The Welfare Impacts of Public Works in Fragile and Conflict Affected Economies: The Londö Public Works in the Central African Republic[*]

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Abstract

Workfare programs are widely used but costly means through which many developing countries provide income generating opportunities for the poor and mitigate adverse impacts from shocks, including conflict and violence. We evaluate the Londö public works program in the Central African Republic, where 75 percent of the population is estimated to live below the poverty line and about two third of the territory is controlled by armed groups. We use a quasi-experimental evaluation design that leverages the random assignment of program participation through publicly held lotteries. We find that the program led to an lasting increase of around 10 percent in post-intervention monthly earnings and a small positive impact on the number of days worked. The response to the program is highly gendered. Female beneficiaries diversify income sources and engage more often in trading whereas men intensify agricultural production. We also document an increase in asset holdings in line with the gendered impacts on economic activity as well as higher levels of happiness and satisfaction among beneficiaries. However, we do not find a strong link between program participation and variables that proxy for social cohesion and social contract outcomes.

JEL classifications: I38, J45, O38

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1 Introduction

With about a quarter of its population displaced, over half in need of assistance and a high level of casualties and destruction, the Central African Republic (CAR) is currently home to one of the World's most dramatic humanitarian crises. Since 2013, violence along ethno-religious lines has dramatically increased and led to a de facto partition of the country and institutions have been weakened to an unprecedented level. The current conflict in CAR is the result of several unresolved and overlooked structural problems, including uneven geographic distribution of public investment, limited state presence outside Bangui, the capital city, chronic poverty and high unemployment as well as weak institutions. The prime marker of this situation has been the proliferation of non-state armed groups who are in control of large portions of the population and the country's territory[1], as well as key sectors of the economy. This situation translates into political instability, decreasing socio-economic welfare, limited or no access to basic services and infrastructure, marginalization of the most rural areas, loss of investments and livelihoods and dramatic violence (World Bank, 2019). According to the United Nation Development Programme[2], CAR's human development index ranks 188 out of 189 countries in the world in 2019.

In this context, the Londö public works program (PWP) has provided temporary employment to vulnerable households through participation in a workfare scheme. Selected through large public lotteries[3], beneficiaries are offered to work for 40 days under the program at a low wage rate and receive a bicycle, with the objective to provide means of transportation to the worksites. The program has been rolled out since 2016 in various regions of the country, including areas not controlled by the government and where the conflict that had started in 2013 was recently still raging. "Londö!" in Sango means "Stand-up!" and a core objective of the intervention is to provide the most vulnerable with the mean to escape extreme poverty and rebuild social cohesion in the aftermath of the conflict. The large asset transfer and the wage rates offered under the scheme are expected to increase beneficiaries' economic opportunities beyond the duration of the intervention. Beyond this capital injection effect, beneficiaries working under the program must comply with a strict code of conduct, ruling out hostile and violent behaviors. The work requirement, beyond improving targeting and the quality of local infrastructure, aim at improving social cohesion among benefiting communities.

The first contribution of this paper concerns the growing literature on the productive impact of social protection programs in poor economies (Daidone, 2019; Stoeffler et al., 2019). The design of Londö remains original in many ways, but PWP are the second-most common social protection instrument used to offer a safety net to poor and vulnerable households in Sub-Saharan Africa[4]. These programs are often characterized by high implementation costs, which has triggered a lively

[1] According to World Bank (2019) and UNDP (2018), about 60% of the CAR territory remains controlled by armed groups, while the HDI index is 2016 was the lowest among 188 countries for which the index is available.
[2] http://hdr.undp.org/en/countries/profiles/CAF, accessed October 2019
[3] Other examples of PWP beneficiaries targeting through public lotteries in fragile and violent contexts include *Empleo en Accion* in Colombia (Alik-Lagrange et al. 2016)
[4] See WB ASPIRE data base online http://datatopics.worldbank.org/aspire/

debate on their cost-effectiveness (Murgai *et al*, 2016; Ravallion, 2019). The existing rigorous (counterfactual-based) evidence on the effectiveness of these programs remains weak (Blattman and Ralston, 2015). PWP interventions have not generated the same amount rigorous evidence relative to the empirical work that has been done on other conditional or unconditional cash transfers (World Bank, 2014). Positive welfare benefits have been documented from work programs, including in India and Argentina (Datt and Ravallion, 1994; Jalan and Ravallion, 2003; Ravallion et al., 2004). A growing empirical literature on India's employment guarantee program (MNREGA) identifies positive impacts on wages and household labor income (Imbert and Papp, 2015; Azam, 2012). Recent empirical studies have also found positive impacts of work schemes on households' consumption in rural areas of some states, with higher impact on food consumption (Deininger and Liu, 2013 and Ravi and Engler, 2015, for India's MNREGA; Al-Yriani et al.,2015 for Yemen SFD's Labour Intense Public Work). However, for Malawi's large public works program (Social Action Fund - MASAF), Beegle et al. (2017) find no evidence that the program increases beneficiaries' food security. Importantly, most of the available evidence concern contemporaneous impacts. Strikingly, considering wide pre-existing gender gaps in labor outcomes, few of these studies provide gender disaggregated welfare impact estimates and little evidence exists on the differential welfare effect of public works programs with respect to the gender of the participants. One example, by Bertrand et al. (2017), finds a stronger effect for female participants in a public works program in Côte d'Ivoire, with earning impacts 2.8 times larger than for male participants. To our knowledge we are the first to provide insights on the gendered productive impact of a cash for work beyond the duration of the intervention in an ultra-poor economy.

Second, on rationale motivating the use of PWP in fragility, conflict and violence (FCV) settings rely on the assumption that they might work as a behavioral intervention. While the potential conflict mitigation effects of PWP has motivated the implementation of various workfare programs, the empirical evidence on these impacts remains thin (Blattman and Ralston, 2015). Recent studies have highlighted the role of social safety nets on conflict prevention through mitigation of income shocks (Fetzer, 2019) and the shaping of the social contract in low-income economies (Evans et al., 2019), but very little is known about the effect of PWP workplace interactions on behaviors, social cohesion and social contract outcomes. Competing theories of change prevail in this context. For a PWP to be implemented, a sufficient level of social cohesion and safety must preexist, which might leave only limited scope for improvement. On the other hand, bringing community members from different religious or ethnic backgrounds to work together and imposing rules and code of conduct on worksites might change behaviors and help beneficiaries forgo illicit or violent activities both during the program and in the longer term. We provide novel evidence on the impact of workfare in an economy strongly affected by a violent conflict, testing whether Londö works as a behavioral intervention increasing social cohesion and shaping a better social contract among beneficiaries.

Finally, gender gaps in daily mobility are an established phenomenon in both high- and low-income countries (Uteng, 2012). These differences in travel behavior persist in many contexts, ranging from limits to mobility borne disproportionately by women and children in the slums of

Nairobi (Salon and Gulyani, 2012) to lower rates of girls biking to school than boys in the US (McDonald, 2012). Bicycles were considered an early tool of women's liberation, not only offering increased access beyond traditionally gendered spheres, but also a physical challenge to male dominance and gender norms (Hanson, 2010). Nowadays, gender norms continue to influence the use of bicycles by men and women, resulting in lower rates of bicycling among women attributed to traditional household obligations (Emond et al., 2009). The response to these differences is often lacking as well, with policies and programs frequently failing to incorporate gender issues due to a lack of contextual understanding and the difficulty of operationalizing higher-level goals (Riverson et al., 2006). This paper provides insights into rural women's mobility needs and how asset transfers in the form of bicycles may or may not help to alleviate the constraints they face.

Leveraging the random selection of program beneficiaries through lotteries, we find positive impacts of Londö on beneficiaries' productivity beyond the program intervention (an increase of around 10 percent in monthly earnings and a small impact on the number of days worked). This improvement seems to result from the diversification of income generating activities, in particular for female beneficiaries who engage more often in trading and the intensification of agricultural production among men in response to the program. We find positive impacts on households' productive assets, durable goods and livestock holdings, along with an increase in resilience. Londö also improves mobility outcomes, but only for male beneficiaries. This pattern can be explained by gender gaps in skills, norms and gender specific risks associated with riding a bicycle in the country context. These positive impacts are mirrored by higher levels of happiness and satisfaction among beneficiaries. We do not find any significant effects on outcomes that proxy for social cohesion and social contracts, a result consistent with the existence of large spillovers of the program.

The large sample size of the data used, with more than 6,000 respondents, enables us to provide insights into distributional impacts of Londö on monthly earning and assets. First, we find a sizable and significant increase in asset holdings and monthly earnings throughout the distribution for the entire sample. This pattern, however, masks distinctly different impacts for female participants. Women at the lower end of the distribution do not seem to be able to translate project participation into economic gains. Second, we identify positive impacts on monthly earnings and assets along the pre-intervention assets distribution. When focusing on the sample of women only, these impacts, again, disappear for women members of the poorest households. This evidence suggests a low impact trap for female participants from poorer households. Such households are more often female headed, with fewer members and characterized by lower level of human capital.

The paper is organized as follows. Section 2 of the paper provides details on Londö program implementation, survey sampling and data, and identification strategy. Section 3 reports on the impacts at the means as well as distributional impacts. Section 4 contains some robustness checks and Section 5 provides the concluding remarks.

