



Inter-Agency Task Force on
Social and Solidarity Economy

KNOWLEDGE HUB WORKING PAPER

Community Currency Programmes as a Tool for Sustainable Development

The Cases of Mombasa and Nairobi
Counties, Kenya

Daan Sillen, Pui-Hang Wong
and Serdar Türkeli

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Inter-Agency Task Force on **Social and Solidarity Economy**

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Acronyms

CC	Community currency
CCIA	Community Currencies in Action
GEF	Grassroots Economics Foundation
IPTW	Inverse probability of treatment weighting
KSH	Kenyan Shillings
SDG	Sustainable Development Goal
SLA	Sustainability Livelihood Approach
SLiFA	Sustainable Lifestyle Analysis Framework
UN Habitat	United Nations Human Settlement Programme
UNDP	United Nations Development Programme
UNRISD	United Nations Research Institute for Social Development
UNTFSSSE	United Nations Inter-Agency Task Force on Social and Solidarity Economy

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Summary

In a century epitomized by rapid urbanization, the population living in informal settlements continues to grow. Grassroots Economics Foundation (GEF) has developed community currency¹ (CC) programmes to boost employment in informal settlements with community currencies. These CC programmes are targeted towards the specific issues in informal settlements, such as lack of basic services, high (youth) unemployment and economic instability. By its design the CC model of GEF promises to be a tool for the sustainable development of informal settlements that goes beyond traditional development programmes (such as cash transfers) and their focus on productive outcomes.

This article therefore investigates if CCs have an impact on lifestyle outcomes. To this end it focusses on the CCs implemented by GEF in Kenyan informal settlements. By using inverse probability of treatment weighting (IPTW) using the propensity score, this article showed a positive and significant impact of CCs on the following two lifestyle outcomes: helping the environment and gifting in professional services and goods. This article contributes to the academic literature by answering to the need of quantitative evidence of the impact of CCs and by evidencing how these CCs can have a more holistic impact than conventional development paradigms.

Keywords: Community currency; Complementary currency; Informal settlements; Poverty alleviation; Cash transfers; Sustainable development

¹ Community currencies are “a subset of complementary currencies that are tied to a specific, demarcated and limited community” (CCIA, 2015, p.32). Complementary currencies are “designed to sit alongside mainstream money to address objectives that the conventional money system can’t” (CCIA, 2015, p.32).

Community Currency Programmes as a Tool for Sustainable Development: The Cases of Mombasa and Nairobi Counties, Kenya

Daan Sillen, Pui-Hang Wong and Serdar Türkeli²

Introduction

One in eight people live in informal settlements (UN-Habitat, 2016a). In a century epitomized by rapid urbanization, especially in the Global South, the population living in informal settlements continues to grow. These settlements are associated with poor social, physical and economic conditions and addressing the living conditions in these settlements therefore deserves ever more attention.

Grassroots Economics Foundation (GEF) is a non-profit social enterprise, based and active in Kenya, that has developed an innovative tool to empower the communities living in informal settlements. In 2017, when the field work for this research was carried out, their community currency (CC) programmes ran in two informal settlements of Mombasa County, three of Nairobi County and one in Kwale County. One of their CC programmes, the Lindi-Pesa, ran in Kibera, Africa's biggest slum.

The World Bank (2017a, p. 26) estimates that in Kenya "nearly 61 percent of urban households live in" informal settlements. The growth of the Kenyan population living in informal settlements is unlikely to stop given Kenya's "urbanization rate of 4.4 percent" (2017b, p. vi). Despite experiencing stable economic growth in the past decade and having a commercial and logistics industry that has a key role in the region and is known for its financial service innovations such as the M-PESA (Muchai & Kimuyu, 2017), the country has a poverty rate of 45.5 percent (UNDP, 2017). One of the ways in which this high poverty rate manifests itself is in the unceasing growth of the population living in informal settlements (World Bank, 2017b, p. 26).

The CCs of GEF are a local means of exchange, which supplements the national Kenyan currency system, targeted at addressing the issues in informal settlements. The Kenyan community currency model of GEF is called Sarafu-Credit. It is the model behind each of the of the specific community currency programmes that GEF developed with the communities, such as Bangla-Pesa for the Bangladesh community. Goods and services in Sarafu-Credit vouchers are worth the same amount in the national Kenyan currency: Kenyan Shillings. A cooperative is formed by a network of businesses, informal sector workers, schools, clinics and self-employed workers. The profits and inventory of this cooperative are issued as credit

² Daan Sillen (sillen@drift.eur.nl) is researcher at DRIFT, Erasmus University Rotterdam in the Netherlands.. Pui-Hang Wong and Serdar Türkeli are researchers at the United Nations University-MERIT at Maastricht University, also in the Netherlands.

that is free of interest and as vouchers for environmental and social services to the members of the community. Applicants can receive 400 CC (is worth the same as 400 Kenyan Shillings) starting credit if they are locally employed or have a local business and have the endorsement of a Community Based Organization (Chama). Sarafu-Credit is backed by the members' services and goods and the cooperative businesses, thus being a mutual credit³. In any participating organisation, shop, school clinic and farm these CC vouchers can be used as a medium of exchange for goods and services. These vouchers circulate in the community and are a stable local means of exchange when the national currency is lacking. As a result of this injection of credit into the community by means of a CC, which is based on local assets, local sales increase and there is a direct development of the local economy.

In the following two ways CC as a socio-economic tool for sustainable development aims to improve living conditions. Firstly, it provides access to an interest-free credit for community groups, which results in employment, increased trade, development of small businesses and general local economic stability. Secondly, it provides a mechanism for these community groups to finance environmental and social services and build trust in the community (Grassroots Economics, 2017). By their design, these CCs thus promise to have an impact that goes beyond the impact of conventional development paradigms, such as cash transfers (see figure 1).



