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.13)	(0.12)	(0.03)	(0.03)
Dist. to the closest secondary school (km.)	-0.00	-0.00	-0.00	-0.00	-0.04*	-0.04*	0.02	0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)
(Log) Total value of assets 10 yrs. ago	0.09*	0.09*	0.04	0.04	0.03	0.03	0.11	0.11
	(0.05)	(0.05)	(0.07)	(0.07)	(0.12)	(0.11)	(0.14)	(0.13)
Religion = Catholic	0.11	0.11	0.23	0.22	0.11	0.11	-0.05	-0.05
	(0.12)	(0.12)	(0.17)	(0.17)	(0.35)	(0.31)	(0.57)	(0.51)
Religion = Muslim	0.21	0.21	0.09	0.08	0.43	0.44	0.46	0.46
	(0.18)	(0.18)	(0.28)	(0.28)	(0.50)	(0.43)	(0.38)	(0.33)
Satisfaction w/ education (village mean)	-0.04	-0.04	-0.07	-0.08	-0.07	-0.07	-0.03	-0.03
	(0.09)	(0.09)	(0.09)	(0.09)	(0.38)	(0.34)	(0.21)	(0.19)
Satisfaction w/ life (village mean)	0.43***	0.42***	0.47***	0.45***	0.43	0.43	0.28	0.29
	(0.11)	(0.11)	(0.12)	(0.11)	(0.33)	(0.29)	(0.26)	(0.24)
Satisfaction w/ health (village mean)	-0.14	-0.14	-0.16	-0.16	0.27	0.27	-0.37	-0.37*
	(0.09)	(0.09)	(0.11)	(0.10)	(0.29)	(0.26)	(0.23)	(0.21)
Age of the coop (yrs.)	-0.02*	-0.03**	-0.01	-0.01	-0.08**	-0.08**	-0.02	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)	(0.03)	(0.04)	(0.03)

Share of decisions made democratically	-0.74**	-0.74**	-0.41	-0.42	-1.52	-1.53	0.14	0.14
	(0.32)	(0.32)	(0.44)	(0.41)	(1.18)	(1.06)	(1.10)	(0.99)
# service/inputs/training providers	0.06	0.05	0.03	0.02	0.03	0.02	0.06	0.06
	(0.05)	(0.05)	(0.06)	(0.05)	(0.12)	(0.11)	(0.14)	(0.12)
District = Lacs	0.01	0.04	0.19	0.23	-0.79	-0.76	-0.16	-0.17
	(0.33)	(0.31)	(0.37)	(0.33)	(0.77)	(0.70)	(0.58)	(0.53)
District = Lagunes	-0.27*	-0.24*	-0.29*	-0.27*	-0.47	-0.45	-0.35	-0.36
	(0.14)	(0.14)	(0.15)	(0.14)	(0.43)	(0.37)	(0.41)	(0.38)
Constant	-4.06***	-4.04***	-3.20	-3.13	-5.54*	-5.58**	-3.98	-3.99*
	(1.26)	(1.23)	(2.00)	(1.94)	(2.95)	(2.61)	(2.67)	(2.40)
Wu-Hausman F-statistic. [a]		0.97		0.73		0.08		0.02
Kleibergen-Paap Wald F statistic [b]		112.05***		72.88***		60.44***		78.02***
Hansen J statistic. [c]		1.18		0.68		2.11		1.49
Observations	712	712	433	433	147	147	132	132

Note: Cluster robust standard errors shown in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] Test of endogeneity (H_0: certified variable is exogenous)

[b] Test for weak instruments (H_0: coefficients of instruments in first stage are not different from zero)

[c] Test of over-identifying restrictions (H_0: instruments are uncorrelated with the error term)

Table A3. Spillover effects of education projects on household education expenditure (log)