2 Program Description, Survey Data and Evaluation Design

2.1 Londö Public Works in CAR

One of the features that separates Londö from other PWPs is that beneficiaries are selected through lotteries open to individuals aged 18 or above. The maximum number of applicants per lottery is capped at 1,500[5]. In all *sous-préfectures* (administrative unit, henceforth SPs), lottery procedures are meticulously followed and monitored by program staff, often under the protection of military forces given the high-risk environment. It is absolutely key to program staff that the lotteries are not only fairly held but also publicly observable and transparent in order to prevent any distrust or suspicions. This motivates our main identification assumption that treatment assignment, winning in one of the lotteries and consequently becoming eligible to participate in the program, is random.

There is no limit to the number of lottery applicants or program participants per household. In each SP, one lottery for each campaign is implemented during which 250 beneficiaries are selected. Work teams of 25 workers are formed according to the lottery ranking[6]. There are no gender quotas imposed by the program, but the project's communication strategy is designed to encourage women to apply. As of June 2019, 34 percent of all Londö beneficiaries were women.

Each program participant receives a daily wage of about US$3 for the 40-day contract period. Such low daily stipends promote self-selection towards the poorest and most vulnerable (Besley and Coate (1992, 1995)). In addition, each participant receives a bicycle, which she can keep after successful completion of the 40-day contract period (during the 40-day period, the bike formally remains the property of the project). The program's compensation package consisting of the cash stipend and the bicycle is offered as the same bundle of benefits in all project areas. It is one of the principles of this project to treat all 71 SPs of CAR in the same way, so as to distribute the project funds evenly and consistently across the entire country.

The bicycles given to participants serve two key objectives. First, they enable program participants from remote areas to reach centrally located work sites in the absence of viable and affordable public transport options[7]. Second, they represent a relatively large asset transfer. The monetary value of the bikes can serve as a buffer stock or, when used, as a time and labor-saving technology that in turn can impact beneficiaries' socio-economic activities well beyond the duration of the public works contract, through an enhanced mobility.

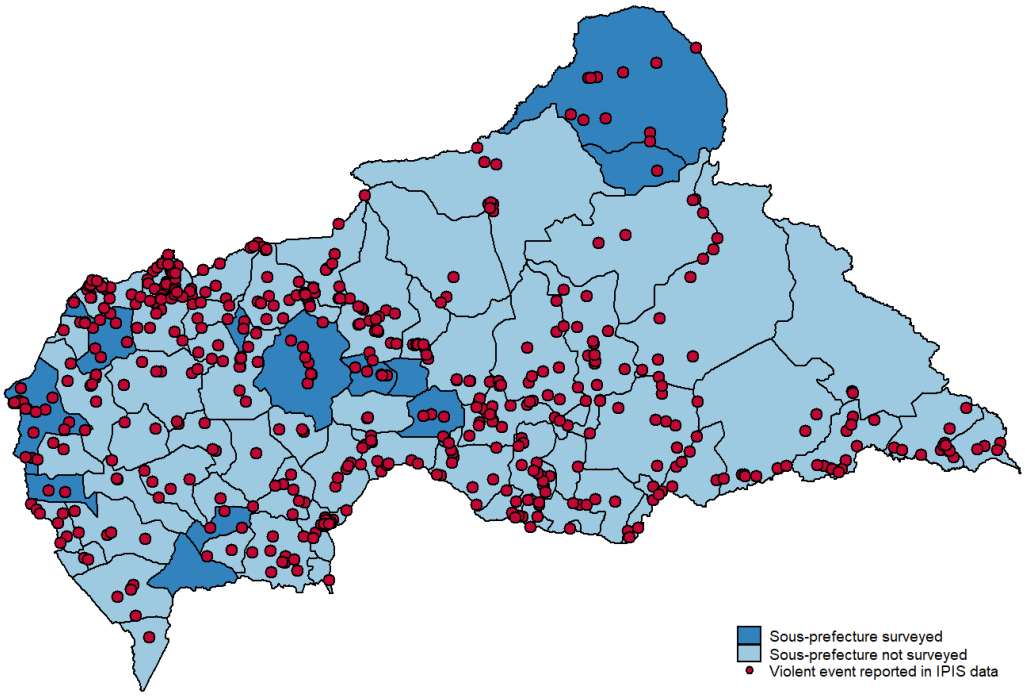
2.2 Survey Data

To build our study sample, we originally focused on 16 SPs with its 32 lotteries, among 38 SP where Londö had been implemented at the time of sampling. Those 16 SPs were selected based

[5] The number of applicants is capped based on a *first come, first served* rule.
[6] Individuals ranked x^{th} to $x^{th}+24$ are in team x. A list of 25 individuals are listed on a waiting-list and replace potential dropouts from the main list.
[7] Out of security considerations, Londö worksites are generally located in the main city of a SP.

on the following criteria (i) using risk-assessments, study SPs had to be judged to be safe enough to collect survey data,[8] (ii) Londö had been implemented within the past two years in order to increase the probability of successfully tracking and interviewing selected lottery participants, and (iii) we prioritized SPs with the highest share of female participants in order to increase the expected number of female respondents and maximize statistical power when exploring gender-specific impacts. The security situation worsened in four of the selected SPs during field work, so that we were only able to collect data in 12 of the selected SPs. Consequently, our sampling universe comprised of participant lists from 24 lotteries. Figure 1 shows the geographical spread of the sample, contrasted with International Peace Information Service (IPSIS[9]) data on fatalities and outbreaks of violence.

Figure 1: Map of the study sites and outbreaks of violence



Source: IPIS, updated on May 16th 2019.

For each of our 24 study lotteries, we base our sampling on a paper-based list of all the lottery participants. The information available on these lists is limited to five variables: (1) the SP name in which the lottery took place, (2) whether the lottery was held for the first or the second Londö campaign, (3) participants' first and last names, (4) participants' gender, and (3) the participants' rank in the lottery. We randomly sampled 6,860 respondents from about 28,000 individuals for

[8] Information from the cluster of NGOs based in Bangui and the United Nations was gathered and a detailed description of the situation in each sous-prefecture was developed.

[9] Accessed at http://ipisresearch.be/mapping/webmapping/car/v2/, for a detailed report on outbreak of violence in CAR, see IPSIS (2018).

whom this information was comprehensibly recorded on these lists, stratifying by gender and lottery outcome.

At the core of our empirical analysis is a cross-sectional data set with information collected from sample respondents well after the public works were completed in the respective local area[10]. Considering the fragile and violent context in which the data collection was carried out, the survey field teams remained only for a limited time in any given sous-prefecture, in general a maximum of two weeks. We expected a higher response rates among lottery winners, who are well identifiable by the former Londö public works supervisors and can be traced and interviewed more easily than those who did not win in the lottery. Enumerators were unaware of the treatment status of individuals in the sample in order to mitigate the consequences of enumerators potentially concentrating their efforts on individuals in the treatment group. Table 1 shows that 75 percent of the individuals in the control group were successfully surveyed, compared to a tracking rate of 85 percent among individuals in the treatment group. Considering that this population is assumed to be highly mobile, the attrition rate remains relatively low. In order to further increase the number of respondents, we also provided the survey team with a list of potential replacement respondents in case interviews with individuals from the principal sampling list could not be conducted. Overall, 11 percent of respondents were drawn from this list of potential replacement respondents and all regression models estimated in the paper control for the replacement status.

Table 1: Sample Size and Attrition

	Sampled		Surveyed	
	Principal	Replacement	Principal	Replacement
	(1)	(2)	(3)	(4)
Control	3428	1626	2548	306
Treatment	3432	1592	2913	343

Table 2 shows near full compliance with lottery outcomes. The vast majority of respondents who won in one the lotteries eventually participate in the program, while nearly none of those who were not selected through the lotteries report to have worked on Londö activities. Compliance is also high on the intensive margin, with 81 percent of the participants reporting that they have not missed even a single day of work.

[10] Considering the highly volatile context of the study, no baseline survey was collected. Following consultations with World Bank operations and actors on the ground, collecting more information at lottery registration could have raised concern among participants and increased the risk of a riot. Second, there was a significant chance to not be able to conduct a follow-up survey in a given site considering how quickly the security situation evolves in CAR. These two aspects relate to a risk management motive excluding options for baseline surveys in field experiments, as described by Muralidharan (2017). Moreover, consistently with the fact that survey field teams' authorized presence in a given area was short, the survey instrument was kept short, focusing on key program participation, socio-demographic characteristics and a reduce set of outcomes.

Table 2: Participation among Lotteries Winners, Incidence and Intensity

		Respondent won the lottery		Respondent missed one or more days of work	
		No	*Yes*	*No*	*Yes*
		(1)	(2)	(3)	(4)
Respondent participated in Londö work	*No*	3,397	73	.	.
		99.8%	2.7%	.	.
	Yes	5	2,636	2,771	631
		0.2%	97.3%	81%	19%

The Londö program rules allow several adult members of a same household to take part in the lottery, with the same chance of winning individually. Therefore, it is possible that several members of the same household participated in the program. In our survey, we asked each respondent whether another household member participated in the lottery. Out of the 6,111 individuals surveyed, 30 percent (1,851) report that at least one other household member participated in one of the lotteries. Cross-checking household rosters for these 1,851 respondents, we were able to identify 6,071 distinct households in our sample, so that 99% of the sample comes from distinct households. Consequently, it is possible that the individual lottery status and the household lottery status diverges. We contrast individual and household level lottery status in Table 3. We find that merely 5 percent of those who did not win in one of the lotteries come from a household where another member won.