Source: Grassroots Economics, 2017

Figure 1: Community currencies versus cooperative and conventional development paradigms

³ In *People Powered Money* (CCIA, 2015, p.175) a mutual credit is defined as “a system by which units of credit are created at the moment of the transaction between individual users as a debit of one’s account and a credit of the other’s. Operating within agreed limits of credit and debt, members of a mutual-credit system effectively loan one another the capital necessary for the exchange of goods and services within the network, with the overall balance of all members’ accounts always equalling zero.”

The currency itself is an impact tool. A tool enabling a community to develop touching upon almost all of the Sustainable Development Goals (SDGs), but especially SDG 11 Sustainable Cities and Communities aims at making cities and human settlements inclusive, safe, resilient and sustainable. The focus lies on co-creating and co-designing community currencies with the local community to stimulate local development based on the qualities, values and assets of the community in question.

On the topic of community currencies as a development tool for informal settlements little research has been published to date. The existing studies are however unique contributions to the wider literature on community currencies, since they focus on the particular case of the application of community currencies for the economic empowerment of communities in informal settlements.

The empirical studies on this topic demonstrated increases in local trade, employment and social services (Richards & Ruddick, 2013; Ruddick, 2011, 2015; Ruddick, Richards, & Bendell, 2015). Research is given to how these currencies function, the economic and social benefits of them, the impact on poverty reduction and their potential to promote the Social and Solidarity Economy (Dissaux, 2016; Dissaux & Ruddick, 2017; Ruddick & Mariani, 2013).

Since these CCs by their design promise to have an impact that goes beyond the impact of conventional development paradigms (such as cash transfers), a quantitative holistic assessment of CCs as a tool for the sustainable improvement of living conditions in informal settlements needs to be added to the body of literature.

The Sustainable Livelihood Approach (SLA) offers a comprehensive and holistic view of poverty and therefore holds potential to be an adequate framework for the holistic analysis of the living conditions in informal settlements (Krantz, 2001). Morse & McNamara (2013) however criticize that the SLA is a framework developed by the Global North for the Global South and they note that given the increasing scepticism about the emphasis on economic growth based on ever more consumption, the focus now shifts towards sustainable lifestyles. They argue for broadening the SLA framework into the Sustainable Lifestyle Analysis Framework (SLifA), which includes lifestyle choices, expectations and outcomes.

The impact CCs have on developing sustainable lifestyles could explain and evidence the differences between CCs and conventional development tools. It is thus the impact of the CC intervention on the lifestyle outcomes of the residents of informal settlements in which we are particularly interested.

Data and Method

Data

The data are provided by Grassroots Economics Foundation, the non-profit social enterprise that developed the CCs under study. All data collected and research activities carried out by Grassroots Economics are approved by the Ethics Board of the University of Cape Town. The dataset consists of surveys collected in 2017 for the following five CC programmes: Bangla-Pesa and Ng'ombeni-Pesa (Mombasa

County); Gatina-Pesa, Kangemi Pesa and Lindi Pesa (Nairobi County). The communities in which people were surveyed are: Kawangware, Kangemi, Kibera, Kilifi, Kwa-Ngombe, Bangladesh, Miyani, Takaungu, Bahakwenu, Pemba, Chumani, Pungu, Likoni, Mombasa, Chaani, Kibaoni Takaungu, Nyamalani and Uthiru. Participants of the CC programmes are either employers or employees of a local business. Applicants can receive 400 CC starting credit if they are locally employed or have a local business and have the endorsement of a Community Based Organization (Chama). Participating and non-participating local prosumers⁴ were randomly selected. The dataset includes 530 participants and 863 non-participants (see table 1). Participating and non-participating communities were randomly selected. However, some communities, such as Pungu and Mombasa, only have a small number of surveyed non-participants. To preserve randomization and balancing as much as possible, these communities were still included in the analysis. This is important in light of the method chosen for this analysis, which matches participants with non-participants. In participating communities, the surveyors made sure the control group was situated sufficiently far away from the treatment group.

Table 1: Community currency participation by community

Community	Are you using CC?	
	No (Percent)	Yes (Percent)
Kangemi	101 (11.70)	129 (24.34)
Kawangware	107 (12.40)	110 (20.75)
Bangladesh	1 (0.116)	101 (19.06)
Kwa-Ng'ombe		100 (18.87)
Kibera	48 (5.562)	88 (16.60)
Pungu	3 (0.348)	
Likoni	216 (25.03)	
Mombasa	2 (0.232)	
Chaani	200 (23.17)	
Miyani	84 (9.733)	
Takaungu	57 (6.605)	
Bahakwenu	42 (4.867)	
Other	2 (0.232)	2 (0.377)
Total	863 (61.95)	530 (38.05)

⁴ A prosumer is someone who produces some of the goods and services entering his or her own consumption (Toffler, 1981).

The surveyors asked male and female local prosumers on their personal, business and family characteristics. From April until July 2017 the data was collected. Since the data is only from one point in time, it is cross-sectional.

We selected two dependent variables that represent lifestyles outcomes. The first variable 'helping the environment' is a categorical variable (1 = no, 2 = sometimes and 3 = yes) that answers the following question: "Do your business or livelihood activities help the environment?" This question has to be situated in the context of the following two ways in which the CC participants can contribute to a better environment: through his or her business activity and by being part of the CC network.

Through his or her business activity a CC participant can contribute to a better environment in the following way. Local production is generally at a low level in the communities GEF targets. Generally, people are exporting most of their labour. GEF stimulates local production and consumption by giving a credit to local production and services. The idea is that the development of local assets and labour are stimulated, which would again buy more local goods from retail and retail would be stocking credits, because they would be using local production. Through cutting transport costs local production is more sustainable. Moreover, sustainable local businesses are stimulated, such as a coconut oil business that uses an oil press for cold-pressing coconuts that are locally sourced.