	(1) Full sample	(2) Farmers	(3) Coop workers	(4) Farm workers
Education project (1/0)	0.31	0.39	0.42	0.79
	(0.20)	(0.34)	(0.54)	(0.52)
Resp. = coop. worker	-0.55**			
	(0.22)			
Resp. = coop. farm worker	-0.67***			
	(0.24)			
Female (1/0)	-0.75	-0.48	-1.80***	0.00
	(0.49)	(0.57)	(0.57)	(.)
Age	0.17***	0.17**	0.28***	0.18
	(0.04)	(0.08)	(0.07)	(0.23)
Age squared	-0.00***	-0.00**	-0.00***	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Education (yrs.)	0.07***	0.06**	0.12**	0.13
	(0.02)	(0.03)	(0.05)	(0.08)
Risk aversion (1-10)	0.04	0.06	-0.09	0.11
	(0.05)	(0.06)	(0.07)	(0.11)
Household size	-0.04	-0.06**	-0.10	0.03
	(0.02)	(0.03)	(0.08)	(0.09)
Akan ethnicity (1/0)	-0.21	-0.40	-0.29	-0.18
	(0.26)	(0.37)	(0.90)	(0.82)
Dist. to input mkt. (km.)	-0.03*	-0.04	-0.07	0.01
	(0.02)	(0.02)	(0.10)	(0.06)
Dist. to road (km.)	0.00	-0.00	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.02)
Dist. to the closest primary school (km.)	0.03	0.02	-0.51*	0.04
	(0.02)	(0.03)	(0.25)	(0.05)
Dist. to the closest secondary school (km.)	-0.00	-0.00	-0.01	0.03
	(0.01)	(0.01)	(0.02)	(0.02)
(Log) Total value of assets 10 yrs. ago	0.09	0.15	-0.03	0.13
	(0.08)	(0.10)	(0.13)	(0.20)
Religion = Catholic	0.17	0.21	-0.27	0.19
	(0.19)	(0.26)	(0.64)	(0.74)
Religion = Muslim	-0.01	-0.13	-0.31	0.63
	(0.29)	(0.42)	(0.81)	(0.77)
Satisfaction w/ education (village mean)	0.09	-0.05	0.28	0.33
	(0.16)	(0.16)	(0.41)	(0.44)
Satisfaction w/ life (village mean)	0.41**	0.37**	-0.01	0.33
	(0.16)	(0.15)	(0.50)	(0.71)
Satisfaction w/ health (village mean)	-0.31	-0.31	0.73	-1.05**
	(0.18)	(0.26)	(0.66)	(0.40)
Age of the coop (yrs.)	-0.02	-0.02	-0.05	-0.04
	(0.02)	(0.02)	(0.05)	(0.06)
Share of decisions made democratically	-1.38**	-0.74	-4.01***	0.84
	(0.51)	(0.82)	(1.28)	(1.81)
# service/inputs/training providers	-0.04	0.05	-0.27	0.25
	(0.08)	(0.11)	(0.28)	(0.41)
Ditrict = Lacs	0.04	-0.05	-0.55	-0.27
	(0.38)	(0.50)	(0.94)	(0.82)
District = Lagunes	-0.29	-0.40	-0.93	-0.28
	(0.21)	(0.24)	(0.58)	(0.53)
Constant	-2.62	-2.22	-4.89	-3.21
	(1.71)	(2.61)	(5.38)	(8.83)
Observations	353	210	78	65

Standard errors in parentheses
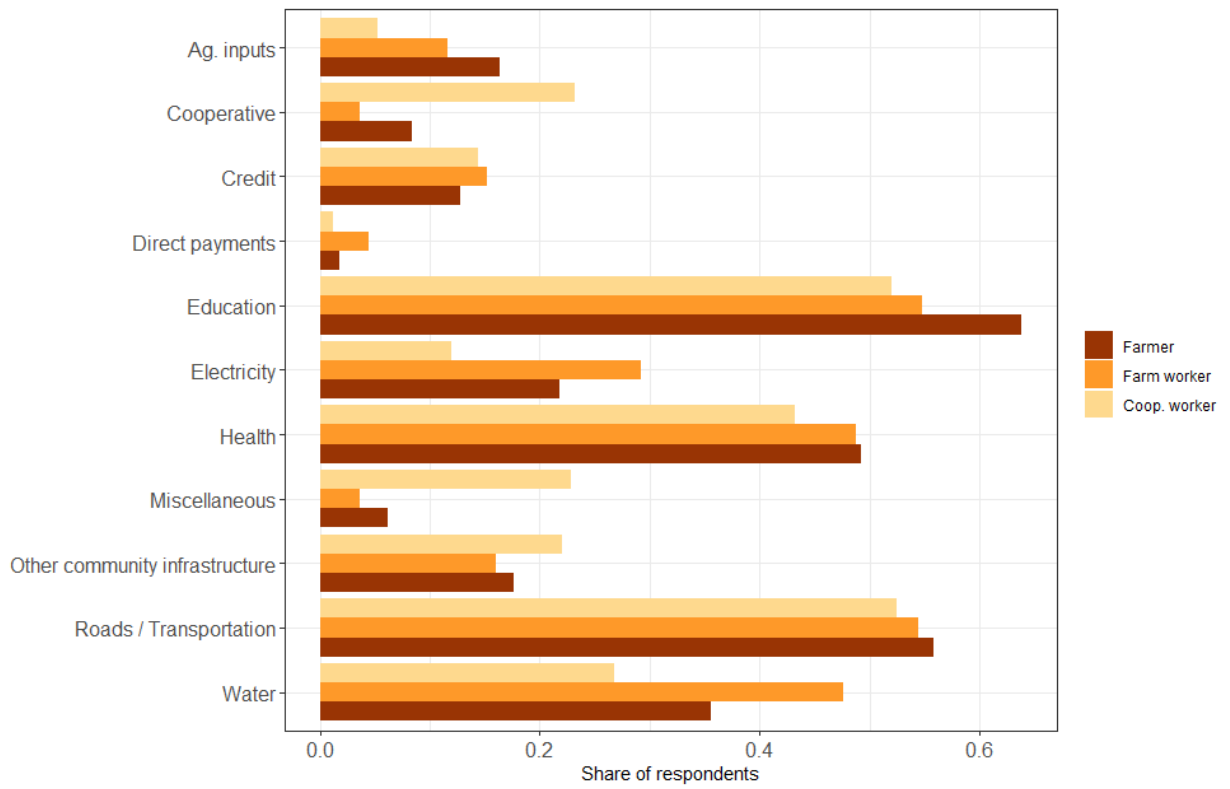* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