Table 3: Individual and Household Level Treatment

		A member of the household won at the lottery (excluding respondent)	
		No	Yes
		(1)	(2)
Respondent won at the lottery	No	2,357	285
		39%	5%
	Yes	2,984	484
		49%	8%

2.2.1 Sample Balance by Lottery Status

From Table A0 of the appendix, we can see that the study sample is characterized by low human development indicators and high exposure to conflict related shocks. Several gender differences

emerge, including large gender gaps in literacy, educational attainment and widowhood. Women in our sample are also less likely to be the head of their respective household and more active in trading, whereas males report more often to be engaged in other non-agricultural activities, such as small manufacturing, mining or hunting.

Differential attrition rates between the treatment and the control group can create unbalances in observables between the two groups. As discussed earlier, in our case, lottery winners are well identifiable and traceable because of the additional contact information they provided at registration and together with the social ties they established with program staff aides in raising the tracking rate. In order to rule out that the differential tracking rate between Londö participants and non-participants is influenced by differences in socio-economic characteristics, we provide extensive balance checks in Table 4, comparing various individual and household level characteristics. Considering the large sample size of the survey, these t-tests are well powered and the unbalances that we detect are small. We compute effect sizes corresponding to the differences observed and we find that none of them is above the rule of thumb threshold of 0.25 recommended by Imbens and Wooldridge (2007).

Table 4: Balance between lottery winners and control group

		Lottery winner *(mean)* (1)	Control group *(mean)* (2)	Difference in means (3)	Effect size (4)
Demographics					
Age of respondent (years)		32.0	32.0	-0.02	-0.00
Respondent marital status	*Free union*	45%	45%	-0.01**	-0.01
	Married (monogamous)	16%	15%	0.01***	0.04
	Married (polygamous)	4%	5%	-0.00**	-0.01
	Single	27%	26%	0.01	0.03
	Widow	6%	7%	-0.02**	-0.06
Polygamous household		14%	15%	-0.01	-0.03
Respondent schooling	*None*	18%	18%	0.00*	0.01
	Primary school	54%	56%	-0.02**	-0.04
	Secondary schooling (1-3yr)	23%	21%	0.02	0.05
Respondent knows	*How to read, not to write*	11%	11%	-0.00	-0.01
	How to read and write	33%	30%	0.02***	0.05
Parental Background					
Father schooling	*None*	12%	12%	-0.00	-0.01
	Primary school	48%	48%	-0.00	-0.00
	Secondary schooling (1-3yr)	9%	8%	0.01**	0.05
	Doesn't know	23%	25%	-0.03**	-0.07
Mother schooling	*None*	10%	10%	0.00	0.01
	Primary school	65%	63%	0.02	0.04
	Secondary schooling (1-3yr)	3%	3%	0.00	0.01
	Doesn't know	21%	23%	-0.02**	-0.06
Father alive		39%	39%	0.01	0.01
Mother alive		56%	55%	0.01	0.02
Household status					
Housing tenure status	*Landlord*	84%	84%	-0.00	-0.00
	Tenant	6%	5%	0.00	0.01
Residence of a	*Rural area*	15%	17%	-0.02	-0.05
	Urban area	85%	83%	0.02	0.05
HH size		4.7	4.8	-0.13	-0.05
# of female HH members		2.4	2.5	-0.08	-0.05
Relationship to head	*Head*	61%	57%	0.04***	0.08
	Spouse of head	25%	29%	-0.05***	-0.10
	Son/Daughter of head	11%	9%	0.01	0.04
HH head is male[1]		82%	80%	-0.03***	-0.07
Age of the HH head[1]		35.1	35.2	-0.17	-0.02
	Observations	3,470	2,641		

Note: * p<0.1, ** p<0.05, *** p<0.01 (p-values based on robust s.e. in t-tests controlling for lotteries fixed effects and gender of the respondent). Effect size is the normalized difference, standardized using the mean and s.d. of the control group.
1 Information on the HH head was reported for only 2,621 lottery winners and 1,929 in the control group.

2.2.2 Bicycles

Our survey includes information on each and every bicycle owned by the respondent's household. This provides a sample of 3,930 bicycles with information on origin, use and individual ownership within the household.

Table 5: Percentage of respondents owning a bicycle

	Male (1)	*Female* (2)
Londö bicycles	89%	66%
Non-Londö bicycles	82%	37%

Respondents report that 90 percent of these bicycles were obtained through Londö. Nearly all (99 percent) of these Londö bicycles are found in households where at least one member won in the lotteries, which mirrors compliance with the rules governing the eligibility to participate in the public works. It is also consistent with limited post-program bicycle transfers between beneficiaries and non-beneficiaries beyond household members. 87 percent of the bicycles surveyed were in working condition at the time of the survey. There is a large gender gap in the share of bicycles personally owned by the respondent (Table 5). This gap appears more severe for non-Londö bicycles, suggesting some empowerment effect from the transfer of Londö bicycle to female participants. Importantly, women's individual use of bicycles is much less frequent than for men (Table 6).

Table 6: Frequency of Bicycle Usage

		Male (1)	Female (2)
Percentage of bicycles personally used by respondents	*Daily*	59%	18%
	Several days per week	33%	16%
	Once a week	4%	12%
	Less than once a week	1%	4%
	Never	3%	51%

2.3 Impact Estimation

For a given outcome $Y_{i,l}$ measured for individual i who entered lottery l, our main regression model will estimate the intention to treat (ITT) impact of Londö at the individual level in the following OLS model:

$$Y_{i,l} = \alpha + \beta T_i + \theta X_{i,h} + \eta_l + \varepsilon_{i,h,l}, \qquad H_0: E\left[T_i \middle| \varepsilon_{i,h,l}, X_{i,h}, \eta_l\right] = 0$$

T_i is a dummy variable that equals 1 if the individual i won at lottery l. $X_{i,h}$ is a vector of individual and household characteristics at the time of the Londö lotteries, measured through recall questions and η_l are lottery fixed effects[11]. We do not cluster standard errors since the lotteries are administered at the individual level (Abadie et al., 2017). The balance checks provided in the previous section fail to reject our main identification assumption $H_0: E\left[T_i \middle| \varepsilon_{ih,l}, X_{i,h}, \eta_l\right] = 0$. We do not need to cluster standard errors at the household level, considering that 99% of the respondents are from distinct households.

Note that balance is not the only required identification assumption. Another potential issue relates to spillovers within SP. In our specification, we assume that Robin's (1974) Stable Unit Treatment Value Assumption (SUTVA) conditions hold, in particular that respondents who lost at the lotteries were not impacted by the program implementation. While our study design does not allow to test this assumption, we provide robustness checks with respect to the exposure to the program among those who did not win the lottery.

To check for gendered patterns in the impacts, we also estimate a version of the econometric specification above in which treatment is interacted with a dummy $female_i$ that equals 1 if respondent i is a woman and 0 otherwise. Aside from the inclusion of the interaction term, the estimation model remains unchanged. Hence, our above specification becomes:

$$Y_{i,l} = \alpha + \beta T_i + \gamma female_i + \delta T_i * female_i + \theta X_{i,h} + \eta_l + \varepsilon_{i,h,l}$$

Here, the coefficient of interest is δ as it provides us with a direct measure of whether and by how much the impact of the program differs for female beneficiaries. γ estimates the gender gap in outcome $Y_{i,l}$.

[11] Note that lotteries fixed effects capture both time and location fixed effect. Our estimates are thus robust to covariation with SP and overtime.

3 Results

In this section, we discuss results from our main regression specification followed by a brief discussion of impacts at different points of the wealth and earnings distribution. For most of the outcomes, we discuss the impacts on male and female respondents separately. Then, we conclude by providing several robustness checks.

3.1 Impacts at the Mean

We thematically group outcomes of interest and the structure of our discussion of the main results does not follow an explicit or implicit ranking of outcomes or theory of change. All tables in this section are structured similarly. For each variable we show the pure program impact estimated using our main specification as well as the results from the interacted model that helps us shed light on gendered impact patterns.

3.1.1 Impact on Employment, Labor Supply and Earnings

By design, participation in Londö provides beneficiaries with short-term earnings from employment in the public works. A central question, however, is whether the program can jumpstart economic activities and whether there are any lasting effects on employment that go beyond the immediate labor contributions required by program participation. As shown in Table 7, we only detect a small and marginally significant increase in the likelihood of having worked for pay in the past week for men only. However, if anything, this result assures us that our analysis is not picking up the direct impact from participation in the public works. Recall that in all SPs the survey was collected more than 30 days after the end of the intervention. In addition, it is crucial to remember that the local SP economies are likely to be relatively weak and the demand for labor may fall well short of the supply of jobs or employment opportunities. Instead, self-employment and in particular agricultural work, is much more likely the margin on which people can act and leverage the cash income they received from Londö for productive activities. And indeed, we do find support for this in the data. From Table 7, we see that beneficiaries increase the number of days worked in the past 30 days by about half a day. This impact is similar for men and women. Considering the high number of days worked by respondents (more than 5 days/week), this increase, however, can be considered as small relative to the mean (an increase of less than 3 percent for the whole sample). Finally, we see an increase in earnings, where both male and female lottery winners report higher monthly earnings of roughly 10 percent.