Through being part of the CC network the CC participants can contribute to the environment in the following three ways. Firstly, as part of a yearly renewal of their memberships CC participants have to pay for being part of the CC network, by devoting some of their CC for community services (such as tree planting, waste collection and agroforestry). Secondly, CC participants have to accept CC earned through community services. For example, youth groups that earned CC for waste collection activities can spend the earned CC in the businesses that are part of the CC network. Thirdly, through a Sarafu Credit shop CC participants contribute to the financing of community services. A Sarafu Credit shop acts as a backer of last resort: anyone holding CC will always be able to spend it in this shop, which is operated by the members of the CC network. Part of the profit of this Sarafu Credit shop goes to community services.

The second dependent variable 'gifting in professional goods or services' is an ordinal variable that answers the following question: "Over the last one month how much did you give in your business's goods or services to support people or groups without expecting compensation?" An example of gifting in professional goods or services is a maize farmer having given away some kilos of maize flower, over the last one month preceding the interview with survey questions, without expecting something in return. Answers to this question were offered on an eleven-unit ordinal scale: (1) None, (2) KSH 0 – KSH 50, (3) KSH 50 – KSH 100, (4) KSH 100 – KSH 200, (5) KSH 200 – KSH 400, (6) KSH 400 – KSH 800, (7) KSH 800 – KSH 1000, (8) KSH 1000 – KSH 1500, (9) KSH 1500 – KSH 2000, (10) KSH 2000 – KSH 3000, and (11) More than KSH 3000.

A limitation of the dataset is that the data were mostly based on recall data. Recall error might thus be present. Given the fact that the questions in the survey ask

questions of a recall period of maximum one year and given the nature of the questions in the survey, it is unlikely that recall errors will be large.

Method

Since the data used in this research is observational, with participants having self-selected into the programme considering it as a random sample is not reasonable. As Gelman and Hill explain (2007, p. 181): “In an observational study, there can be systematic differences between groups of units that receive different treatments—differences that are outside the control of the experimenter—and they can affect the outcome, y .” Simply relying on treatment and outcome data will not be enough, we will have to rely on more data in this situation and we therefore will have to make use of a more complex analysis strategy which relies upon stronger assumptions (Gelman & Hill, 2007).

Propensity score methods are popular for estimating the impact of a treatment using observational data. The definition of the propensity score is the following: “the probability of treatment assignment conditional on measured baseline covariates” (Austin & Stuart, 2015, p. 3662). The central property of a propensity score is: “conditional on the propensity score, treatment status is independent of measured baseline covariates” (Austin & Stuart, 2015, p. 3662). The propensity score is thus a balancing score, meaning participants and non-participants that have the same propensity score have observed baseline control variables with similar distributions. The statistics literature mentions four methods that make use of the propensity score: matching on the propensity score, stratification on the propensity score, inverse probability of treatment weighting (IPTW) and covariate adjustment using the propensity score (Austin & Stuart, 2015).

Since the two dependent variables of interest are discrete variables and most covariates are dummy or categorical variables, the propensity score will be predicted using a logistic regression model. The method used to correct for the selection bias is the inverse probability of treatment weighting (IPTW) method. Based on Austin & Stuart (2015) and He, Hu, & He (2016) the IPTW method is described as follows. If Z denotes assignment to the treatment, thus whether or not the person is a CC participant ($Z = 1$ denoting CC participant; $Z=0$ denoting CC non-participant), and X denotes a vector of observed baseline control variables, then the propensity score can be defined as $e = P(Z = 1|X)$; which is the probability of a person receiving CC conditional on their observed baseline control variables. The inverse probability of being a CC participant can then be defined as $\frac{Z}{e} + \frac{1-Z}{1-e}$. The weight of each subject “is equal to the inverse of the probability of receiving the treatment that the subject received” (Austin & Stuart, 2015, p. 3663). The average treatment effect is then estimated by applying these weights in an ordered logistic regression model, after having checked the four propensity score assumptions being: positivity, consistency, no misspecification of the propensity score model and exchangeability.

A limitation of this method is that it requires an extensive dataset, but this is the case in this study. The method furthermore depends on the degree to which observed characteristics drive participation into the programme. It also assumes that there are no unobserved differences between the treated and control group that could explain

participation into the programme (conditional independence assumption). It is however not possible to test this assumption (Gertler, Martinez, Premand, Rawlings, & Vermeersch, 2016).

Results and Analysis

Variable Selection for the Propensity Score Model

For the variable selection for the propensity score model we made sure observed background characteristics were selected that best determine programme participation, to avoid a biased estimate (Gertler et al., 2016). We made this selection based on the context in which the programme was introduced. Khandker, Koolwal and Samad (2009) highlight the importance of having a good understanding of the context of programme participation; the better this understanding, the better we can construct a matched comparison group. They furthermore mention following three provisions for good matching and avoiding biased estimates: “using the same data source” and having “a representative sample survey of eligible nonparticipants as well as participants”. They also note that “the larger the sample of eligible nonparticipants is, the more good matching will be facilitated” (Khandker, Koolwal, & Samad, 2009, p. 58). The data in this research comes from the same data source, is a representative sample and has significantly more non-participants than participants. The authors also mention the following: “A related point is that participants and nonparticipants should be facing the same economic incentives that might drive choices such as programme participation ((...) such incentives might include access to similar markets, for example). One could account for this factor by choosing participants and nonparticipants from the same geographic area.” (Khandker, B. Koolwal, & Samad, 2009, p. 59). In our case non-participants and participants come from the same or a similar neighbouring community, so the same geographic area and they have access to similar markets. The data in this study thus forms a good basis for matching.

Austin & Stuart (2015) suggest that next to the inclusion of covariates that influence selection, it is also important to include covariates that have an effect on the outcome. However, the inclusion of too many covariates should be avoided as Khandker, B. Koolwal, & Samad (2009, p. 59) point out: “overspecification of the model can result in higher standard errors for the estimated propensity score $\hat{P}(X)$ and may also result in perfectly predicting participation for many households ($\hat{P}(X) = 1$).” Based upon these considerations we have selected the set of appropriate covariates for the propensity score model. Table 2 provides an overview of this set of covariates and the treatment dummy ‘Community currency participant’.