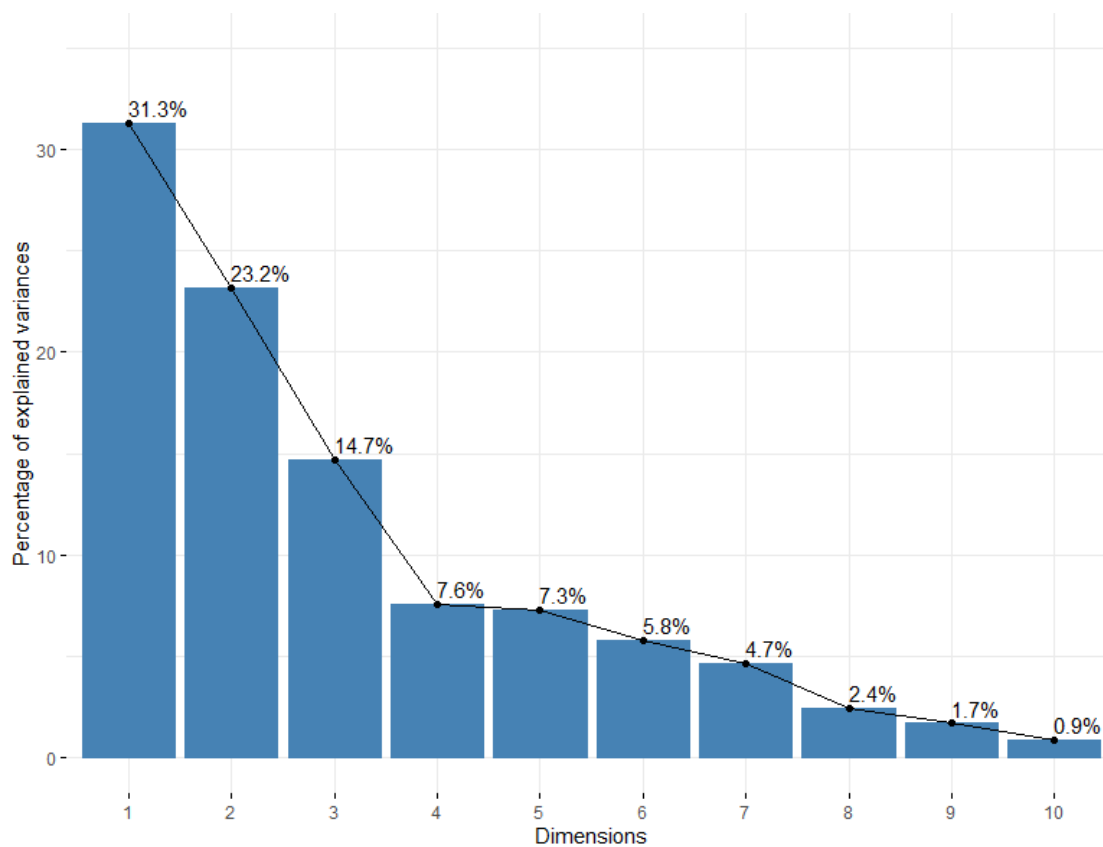**Figure A1. Most pressing needs of the villages that should be addressed**