Table 7: Project Impacts on Economic Activities

	Any paid labor past 7 days by respondent (yes=1)		Total number of days worked by respondent primary and secondary activities (past 30 days)		Total respondent individual earnings (Francs CFA) from primary and secondary activities (past 30 days, in-kind and cash) *Conditional on earnings>0*	
	(1)	(2)	(3)	(4)	(5)	(6)
Respondent won lottery *(yes=1)*	0.01	0.03*	0.56**	0.59*	3,388***	4,061**
	(0.01)	(0.02)	(0.28)	(0.35)	(1,087)	(1,668)
Respondent is female *(yes=1)*		-0.19***		1.60***		-6,732***
		(0.02)		(0.47)		(1,679)
Respondent won & is female		-0.04		-0.05		-1,419
		(0.02)		(0.52)		(2,102)
Implied ITT (female)		-0.01		0.53		2,642***
		(0.02)		(0.41)		(1,316)
Observations		6109		6108		6109
Adjusted R sq.		0.17		0.05		0.13
Control means:						
Whole		0.32		22.2		36,313
Male		0.45		22.3		44,857
Female		0.20		22		27,968

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. The implied ITT (female) is the linear combination of the coefficients on won and female and won. All variables measured in Francs CFA are top 1% winsorized.

Taken together, these impacts show that participation in the public works increased productive activities well beyond the time span of the program in the respective SP. Considering the limited increase in number of days worked and the relatively large increase in earnings, these results are likely to reflect a positive impact on individuals' productivity. There are two main channels through which respondents can increase their productivity in this context. The first option is to intensify current income generating activities, which for our sample corresponds to mostly agricultural production. The second option is to diversify towards other, potentially more profitable, economic activities such as trading, small manufacturing and other non-agricultural activities. We explore these channels below.

Table 8 indicates that there is a marginally significant change in the primary economic activity. Lottery winners report less often that their primary activity is agriculture which includes livestock. Nevertheless, agriculture remains the primary economic activity for those who won in the lottery as well as for those who did not and for both men and women. Lottery winners, however, appear to be more likely to engage in a secondary activity in response to program participation. There also appears to be a change in the type of activity they pursue and thus, overall, diversify away from agriculture. Lottery winners report more often trade as being their primary or secondary activity. This result is driven by female respondents. Lottery winners also report more non-agricultural and non-trade activities such as craftwork, fishing/hunting, forest exploitation, industry, mining, public administration, repair work, transport and other work. The latter impact being driven by male respondents.

These results suggest significant positive impacts of the program on individuals' productivity through diversification towards non-agricultural activities. This diversification appears to be gendered, with female beneficiaries switching to trading and men to other non-agricultural activities such as small manufacturing.

Table 8: Project Impacts on the Diversity of Economic Activity

	Primary activity is Ag. (including livestock) *(yes=1)*		Has no secondary activity *(no activity=1)*		Primary or secondary activity is Trade *(yes=1)*		Primary or secondary activity is not Ag. or trade	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Respondent won lottery *(yes=1)*	-0.02*	-0.01	-0.05***	-0.06***	0.04***	0.02*	0.02*	0.04**
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Respondent is female *(yes=1)*		-0.04*		-0.00		0.26***		-0.20***
		(0.02)		(0.02)		(0.02)		(0.01)
Respondent won & is female		-0.01		0.01		0.05***		-0.04**
		(0.02)		(0.02)		(0.02)		(0.02)
Implied ITT (female)	-0.03***		-0.05***		0.07***		0.00	
	(0.02)		(0.01)		(0.02)		(0.01)	
Observations	6,109		6,109		6,109		6,109	
Adjusted R sq.	0.12		0.03		0.14		0.17	
Control means:								
Whole	0.71		0.83		0.16		0.15	
Male	0.71		0.81		0.06		0.28	
Female	0.72		0.86		0.25		0.03	

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. Non-Agricultural (non-Trade) activities include craftwork, fishing/hunting, forest exploitation, industry, mining, public administration, repair work, transport, and other work. The implied ITT (female) is the linear combination of the coefficients on *won* and *female and won*.

3.1.2 Impact on Assets

The impact identified on productivity and diversification of economic activities away from agriculture do not rule out intensification of household farming which, after all, remains our respondents' dominant source of livelihood. Such intensification can be achieved through different means that typically, however, involve to some extent investment in productive assets such as agricultural technologies, tools or inputs. Despite the extreme level of poverty in the target population, the increase in earnings from both participation in Londö as well as the higher earnings from more diversified economic activities that beneficiaries report may also enable respondents to invest in basic durable goods. We test this hypothesis below.

Overall, lottery winners report higher levels of durable goods, as measured along the first axis of a principal component analysis prediction for all durable goods reported in the survey. This impact is similar for male and female beneficiaries, but not significant for women when bicycles are excluded from the index, which might be explained by a lower bicycles retention rate among female participants. Table 9 of the appendix show results for each component of the durable goods index. Primarily beneficiaries appear to have bought basic household equipment such as furniture, mattresses or irons. Male lottery winners also acquired cell phones which can, not only in this

context, function as an indirect or direct enabler for economic activities such as offering money transferring services. Turning to the productive assets index, we find a significant positive impact driven entirely by male beneficiaries. As shown in the appendix Table 10, the components of this index comprise of mostly productive assets used in agriculture such as oxen, hoes, machetes and plots for cultivation. This gendered impact is consistent with the result on earnings discussed previously and male beneficiaries seem to invest in agriculture and thus increase returns to their primary activity. Finally, we also see that both men and women increase their livestock holdings measured by a tropical livestock unit (LTU) index. This can represent both an investment, e.g. in draft animals or in livestock held for the production of animal products, as well as a form of saving. We return to savings in the next section.

3.1.3 Impact on Expenditures and Resilience

The impacts on assets, documented above, in particular the more liquid ones such as livestock and savings, might lead to an improvement of the beneficiaries' household resilience. Table 11 mirrors these findings. Even though, participants do not report that food security increased directly as a result of program participation, other measures for resilience such as savings and the ability to rely on the social network in times of need improve. We also see an increase in non-food expenditures, mostly driven by men. Food expenditures, however, is only marginally impacted, which is in line with the null result on food security. Asking respondents whether they could gather a large sum (15,500 CFA) in the event of an emergency, we find a strong positive impact. Consistently, winners at the lottery report to have contracted debt for schooling, health services or food significantly less often than the control group. Not only did Londö increases productivity and household wealth appear, but it also impacted households' resilience positively.

Table 10: Project Impacts on Assets

	Durable goods Index (including bicycles)		Durable goods Index (excluding bicycles)		Productive assets Index (Ag. activities)		Tropical Livestock Unit		Total savings In Francs CFA	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Respondent won lottery *(yes=1)*	0.30***	0.36***	0.15***	0.19***	0.13***	0.25***	0.06***	0.05**	4,412***	4,521***
	(0.04)	(0.06)	(0.04)	(0.06)	(0.03)	(0.04)	(0.01)	(0.02)	(1,044)	(1,666)
Respondent is female *(yes=1)*		-0.77***		-0.76***		-0.49***		-0.14***		-2,843*
		(0.08)		(0.08)		(0.05)		(0.02)		(1,567)
Respondent won & is female		-0.12		-0.09		-0.25***		0.03		-228
		(0.08)		(0.08)		(0.06)		(0.02)		(2,035)
Implied ITT (female)	0.24***		0.10***		0.00		0.08***		4,293***	
	(0.05)		(0.05)		(0.04)		(0.02)		(1,182)	
Observations	6109		6109		6109		6109		6091	
Adjusted R sq.	0.29		0.28		0.22		0.10		0.15	
Control means:										
Whole	-0.39		-0.22		-0.14		0.2		17,696	
Male	-0.14		0.04		-0.04		0.26		21,852	
Female	-0.65		-0.47		-0.23		0.15		13,568	

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. The implied ITT (female) is the linear combination of the coefficients on *won* and *female and won* Indices are predictions constructed from the scores of a principal component analysis, standardized by mean and standard deviation of the control group. Tropical Livestock Unit: livestock numbers converted to a common unit using weighting factors: cattle = 0.7, sheep = 0.1, goats = 0.1, pigs = 0.2, chicken = 0.01 (Harvest Choice, 2015). The Livestock Tropical Units and savings are top 1% winsorized.

Table 11: Project Impacts on Expenditures and Resilience

	In the past 7 days, 1 or more HH members skipped 1 or more meal. *(yes=1)*		Food expenditures In CFA		Non-food expenditures In CFA		Could you gather 15,500 CFA in the event of an emergency?		Household has contracted debt in past 6 months to buy food, consumption good, schooling or health services *(yes=1)*	
	(1)	(2)	(3)	(4)	(5)	(6)	(9)	(10)	(11)	(12)
Respondent won lottery *(yes=1)*	-0.01	-0.00	730*	1,191**	738**	1,608***	0.17***	0.17***	-0.02**	-0.03**
	(0.01)	(0.02)	(427)	(604)	(313)	(459)	(0.03)	(0.03)	(0.01)	(0.01)
Respondent is female *(yes=1)*		-0.03		-2,782***		-2,121***		-0.18***		0.00
		(0.02)		(699)		(527)		(0.05)		(0.02)
Respondent won & is female		-0.01		-972		-1,835***		0.00		0.01
		(0.02)		(806)		(585)		(0.05)		(0.02)
Implied ITT (female)	-0.01		218		-227		0.17***		-0.02	
	(0.02)		(567)		(391)		(0.04)		(0.01)	
Observations	6109		6109		6109		6109		6109	
Adjusted R sq.	0.11		0.24		0.19		0.06		0.03	
Control means:										
Whole	0.31		19,317		10,404		-0.11		0.15	
Male	0.33		20,438		11,714		0.03		0.16	
Female	0.28		18,203		9,103		-0.24		0.14	

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. The implied ITT (female) is the linear combination of the coefficients on *won* and *female and won*. Variables that are measured in CFA are top 1% winsorized.