Table 2: Treatment and control variables for propensity score model

	N	Mean	SD	Min	Max
Treatment Variable					
Community currency participant	1,393	0.380	0.486	0	1
Control Variables					
Years in area	1,393	11.94	10.77	0	98
Level of schooling	1,393	3.668	0.922	1	6
Municipality support	1,393	1.191	0.393	1	2
Own business	1,393	1.863	0.897	1	3
Bank account holder	1,393	1.650	0.477	1	2
Age	1,393	32.99	9.578	18	72
Gender	1,393	1.550	0.498	1	2

CC is given to everyone with a local business or that is employed locally and who is endorsed by a Chama. A Chama is the community committee that reviews the application of a potential new member and decides whether or not the person can participate in the programme. The programme assignment rule is thus very broad. We therefore looked at variables that explain differences in self-selection into the programme. The years someone lived in the area could explain why this person self-selected into the programme and could also have an effect on the outcome of helping the environment and professional gifting. Someone who already has his business for a long time in the area is more likely to know the local business network well and therefore has incentives to join the local CC business network. It could also influence how much the person is willing to gift in professional goods or services to people in the community.

The person's level of schooling is selected, because one's level of schooling in this context can play a role in the choice of applying for the CC programme. The concept of CC has to be understood and the CC user guide has to be read, which both can be difficult given the amount of complexity for someone without having had schooling. One's level of schooling could also influence the outcome of helping the environment and gifting the community, since people with higher education levels potentially are more aware of the global social and environmental challenges we face.

Another important covariate is 'Municipality support'. Whether the person receives any other support, such as a subsidy, could explain differences in participation as well. It is furthermore a variable that needs to be controlled for when estimating the impact of the two lifestyle outcomes, since we want to know whether CCs go beyond traditional forms of aid.

Whether someone owns his business premise or not is a background characteristic that gives an indication of the financial situation and stability of the local prosumer. Given one of the main aims of the CC programme is to provide credit to people that lack it and it is a tool targeted to low-income communities, it can be expected that less well-of local prosumers self-select into the programme. If one has the financial

stability of having his own business, one could also be expected to be in a situation where one has the resources and time to take part in activities that help the environment and gift in professional services or goods (W. Ruddick, personal communication, March 22, 2017).

The CC of GEF is a new financial service: one for low-income communities that builds capacity and develops credit ratings prior to being in formal banking and develops local economies in general. Whether the person holds a bank account or not is thus an important background characteristic for explaining differences in participation. If you own a bank account or not can also be expected to have an effect on gifting or being in a situation where time and resources can be devoted to environmental activities (W. Ruddick, personal communication, March 22, 2017).

The age of the local prosumer could explain differences in self-selection as well. Age potentially also has an effect on giving and environmental help. Since generational differences could influence lifestyle outcome such as the one in this study.

Richards and Ruddick (2013) note that in the areas in which GEF operates most “small businesses are owned and operated by women” and that although women “represent the majority of the workforce, business ownership and unpaid labour, these women earn less income than their male counterparts”. Gender is therefore another important characteristic for the explanation of differences in programme participation. Richards and Ruddick (2013) furthermore mention that “while women make up the bulk of the businesses and labour, male business owners earn more profit from their enterprises” in these areas. This highlights that the gender variable could also affect gifting in professional good or services and helping the environment. Table 3 shows the propensity score model. This logistic regression confirms what is previously discussed about the included covariates. On average, you are more likely to participate in a CC programme if you received municipality support, if you are female, the older you are and if you had schooling, *ceteris paribus*. On average, you are less likely to participate if you hold a bank account and if you own your business premise, *ceteris paribus*. Strangely, on average you are slightly less likely to participate the longer you live in the area, when keeping everything else constant. The effect of ‘municipality support’, ‘bank account holder’, ‘age’ and ‘years in area’ are statistically significant at the 1% significance level. The categories ‘primary educ.’, ‘secondary educ.’ and ‘diploma’ of the ‘level of schooling’ variable are also statistically significant at the 1% level. The category ‘National Technical Certificate’ of the schooling variable is statistically significant at the 5% significance level and the ‘tertiary educ.’ category of this variable is statistically insignificant. Gender and the ‘Yes’ category of the ‘own business premise’ variable are statistically significant at the 10% significance level. The ‘Not applicable’ category of the ‘own business premise’ variable is statistically insignificant.

Table 3: Propensity score model

Community currency	Propensity Score Model
Municipality support	
Yes	0.954*** (0.000)
Bank account holder	
Yes	-0.487*** (0.000)
Own business premise	
Not applicable	-0.094 (0.576)
Own business premise	
Yes	-0.245* (0.069)
Gender	
Female	0.213* (0.073)
Age	0.038*** (0.000)
Years in area	-0.022*** (0.001)
Level of schooling	
Nat. Tech.	1.283** (0.020)
Primary educ.	1.030*** (0.004)
Secondary educ.	1.412*** (0.000)
Diploma	1.495*** (0.000)
Tertiary educ.	0.524 (0.469)
Constant	-2.641*** (0.000)
Observations	1,393
Pseudo R-squared	0.058

Robust p-value in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Balancing Property

Austin and Stuart (2015, p. 3665) note: “Having identified the appropriate set of variables, the objective of IPTW using the propensity score is to create a weighted sample in which the distribution of these covariates is the same between treated and control subjects.” Although one can obtain an unbiased estimate of the average treatment effect with IPTW using the propensity score, these estimates are solely valid “if there are no residual systematic differences in observed baseline characteristics between treated and control subjects in the sample weighted by the estimated inverse probability of treatment” (Austin & Stuart, 2015, p. 3665). Austin and Stuart found the balancing property is often not examined in studies that use IPTW. They therefore propose several balancing diagnostics. We will assess balance by applying one of the diagnostics proposed by the authors: by comparing the means

of the control variables between participants and non-participants in the weighted sample.