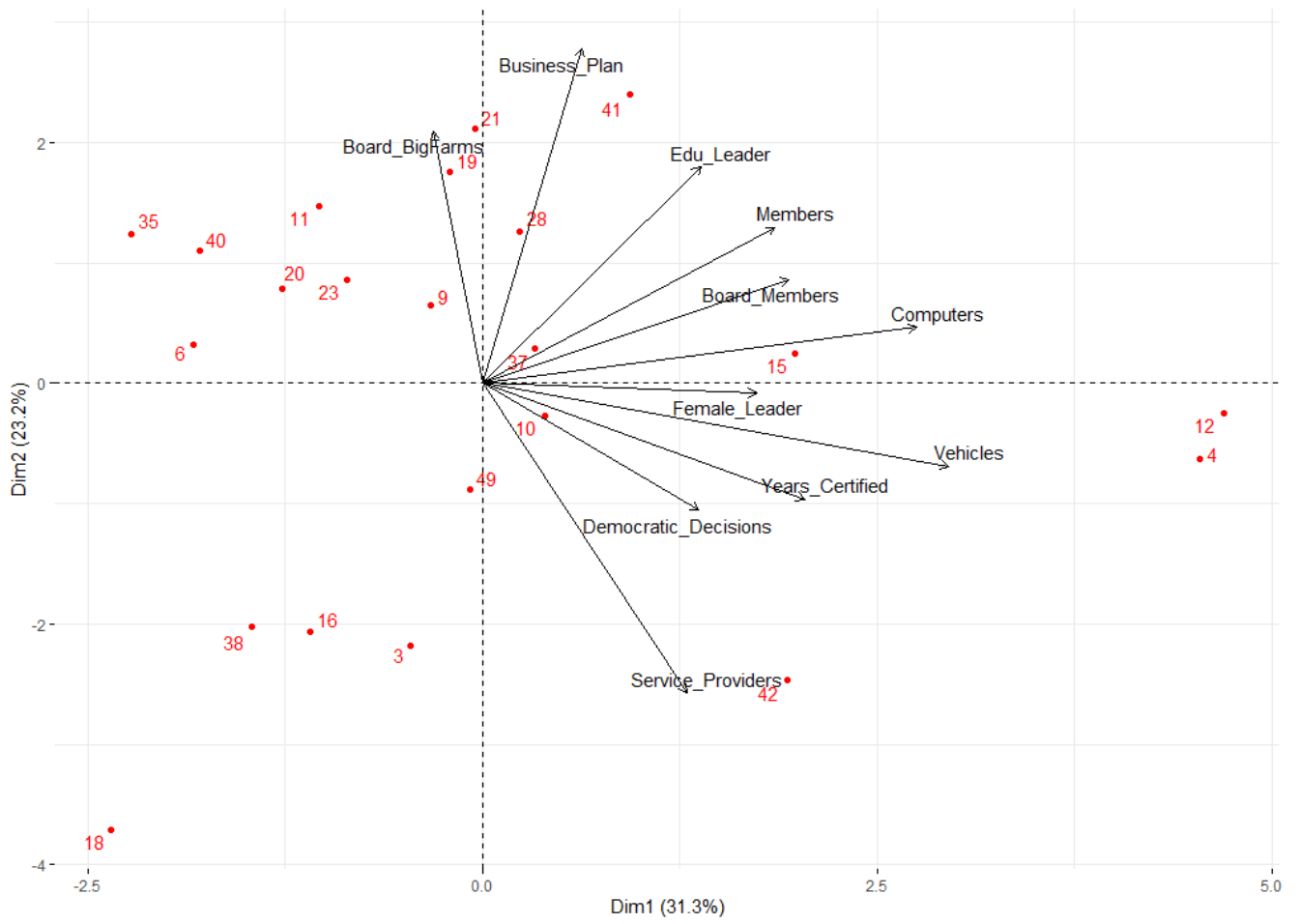**Figure A2. Scree plot of the principal component analysis**

Figure A3. Biplot of the principal component analysis. Cooperatives are indicated by red dots.