3.1.4 Impact on Mobility

Overall, we find important markers for increased mobility among the treatment group. Lottery winners are more likely to work outside their home and increase the frequency in which they travel away from home and the number of places they visit (Table 12). Importantly, these effects are driven by male respondents only. These impacts can be seen as potential knock-on effects of the increased economic activity that we have seen before or as a result of the bicycle transfer that was part of the project. In fact, commuting times decrease for lottery winners which suggests that the bicycles may offer a faster mode of transport.

Table 12: Project Impacts on Respondents' Mobility

	Work outside home *(yes=1)*		Commuting time *(minutes)*		Has left home at least once in the past 2 days *(yes=1)*		Number of places visited in the past 2 days	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Respondent won lottery *(yes=1)*	0.01*	0.01	-1.7*	-3.6***	0.03**	0.05***	0.10***	0.16***
	(0.01)	(0.01)	(1.0)	(1.3)	(0.01)	(0.02)	(0.03)	(0.04)
Respondent is female *(yes=1)*		-0.04***		2.2		0.02		-0.04
		(0.01)		(1.8)		(0.02)		(0.05)
Respondent won & is female		-0.00		4.11**		-0.06**		-0.13**
		(0.02)		(2.0)		(0.02)		(0.06)
Implied ITT (female)		0.01		0.5		0.00		0.03
		(0.01)		(1.6)		(0.02)		(0.04)
Observations		6109		5515		6109		6109
Adjusted R sq.		0.10		0.05		0.08		0.09
Control means:								
Whole		0.89		60		0.63		1.16
Male		0.91		59		0.62		1.18
Female		0.86		61		0.65		1.15

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. ITT (female) is the linear combination of the coefficients on *won* and *female and won*. Regressions for outcomes about the past 2 days have control for the day of the week when the survey was administered. The regression on commuting time is for the subsample of respondents working outside home.

Table 13 supports the hypothesis that availability of the Londö bikes has changed the pattern in which people commute to their workplace, particularly among male project participants who substitute cycling to work for walking. Female winners however walk to work as much as those who lost at the lotteries.

Table 13: Use of Different Transportation Modes, by Treatment Status

		Male		Female	
		T=0	*T=1*	*T=0*	*T=1*
		(1)	(2)	(3)	(4)
Mode of transportation mostly used to go to work:	*Walking*	90%	75%	98%	97%
	Bicycle	5%	21%	0%	1%
	Moto	3%	3%	1%	1%
	Horse/Donkey	1%	1%	1%	1%

The ability to ride a bicycle is clearly a key requirement to make effective use of the asset and from Table 14 we can see that this may constitute a considerable constraint for women. Merely 25 percent of the female respondents in the control group know how to ride a bike which is far less than the 89 percent of men. However, both men and women seem to be willing and able to acquire the skill to ride a bike given the asset transfer, based on the positive and significant effect document in the regressions shown in Table 13. Interestingly, the ITT estimate for female are significantly higher than for male, suggesting that the program contributes to closing the gender gaps in ability to cycle.

Table 14: Project Participation and Respondents' Ability to Cycle

	Able to ride a bicycle *(yes=1)*	
	(1)	(2)
Respondent won lottery *(yes=1)*	0.08***	0.06***
	(0.01)	(0.01)
Respondent is female *(yes=1)*		-0.61***
		(0.02)
Respondent won & is female		0.03*
		(0.02)
Implied ITT (female)	0.10***	
	(0.02)	
Observations	6109	
Adjusted R sq.	0.47	
Control means:		
Whole	0.57	
Male	0.89	
Female	0.25	

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. The implied ITT (female) is the linear combination of the coefficients on *won* and *female and won*.

While the majority of our respondents consider it to be appropriate for women to ride a bicycle, men agree far less with both statements on the appropriateness of cycling for women, as can be seen from Table 15. Agreement rates go markedly down when adding to the statement *"…without asking permission of her husband"*. Hence, gender norms on mobility and within household power dynamics seem to play an important role and need to be considered to allow all program participants to fully materialize the project benefits.

Table 15: Gender Norms about Cycling

	It is appropriate for a woman to ride a bicycle.		It is appropriate for a woman to ride a bicycle, without asking permission of her husband.	
	Male (1)	*Female* (2)	*Male* (3)	*Female* (4)
Fully agree	50%	67%	41%	31%
Agree	26%	24%	20%	17%
Neither	3%	2%	2%	4%
Does not agree	10%	4%	17%	33%
Does not agree at all	12%	3%	20%	14%

One aspect of the challenge to overcome norms is that men and women differently assess the gender specific risks associated with cycling as documented in Table 16. The risks mentioned by respondents reflect the skills gaps and constraining norms described before.

Table 16: Gender Specific Risks Associated with Cycling

		Percentage of respondents that believe it is a risk for women	
		Male (1)	Female (2)
Specific risks for a woman riding a bicycle	*Accident*	66%	74%
	Theft	23%	24%
	Virginity loss	15%	8%
	Bad reputation	15%	10%
	Exposure to violence within household	8%	3%
	Exposure to violence outside household	2%	2%
	No specific risk	34%	27%

3.1.5 Impact on Happiness, Satisfaction and Perceived Personal Safety

Table 17 shows that the positive results on increased economic activity, asset holdings, expenditures and resilience also translate into improvements in perceived welfare. Both our happiness as well as our satisfaction index increases for lottery winners. However, measures for the personal safety of respondents are not affected by program participation.

Table 17: Project Impacts on Happiness, Satisfaction and Personal Safety

	Happiness *(z-scored scale)*		Satisfaction with security situation in community *(z-scored scale)*		Security situation in community evolution pre/post Londö *(z-scored scale)*		Safe outside during the day *(yes=1)*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Respondent won lottery *(yes=1)*	0.14***	0.17***	0.08***	0.08***	-0.01	0.00	0.00	0.01
	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.01)	(0.01)
Respondent is female *(yes=1)*		-0.16***		-0.07*		0.09**		0.06***
		(0.04)		(0.04)		(0.04)		(0.01)
Respondent won & is female		-0.06		-0.02		-0.04		-0.02
		(0.05)		(0.04)		(0.05)		(0.02)
Implied ITT (female)	0.11***		0.07***		-0.04		-0.01	
	(0.04)		(0.03)		(0.04)		(0.01)	
Observations	6109		6068		6040		6058	
Adjusted R sq.	0.22		0.30		0.20		0.11	
Control means:								
Whole	-0.10		-0.07		0.00		0.88	
Male	0.03		0.00		-0.01		0.86	
Female	-0.23		-0.15		0.01		0.91	

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. The implied ITT (female) is the linear combination of the coefficients on *won* and *female and won*. The happiness and satisfaction with security scales are z-scored.

3.1.6 Impact on Social Cohesion and Social Contract Outcomes

One key objective that the Londö project is aiming at is to increase social cohesion. The fact that project was implemented by itself as well as the beneficiaries jointly working together, was thought to foster a sense of community, unity and belonging. Using several proxies for social cohesion, our results in Table 18 do not provide support for the success in reaching this goal. Exploring impact on components of the indices, we find a marginal improvement on some dimensions for male respondents only (Table A6). However, it is important to recognize that, to the extent that the project implementation by itself has an effect, community wide spillover effects may fully eradicate any treatment effects that we attempt measure at the individual level. Given the setup of our research and survey design, we cannot test this hypothesis.

Table 18: Project Impacts on Social Cohesion

	Social cohesion Index (between religious groups)		Social cohesion Index (between ethnic groups)		Trust in governmental institutions Index		Interactions with governmental institutions Index		Recognition of state authority Index	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Respondent won lottery *(yes=1)*	0.08	0.11	0.04	0.06	0.04	-0.01	0.02	0.10	-0.04	0.01
	(0.05)	(0.07)	(0.05)	(0.07)	(0.06)	(0.08)	(0.05)	(0.07)	(0.06)	(0.08)
Respondent is female *(yes=1)*		0.06		0.03		0.05		-1.19***		-0.05
		(0.09)		(0.09)		(0.09)		(0.07)		(0.09)
Respondent won & is female		-0.06		-0.04		0.11		-0.17**		-0.11
		(0.10)		(0.10)		(0.11)		(0.08)		(0.11)
Implied ITT (female)		0.05		0.02		0.10		-0.07		-0.10
		(0.07)		(0.07)		(0.08)		(0.04)		(0.08)
Observations		6005		6024		5888		6045		5888
Adjusted R sq.		0.1		0.02		0.13		0.26		0.13
Control means:										
Whole		-0.12		-0.02		-0.09		-0.22		0.09
Male		-0.11		0.00		-0.01		0.56		0.01
Female		-0.13		-0.03		-0.17		-0.99		0.17

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. The implied ITT (female) is the linear combination of the coefficients on *won* and *female and won*. Indices are predictions constructed from the scores of a principal component analysis, standardized by mean and standard deviation of the control group.