Table 4 shows the comparison of the proportions and means of the control variables for the control and treatment subjects in a sample that was weighted by the inverse probability of treatment. The proportions and means are well-balanced and we thus consider the balancing property as satisfied.

Table 4: Comparison of means and proportions of baseline control variables between control and treated subjects in the weighted sample

	Municipality support		Bank account		Own business premise		Gender		Age		Years in area		Level of schooling		
	Control (Proportion)	Treatment (Proportion)	Control (Proportion)	Treatment (Proportion)	Control (Proportion)	Treatment (Proportion)	Control (Proportion)	Treatment (Proportion)	Control (Mean)	Treatment (Mean)	Control (Mean)	Treatment (Mean)	Control (Proportion)	Treatment (Proportion)	
No	0.815	0.814	0.351	0.346	No	0.471	0.472	0.464	32.75	32.51	11.79	11.57	No school	0.0525	0.0594
Yes	0.185	0.186	0.649	0.654	Not Applicable	0.183	0.189	0.536					NTC (National Technical Certificate) Grade School (Primary) Secondary School Diploma	0.0184	0.0182
					Yes	0.346	0.339						Bachelors or Tertiary Degree	0.269	0.257
														0.542	0.540
														0.106	0.109
														0.0126	0.0160
N	863	530	863	530		863	530	863	863	530	863	530		863	530

Results

We assess the effect of community currency participation on helping the environment and gifting in professional goods or services. By using the inverse probability of treatment weights in an ordered logistic model, we will assess the effect on both lifestyle outcomes.

Lifestyle Outcome One: Helping the Environment

Table 5 presents the results of ordered logistic model 1A and 1B for the effect of community currency participation on helping the environment. In these ordered logistic models, we used the inverse probability of treatment weights for the estimation of the programme effects. The same covariates as in the propensity score model are included in model 1A and 1B. The covariates that explain selection are very likely to have impacts on outcome as well. That is why people may self-select themselves into the treatment. However, in model 1A and 1B we added extra control variables that explain the outcome. These variables help explain outcome, but are unlikely to have had an effect on selection, since our lifestyle outcome variable is rather general and people may not “choose” to participate because they had the outcome of helping the environment in mind.

These extra covariates are the ‘Impact on the community’ variable and ‘Amount of local stock or production inputs purchases’. Whether one sees himself as having a big impact on making the community a better place to live could explain why one participates more in the environmental activities organised by the community and whether one is concerned about having a business that has a positive impact on the environment in general. The amount of local stock or production input purchases represent whether one buys a lot locally or not. Since Grassroots Economics, as part of developing sustainable local communities, promotes local production and consumption, the amount of local stock or production input services is likely to help explain whether one considers himself to be less or more likely to help the environment with his activities.

The difference between model 1A and 1B is that in model 1A the treatment variable is not included and we use a set of community variables to capture the treatment effects. The inclusion of the set of community variables also allows us to account for potential heterogeneity among communities. However, to avoid the perfect multicollinearity problem in estimation (Stock & Watson, 2018), one community variable is omitted and is treated as the reference group. In model 1A we choose the Chaani community as the reference group, because this community has 200 control subjects, therefore being the community with the largest amount of control subjects.

Table 5: Ordered logit models for effect of community currency participation on helping the environment

Helping the environment	Model 1A		Model 1B	
	β	SE	β	SE
Community				
Kawangware	0.847***	(0.286)		
Kangemi	1.215***	(0.246)	0.683**	(0.270)
Kibera	0.952***	(0.284)	0.169	(0.301)
Kwa Ng'ombe	1.007***	(0.261)	-1.088***	(0.372)
Bangladesh	-0.181	(0.241)	-2.682***	(0.359)
Miyani	3.064***	(0.677)	5.264***	(0.710)
Takaungu	17.07***	(0.301)	19.63***	(0.344)
Bahakwenu	-2.137***	(0.442)	-0.439	(0.481)
Pungu	-0.435	(1.203)	0.605	(1.597)
Likoni	0.700***	(0.253)	2.999***	(0.344)
Mombasa	17.86***	(1.062)	19.81***	(0.846)
Chaani			1.956***	(0.321)
Other	1.645	(1.075)	0.747	(1.681)
Municipality Support				
Yes	-0.366**	(0.172)	-0.509**	(0.208)
Bank account holder				
Yes	-0.146	(0.168)	0.0584	(0.182)
Own business premise				
Not applicable	-0.304	(0.191)	-0.321	(0.201)
Yes	0.229	(0.163)	0.420**	(0.189)
Gender				
Female	0.139	(0.128)	0.112	(0.142)
Age				
	0.00962	(0.00849)	0.00772	(0.0103)
Years in area				
	0.0220*	(0.0113)	0.0248**	(0.0123)
Level of schooling ('No schooling' omitted)				
Nat. Tech. Certificate	-0.608	(0.627)	-1.131*	(0.635)
Primary educ.	-1.400***	(0.492)	-1.269**	(0.524)
Secondary educ.	-1.120**	(0.486)	-0.934*	(0.522)
Diploma	-1.147**	(0.502)	-1.347**	(0.544)
Tertiary educ.	0.273	(0.862)	0.375	(1.021)
Impact on the community				
A small impact	0.438	(0.480)	0.157	(0.498)
A big impact	1.686***	(0.488)	1.097**	(0.515)
Amount of local stock or production inputs purchases				
KSH0 - KSH500	0.711***	(0.229)	0.569**	(0.257)
KSH500 - KSH1,000	0.150	(0.230)	-0.228	(0.267)
KSH1,000 - KSH2,000	0.0424	(0.251)	0.266	(0.265)
KSH2,000 - KSH3,000	-0.338	(0.248)	-0.0668	(0.231)
KSH3,000 - KSH5,000	-0.623**	(0.266)	-0.0197	(0.284)
KSH5,000 - KSH10,000	-0.539**	(0.255)	0.241	(0.325)
KSH10,000 - KSH20,000	-1.347***	(0.437)	-0.321	(0.418)
KSH20,000 - KSH40,000	-1.748**	(0.723)	-0.196	(0.763)