3.2 Distributional Impacts

While most Londö lottery participants can be considered as poor by most standards, there is substantive variation in households' economic status. The impacts at the mean observed in the previous section might cover important distributional effects. Therefore, we disaggregate the impact estimates along the welfare distribution, measured by income of wealth levels and identify whether some segment of the population of applicants show lower impacts than others. In this section we report (i) impacts *on* the welfare distribution and (ii) impacts on welfare *at* different points of the welfare distribution.

3.2.1 Impact on the Welfare Distribution

Figure 2 shows the empirical cumulative distribution functions of two welfare measures, monthly earnings and a wealth index, for Londö participants and those who didn't win in the program lotteries respectively. We observe a shift of the whole distribution, the welfare distribution of those who weren't drawn through the lotteries is first order dominated by the winners', a pattern less marked for bottom and top quantiles. Disaggregating the distributions by gender, it appears that the positive shift is concentrated in the top two deciles for women. For men, the impact on the distribution seems to occur for almost the entire distribution.

To investigate these patterns further, we estimate the following quantile regression model:

$$Q_q\left(Y_{i(,h)}\right) = \alpha + \beta_q T_{i(,h)} + \gamma G_i + \eta_l + \varepsilon_{i,h,l}, E\left[\varepsilon_{i,h,l} \middle| T_{i(,h)}, \eta_l\right] = 0$$

where $Q_q\left(Y_{i(,h)}\right)$ is the q^{th} quantile of the welfare distribution. Note that our identifying assumption require balance in the welfare distribution in the absence of the intervention. We test this identification assumption using a wealth index based on a recall on household assets holding at the time of the lottery. While we cannot provide a similar test for the earnings distribution, we do find balanced distributions for the recall wealth index between lottery winners and those who did not win (see the empirical cumulative distribution function in appendix A1).

We estimate this model for a series of quantiles, from the 10^{th} to the 90^{th} quantiles for the wealth index, and from the 30^{th} to the 90^{th} for monthly earnings (20 percent of the sample reporting no earnings at all). We report these estimates for the whole sample and for men and women separately in Figure 3. The wealth index impacts can be observed across the entire wealth distribution for men, while this is only true for the upper part of the distribution for women. The impacts on monthly earnings quantiles are less precisely estimated but reveal a zero impact for the bottom two deciles of the distribution, which seems mostly driven by women in our sample.

Figure 2: Program impact on wealth index distribution and monthly earnings distribution

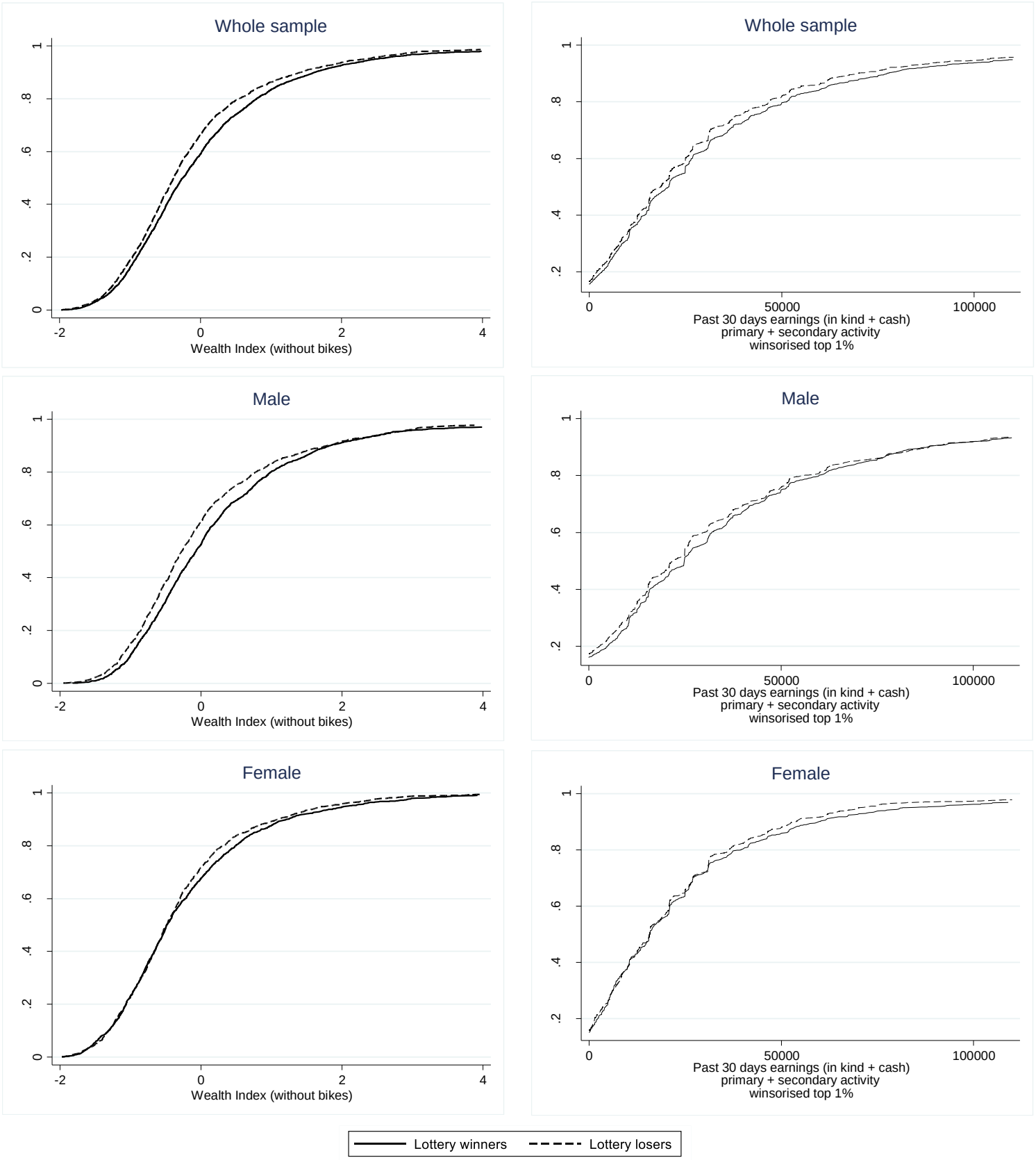
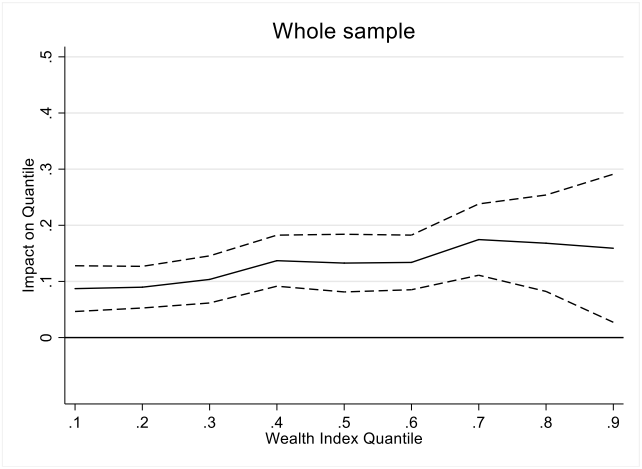
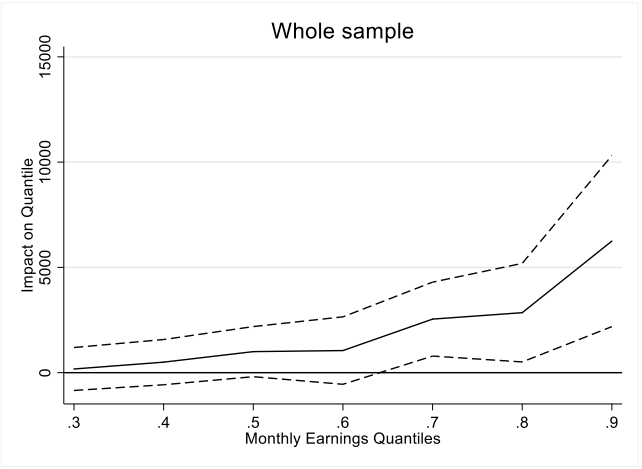
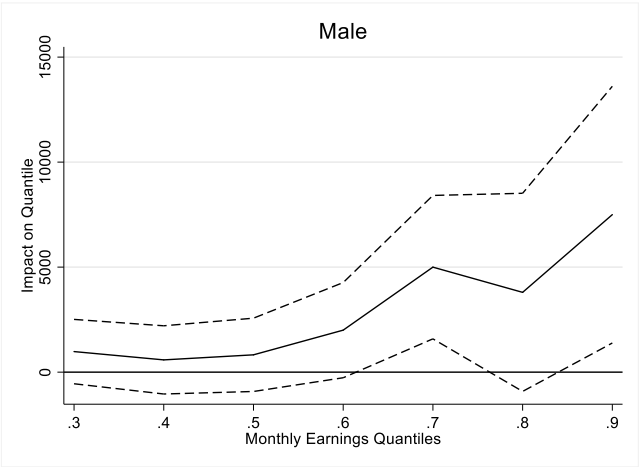
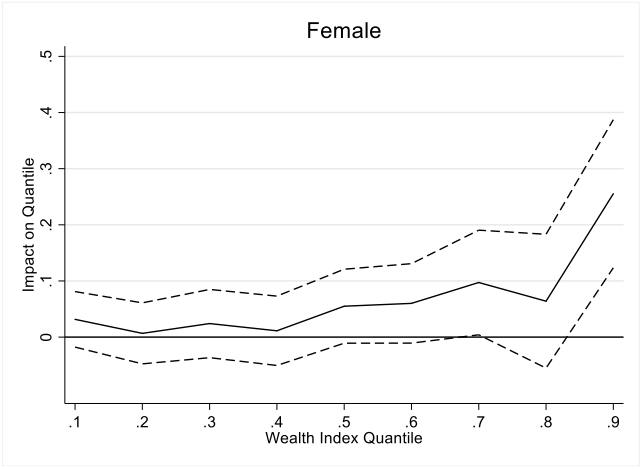


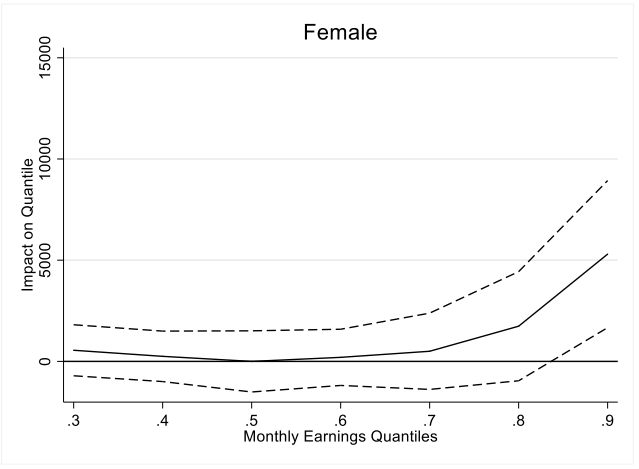
Figure 3: Program impact on quantiles, wealth index and monthly earnings











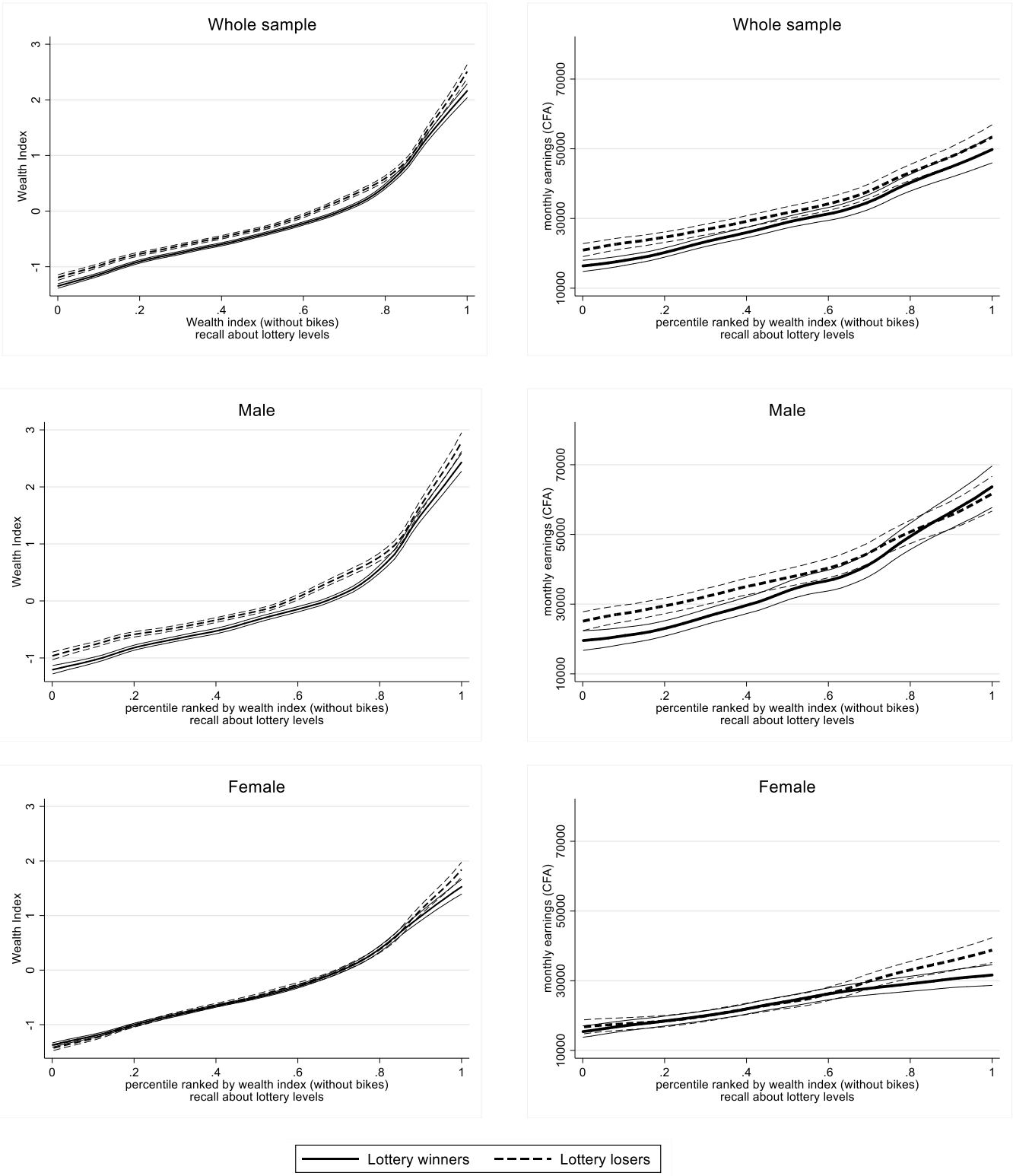
Note: Conditional quantile estimates, controlling for gender and lottery fixed effects. Monthly earnings include cash and in-kind earnings from primary and secondary activities and have the top 1% winsorized. The dashed lines are 95% C.I. bounds. The wealth index from a principal component analysis excluding bicycles, standardized by mean and standard deviation of the control group.

3.2.2 Impact at Different Points of the Welfare Distribution

The impacts observed on the distributions are consistent with lower impacts among beneficiaries from poorer households, but it does no need to be the case and the change in distribution might also come from an uneven re-ordering of individuals along the welfare distribution. We test this hypothesis estimating the impact of the Londö on earnings at different quantiles of the recall on wealth index distribution.

We assess the impact along the recall distribution of our welfare measures by fitting a non-parametric function of quantile q_i along the recall on wealth index distribution. Figure 4 shows the resulting fits. For the wealth index, we observe a consistent impact along the recall wealth index distribution. This is also the case for the subsample of male respondents but differs again for women from the lowest half of the pre-program decile. For monthly earnings, we find mixed evidence with positive impacts for the lowest and highest deciles of the female distribution and a negative impact for the top decile of the male distribution.

Figure 4: Program Impact at Quintiles of the Recall on Wealth Index



Note: Non-parametric local polynomial smoothing estimate. Thin lines are 90% C.I. The Wealth Index is a prediction constructed from scores from a principal component analysis excluding bicycles, standardized by mean and standard deviation of the control group.

3.3 Cost-Benefit Analysis

Between 2 and 21 months after participation in Londö, male beneficiaries earn on average an additional 4,061Francs CFA[12] /month and female beneficiaries earn on average an additional 2,642 Francs CFA[13] /month. We contrast these increased earnings with the average per beneficiary costs reported in Table 9.

Table 9: Average Project Itemized Costs (in CFA Francs per beneficiary)

Cash (stipend) transferred to beneficiaries	60,000
Bicycle transferred to beneficiaries	68,000
Transport of the bicycle to the districts	5,000
Tools	25,000
Team leaders' remuneration	19,200
Total per beneficiary	177,200

Assuming a lasting impact on monthly earnings, we can calculate different cost and return ratios of Londö. At 72 percent, the ratio of transfers to total costs is in the upper range of existing public works interventions. Based on this, the annualized returns are sizeable and the program breaks even at the beneficiary level at around four years for men and six years for women. It is important to keep in mind, however, that the costs listed in Table 9 exclude indirect management costs. On the benefit side, it is worth pointing out that the income effects are not the only impacts that we observe which we do not consider here.