KSH40,000 – KSH80,000	-1.532***	(0.383)	0.728	(0.499)
KSH80,000 – KSH100,000	15.81***	(0.658)	18.07***	(1.042)
Community currency participant				
Yes			4.264***	(0.298)
Constant cut1	-1.895***	(0.732)	-0.436	(0.791)
Constant cut2	1.157	(0.734)	3.328***	(0.814)
Observations	1,393		1,393	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In model 1A, Kawangware, Kangemi, Kibera and Kwa-Ng'ombe have a positive and highly statistically significant effect on helping the environment when compared to Chaani; the effects being statistically significant at the 1% significance level. Together with the Bangladesh community, these are the communities with community currency participants. Bangladesh however is not statistically significant. In model 1B, the effect of community currency participation on helping the environment is positive and statistically significant at the 1% significance level, thus highly significant. The Kangemi community has a positive and statistically significant coefficient at the 5% significance level. The coefficient of Kibera is insignificant. Kwa-Ng'ombe and Bangladesh have negative and highly statistically significant coefficients, significant at the 1% significance level. Since the omitted Kawangware community together with the Kangemi community are the communities with the most CC participants, they seem to absorb the positive effect on helping the environment. Based on the discussion of the communities in model 1A and 1B the positive effect on helping the environment seems to hold for all the CC communities.

Table 6: Marginal effects of community currency participation on helping the environment

	No	Sometimes	Yes
Does your business or livelihood activities help the environment?	Predicted prob.	Predicted prob.	Predicted prob.
Community currency participant	-0.281***	-0.245***	0.527***

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In table 6 the results of the estimation of the marginal effects of community participation on helping the environment are presented. All the marginal effects are statistically significant at the 1% significance level. Being a community currency participant is associated with being 28% less likely to have business or livelihood activities that don't help the environment, 25% less likely to have business or livelihood activities that sometimes help the environment, and 53% more likely to have business or livelihood activities that help the environment. The first lifestyle outcome of CC participation that is tested in this analysis is thus positive and highly statistically significant.

Lifestyle Outcome Two: Gifting in Professional Goods or Services

The results of ordered logistic model 2A and 2B for the effect of community currency participation on gifting in professional goods or services are provided in table 7. Like

in the models for estimating the impact on helping the environment, in these ordered logistic models we used the inverse probability of treatment weights for the estimation of the programme effects. Like in model 1A and 1B, the same covariates as in the propensity score model are included in model 2A and 2B. The motivations for including these variables in model 1A and 1B, apply for model 2A and 2B as well. In the latter extra covariates are also added based on the same reasoning as for model 1A and 1B.

The extra covariates included in model 2A and 2B are 'Financial situation', 'Forced to consult others for decisions', 'Total outstanding debt', 'Community willingness to help', 'Trust in others of community' and 'Impact on the community'. The financial situation of the subject and his total outstanding debt play an important role in explaining the amount of giving to others for obvious reasons. If one is forced to consult others for decision, one could be more likely to also to do more gifting in professional goods or services to others. Trust in the community and the willingness of other members of the community to help you when needed, could also explain gifting to other members of the community. Whether one sees himself as having a big impact on making the community a better place to live could explain why someone does more gifting in professional goods or services to other members of the community.

The difference between model 2A and 2B is that in model 2A the community variable is represented as dummy variables for each community and the treatment variable is not included. Like for model 1A and 1B, we do this for model 2A and 2B to verify if community heterogeneity influences the results. Following the same logic as in model 1A, we omitted the Chaani community in model 2A and Kawangware community in model 2B.

Table 7: Ordered logit models for effect of community currency participation on gifting in professional goods or services

Gifting in professional goods or services	Model 2A Community dummies		Model 2B Categorical Community var.	
	β	SE	β	SE
Community				
Kawangware	-2.347***	(0.356)		
Kangemi	-1.232***	(0.313)	1.063***	(0.317)
Kibera	-1.518***	(0.355)	0.683*	(0.352)
Kwa Ng'ombe	-1.496***	(0.294)	0.413	(0.460)
Bangladesh	-2.667***	(0.480)	-0.807	(0.605)
Miyani	-0.962**	(0.445)	1.850***	(0.505)
Takaungu	-0.173	(0.573)	2.895***	(0.580)
Bahakwenu	-3.433***	(0.965)	-0.563	(0.959)
Pungu	-3.037	(2.524)	-0.162	(2.532)
Likoni	-2.641***	(0.432)	0.257	(0.443)
Mombasa	-0.0761	(0.804)	2.910***	(0.812)
Chaani			2.781***	(0.349)
Other	0.0658	(1.284)	2.418*	(1.374)
Municipality Support				

Yes	-0.167	(0.192)	-0.186	(0.193)
Bank account holder				
Yes	-0.109	(0.180)	-0.0870	(0.180)
Own business premise				
Not applicable	-0.332*	(0.200)	-0.310	(0.204)
Yes	0.139	(0.237)	0.239	(0.249)
Gender				
Female	-0.0244	(0.137)	-0.0475	(0.140)
Age	-0.0112	(0.00919)	-0.00997	(0.00924)
Years in area	0.0239***	(0.00919)	0.0239***	(0.00911)
Level of schooling (‘No schooling’ omitted)				
Nat. Tech. Certificate	0.172	(0.647)	0.0727	(0.654)
Primary educ.	-0.432	(0.381)	-0.413	(0.384)
Secondary educ.	-0.972***	(0.373)	-0.954**	(0.379)
Diploma	-0.0686	(0.412)	-0.0990	(0.417)
Tertiary educ.	-0.344	(1.167)	-0.304	(1.232)
Financial situation (‘Very underprivileged’ omitted)				
Underprivileged	0.199	(0.396)	0.355	(0.391)
Below average	-0.207	(0.368)	-0.0969	(0.360)
Average	-0.838**	(0.401)	-0.659*	(0.400)
Above average	-1.025**	(0.448)	-0.843*	(0.447)
Rich	-0.274	(0.726)	-0.0843	(0.706)
Forced to consult others for decisions (‘Never’ omitted)				
Almost never	1.775***	(0.454)	1.982***	(0.495)
Sometimes	2.109***	(0.440)	2.278***	(0.481)
Quite often	1.120**	(0.485)	1.312**	(0.520)
Always	1.642***	(0.521)	1.762***	(0.552)
Total outstanding debt				
KSH0 - KSH500	-0.138	(0.406)	-0.170	(0.426)
KSH500 – KSH1,000	0.691**	(0.287)	0.653**	(0.295)
KSH1,000 – KSH2,000	0.613*	(0.318)	0.424	(0.339)
KSH2,000 – KSH3,000	0.831*	(0.482)	0.668	(0.476)
KSH3,000 – KSH5,000	0.884*	(0.512)	0.750	(0.549)
KSH5,000 – KSH10,000	1.114**	(0.459)	0.957**	(0.457)
KSH10,000 – KSH20,000	1.129**	(0.573)	0.982*	(0.576)
KSH20,000 – KSH40,000	0.851	(0.750)	0.781	(0.750)
KSH40,000 – KSH60,000	2.115	(1.469)	1.959	(1.434)
KSH60,000 – KSH80,000	-1.255	(0.892)	-1.434*	(0.860)
KSH80,000 – KSH100,000	1.277*	(0.711)	1.124	(0.784)
more than KSH100,000	-0.280	(0.945)	-0.426	(0.893)
Community willingness to help				
Sometimes	-0.152	(0.209)	-0.189	(0.212)
Yes	0.265	(0.306)	0.226	(0.313)
Trust in others of community (‘No’ omitted)				
Sometimes	-0.279	(0.258)	-0.256	(0.263)
Yes	-0.0583	(0.293)	-0.0164	(0.298)

Impact on the community				
(‘Not impact’ omitted)				
A small impact	0.338	(0.383)	0.278	(0.370)
A big impact	0.830**	(0.401)	0.628	(0.394)
Community currency participant				
Yes			0.890***	(0.285)
Constant cut1	0.0569	(0.935)	3.136***	(0.960)
Constant cut2	0.595	(0.937)	3.679***	(0.965)
Constant cut3	1.604*	(0.928)	4.698***	(0.963)
Constant cut4	2.305**	(0.929)	5.406***	(0.969)
Constant cut5	2.898***	(0.912)	6.004***	(0.956)
Constant cut6	3.371***	(0.911)	6.479***	(0.960)
Constant cut7	3.834***	(0.924)	6.944***	(0.969)
Constant cut8	4.256***	(0.932)	7.368***	(0.978)
Constant cut9	4.839***	(0.959)	7.953***	(0.995)
Constant cut10	5.429***	(1.005)	8.545***	(1.039)
Observations	1,393		1,393	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Model 2B suggests the positive effects on gifting are absorbed by the communities with the biggest amount of CC participants: Kawangare and Kangemi. Kawangare is the omitted category. Kangemi has a positive impact at the 1% significance level. Kibera also has a positive impact, but at the 10% significance level. Based on the discussion of the communities, the positive effect on gifting in professional goods and services seems to hold for all the CC communities.

Table 8: Marginal effects of CC participation on gifting in professional goods or services

Gifting in professional goods or services	None	KSH0 -	KSH50 -	KSH100 -	KSH200 -	KSH400 -	KSH800 -	KSH1,000 -	KSH1,500 -	KSH2,000 -	KSH3,000 -	More than KSH3,000
		KSH50	KSH100	KSH200	KSH400	KSH800	KSH1,000	KSH1,500	KSH2,000	KSH3,000		
Predicted prob.												
Community currency participant	-0.133***	0.015***	0.038***	0.026***	0.018***	0.011**	0.008**	0.005**	0.005*	0.003*	0.004*	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In table 8 the results of the estimation of the marginal effects of community participation on gifting in professional goods or services are presented. All the marginal effects are statistically significant. No gifting and gifting between KSH0 – KSH50, KSH50 – KSH100, KSH100 – KSH200 and KSH200 – KSH400 are statistically significant at the 1% significance level. Gifting between KSH400 – KSH800, KSH800 – KSH1,000 and KSH1,000 – KSH1,500 are statistically significant at the 5% significance level. Gifting between KSH1,500 – KSH2,000 and KSH2,000 – KSH3,000 and more than KSH3,000 are statistically significant at the 10% significance level. Being a community currency participant is associated with being 13% less likely to do no gifting in professional goods or services, 2% more likely to gift between KSH0 – KSH50, 4% more likely to gift between KSH50 – KSH100, 3% more likely to gift between KSH100 – KSH200, 2% more likely to gift between KSH200 – KSH400, 1% more likely to gift between KSH400 – KSH800, 1% more likely to gift between KSH800 – KSH1000, 1% more likely to gift between KSH1000 – KSH1500, 1% more likely to gift between KSH1500 – KSH2000, 0.3% more likely to gift between KSH2000 – KSH3000, and 0.4% more likely to gift more than KSH3000. Being a community currency participant is thus associated with being less likely to do no gifting and slightly more likely to do gifts of a low, medium and high amount, compared to non-participants.

For the amounts up to KSH400, which is approximately equal to a household's average food budget per day, the predicted probabilities are highly significant. Given the scarcity of credit, already being slightly more likely to do gifting for these amounts and less likely to do no gifting compared to non-participants, can thus be seen as a positive effect. The second lifestyle outcome of CC participation that is tested in this analysis is thus positive and statistically significant. In conclusion, we can therefore state that both the first and second lifestyle outcome are positive and statistically significant.

Discussion

Discussion of Results

Both findings support the tested hypothesis that the use of CC is positively associated with helping the environment and gifting (altruistic behaviour). This evidence supports the hypothesis that community currencies as a tool for the sustainable development of informal settlements go beyond traditional development programmes and their focus on productive outcomes.

Whilst long-term development with community currencies is based on cooperative assets (e.g. maize mills, wholesale shops, coconut oil etc.), long-term development in the case of cash transfers seems to be questionable because of its dependency on donor funds. For example, if people want to make the most out of cash given to them, they need to be able to purchase affordable and high-quality services and products such as quality education, food, healthcare... (Starr & Hattendorf, 2014). The provision of these basic services however is what is typically lacking in informal settlements. As Starr & Hattendorf (2014) put it: "the poor do not spend the cash on stupid things; they just may not have access to great things". This underpins one of

the reasons why CC programmes hold potential to have a more structural impact in these communities than cash transfer programmes.

Furthermore, it needs to be noted that in some cases cash transfers will not work. For example, when a lack of credit is not the problem of a poor business owner, but he faces other constraints, providing credit alone is unlikely to help him (Blattman et al., 2013). The CC programmes of GEF however are targeted towards the specific issues in informal settlements, such as lack of basic services, high (youth) unemployment and economic instability. CCs thus hold the potential to meet the objectives of both cooperative and conventional development paradigms, truly stimulating sustainable development of these communities.

Limitations and Future Research

It is important to note the limitations of this study and possible suggestions for further research. Since this research is the first quantitative assessment based on the Sustainable Lifestyle Analysis framework, we acknowledge the need for more studies that base their analysis on the SLiFA. Further in-depth analysis of the different lifestyles in the CC communities could further explain differences between CCs and cash transfers. Studying how these currencies can be scaled-up is what future research also should address. Assessing the long-term impact of CC with longitudinal data is also an aspect future research should focus on to support the evidence of CCs as an adequate tool for sustainable development of informal settlements. Lastly, because these CCs are very context-specific external validity of the results is questionable.

Policy Implications

The evidence of the positive impact of CCs on lifestyle outcomes has the following policy implications. It shows the need for exploring tools that go beyond traditional development programmes. This article provides evidence that the CC programmes of GEF go further than a mere focus on productive goals. We furthermore argue that this also distinguishes CCs from cash transfer programmes. Assessing if and how these CCs contribute to sustainable lifestyles is not only crucial for the further improvement of the living conditions of the residents of the informal settlements where the community currency programmes are running, but can also provide revelatory insights for similar cases. This assessment furthermore can inform policy solutions in light of Sustainable Development Goal number 11 *Sustainable Cities and Communities* and the challenges it entails; such as: lack of funds to provide basic services, a shortage of adequate housing and declining infrastructure (United Nations, 2017).

This evidence supports the potential the CC programmes of GEF hold for the sustainable development of informal settlements. The UN-Habitat (2016) notes that “improving the lives of the millions living in slum conditions today continues to be a core task for development and for ending our world’s poverty”, this was first underpinned by Target 7D of the Millennium Development Goals and repeated in Target 11.1 of SDG 11: “By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums” (United Nations, 2017). In the New Urban Agenda (UN-Habitat, 2016b), the importance of “Participatory and

‘Bottom-Up’ Practices” in all challenges linked to urbanization is stressed, profiled as “legitimate alternatives or complimentary catalysts for positive change”. These ‘Bottom-Up’ Practices can assist governments in developing more appropriate policies and addressing urban challenges through national and local development policy frameworks (Croese, Cirolia, & Graham, 2016). Among these challenges is the improvement of the living conditions in informal settlements. There is thus a clear need for grassroots innovations, such as the CCs of GEF, that have a more holistic perspective on development. This need is further underpinned by the Mexico City Declaration for Habitat III on Financing Urban Development which calls for “further research, promotion, systematization and scaling-up” of “local, complementary and thematic currencies” amongst other SSE strategies and mechanisms (United Nations, 2016).

Most traditional development programmes are developed by the Global North for the Global South. The CCs under study however involve the participants in the implementation of the programme that they will participate in. It aims at structurally helping these communities in terms of welfare services, and hence goes further than merely giving cash. These CC programmes include broader considerations than a narrow economic focus, like the SLifA includes broader considerations in the analysis of development programmes. The SLifA acknowledges that it is not because people are poor that they do not have aspirations and that everyone needs to shift to sustainable lifestyles in light of the global 21st century challenges, thus being an analysis framework that can be used for analysis of programmes in both the Global North and Global South.

Conclusion

This article evidences that the use of community currency is positively associated with helping the environment and gifting in professional goods and services (altruistic behaviour). These findings support the hypothesis that community currencies as a tool for the sustainable development of informal settlements go beyond traditional development programmes and their focus on productive outcomes. It evidences that community currencies contribute to sustainable lifestyles and the development of sustainable and thriving communities.

This research contributes to the academic literature in the following ways. Firstly, this research answers to the need of quantitative evidence of the impact of community currencies. Secondly, the quantitative evidence on community currencies and informal settlements only provided quantitative evidence on some economic and social livelihood outcomes, there has not been a quantitative study assessing the impact of these CCs from a lifestyle perspective, which is a more holistic perspective on development. Thirdly, to date this research is the first to base its analysis on the Sustainable Lifestyle Analysis (SLifA) framework. Fourthly, the evidence of this research shows how CC can go beyond the outcomes of cash transfer programmes. The evidence in this article furthermore sheds light on how these community currencies differ from cash transfer programmes and other conventional development paradigms.

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