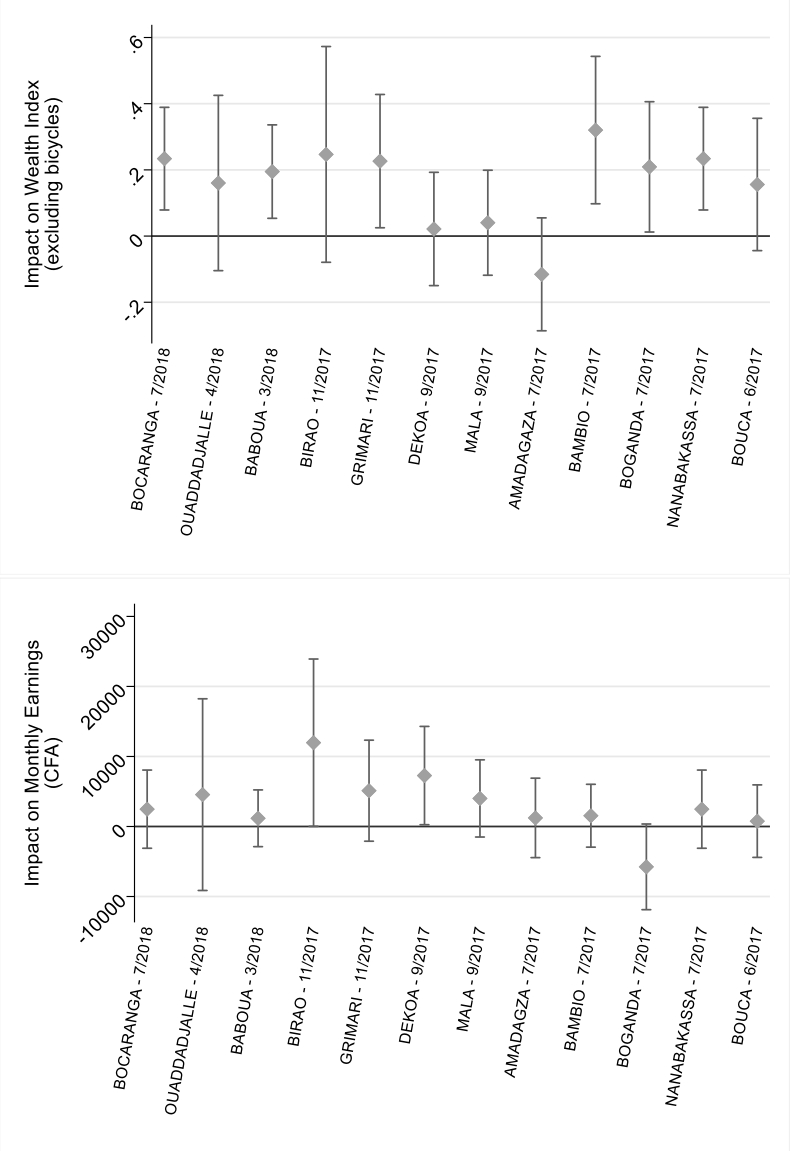
[12] circa 2018 PPP USD$12.5
[13] circa 2018 PPP USD$8.2

4 Robustness checks

4.1 Impact Decay

The twelve SPs surveyed received Londö at different point in time, from 2 months to 21 months before the survey data collection. The roll-out of Londö intervention was not randomized and, as a consequence, it is difficult to compare impacts across SPs. Nevertheless, it is of interest to test whether the impacts identified on earnings and wealth is observed only among SPs where Londö was implemented shortly before the survey was conducted in the same location. We show in Figure 5 ITT estimates for each SP, ranked along the horizontal axis by the date of the Londö lottery. We do not find strong evidence of an impact decay.

Figure 5: Welfare Impacts by SP Ranked by Lottery Date



4.2 ANCOVA Specification using Recall Values

Recall data on outcomes at the time of the lotteries was collected during the survey. We show in Table 19 balance between lotteries winners and those who didn't win (controls) on this set of outcomes. While corresponding effect sizes remain small, some unbalances emerge on livestock, non-agricultural economic activities other than trade, and having a secondary activity. Respondents were also asked about bicycles ownership, to test for potential bias in recall. Strikingly more lottery winners reported owning a bicycle at the time of the lottery which, in this context[14], suggests that the recall was biased upwards. While we acknowledge this potential bias in recall, we provide as a robustness check ANCOVA impacts estimates for the outcomes on which recall information was collected. We show in Table 20 and Table 21 that the results presented in our main analysis hold. Some coefficients are estimated with higher precision, as one can expect in the presence of autocorrelation.

Table 19: Balance between Londö Winners and Control group of respondent's recall values

	Winner *(mean)*	Control *(mean)*	Difference in means	Effect size
Asset Indices				
DG Index (excluding bikes)	0.00	0.02	-0.01	-0.01
DG Index (including bikes)	0.00	-0.04	0.03	0.02
Productive Assets Index	0.00	0.01	-0.01	0.00
Livestock Tropical Index	0.21	0.19	0.02*	0.04
Economic Activities				
Primary or secondary activity was trade	0.15	0.14	0.01	0.04
Primary or secondary activity was non-ag, non-trade	0.19	0.14	0.05***	0.14
Primary activity was agriculture	0.07	0.06	0.02	0.06
Had no secondary activity/student	0.79	0.83	-0.04***	-0.11
Bicycles				
Knew how to ride a bike	0.68	0.55	0.13***	0.27
Owned a bike	0.23	0.10	0.13***	0.31
Observations	3,470	2,641		

Note: *p<0.1, ** p<0.05, *** p<0.01 (p-values based on robust standard errors in t-tests controlling for lottery fixed effects and gender of the respondent). Effect size is the normalized difference, standardized using the control group's mean and standard deviation. Indices are predictions constructed from the scores of a principal component analysis, standardized by mean and standard deviation of the control group.

[14] Recall that 90 percent of all bicycles owned by respondents were given to Londö participants as part of the program's remuneration package.

Table 20: Impact on Economic Activities Controlling for Recall Values

	Primary activity is Ag. (including livestock) *(yes=1)*		Has no secondary activity *(no activity=1)*		Primary or secondary activity is trade *(yes=1)*		Primary or secondary activity is Non-Ag. (non Trade)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Respondent won lottery *(yes=1)*	-0.01	-0.01	-0.03***	-0.02**	0.02***	0.01	-0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Respondent is female *(yes=1)*		-0.05***		0.03**		0.09***		-0.03***
		(0.02)		(0.01)		(0.02)		(0.01)
Respondent won & is female		0.00		-0.01		0.03**		0.00
		(0.02)		(0.02)		(0.01)		(0.01)
Implied ITT (female)	-0.01		-0.03***		0.04***		0.00	
	(0.01)		(0.01)		(0.01)		(0.00)	
Observations	6,109		6,109		6,109		6,109	
Adjusted R sq.	0.62		0.46		0.56		0.71	
Control means:								
Whole	0.71		0.83		0.16		0.15	
Male	0.71		0.81		0.06		0.28	
Female	0.72		0.86		0.25		0.03	
Recall	0.74		0.83		0.14		0.14	

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. Non-Agricultural (non-Trade) activities include craftwork, fishing/hunting, forest exploitation, industry, mining, public administration, repair work, transport, and other work. The implied ITT (female) is the linear combination of the coefficients on won and female and won.

Table 21: Impact on Asset Indices Controlling for Recall Values

	Durable goods Index (including bicycles)		Durable goods Index (excluding bicycles)		Productive assets Index (Ag. Activities)		Livestock Tropical Unit *(Winsorized top 1%)*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Respondent won lottery *(yes=1)*	0.28***	0.34***	0.17***	0.20***	0.11***	0.15***	0.05***	0.03**
	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.01)	(0.02)
Respondent is female *(yes=1)*		-0.29***		-0.27***		-0.24***		-0.08***
		(0.04)		(0.04)		(0.03)		(0.02)
Respondent won & is female		-0.12***		-0.05		-0.07**		0.04*
		(0.04)		(0.04)		(0.03)		(0.02)
Implied ITT (female)	0.22***		0.15***		0.08***		0.07***	
	(0.03)		(0.03)		(0.02)		(0.01)	
Observations	6,109		6,109		6,109		6,109	
Adjusted R sq.	0.81		0.81		0.73		0.39	
Control means:								
Whole	-0.39		-0.21		-0.14		0.20	
Male	-0.14		0.04		-0.04		0.26	
Female	-0.65		-0.47		-0.23		0.14	
Recall	-0.04		0.02		0.01		0.19	

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. The implied ITT (female) is the linear combination of the coefficients on *won* and *female and won*. Indices are predictions constructed from the scores of a principal component analysis, standardized by mean and standard deviation of the control group.

4.3 Exploring spillovers

Our design does not allow the identification of spillovers. As discussed in section 2.3., this is an important limitation. If individuals who lost at the lottery indirectly benefit - or suffer from – Londö benefits offered to participants, the impact estimates presented in this paper could be considered as lower – or upper – bound of the real impact of Londö. While we cannot rule out these potential biases, we explore in this section spillovers between and within households of respondents.

4.3.1 Transfer of Londö benefits between households

One obvious channel through which Londö might impact indirectly the control group is through transfer of cash or bicycles from the winners. We know from the bicycle rosters that 99% percent of all the Londö bicycles reported in our sample are found in households where at least one member won in the lotteries. This is a sign that only limited transfers of bicycles occur from winning households to the control groups. The survey also includes for each respondent, whether Londö benefits were invested on her main activity. In column (1) Table 22, we show that the majority of respondents who lost at the lottery but report investment of Londö benefits are found in households where at least one other member won at the lottery, while nearly 99% of control from household where no other members won a the lotteries report no investment of Londö benefits on their main activity. While these descriptive statistics does not rule out other form of spillovers (such as general equilibrium effects, through income and price effects, or change in labor market dynamics), it is supportive evidence that only limited transfers of Londö occurred between households.

Table 22: Londö investment according to lottery status of household members

		Respondent lost lottery Another HH member won:		Respondent won lottery Another HH member won:	
		No	*Yes*	*No*	*Yes*
		(1)	(2)	(3)	(4)
Have Londö benefits been invested in the respondent's main activity?	*No*	2,131	215	1,019	137
		98.6%	83.0%	36.9%	30.7%
	Yes	31	44	1,739	309
		1.4%	17.0%	63.1%	69.3%

Note: these figures come from a sample that includes only respondents that reported having a main activity. The descriptive statistics are reported across the lottery outcome for the respondent. They are broken down further by whether or not there was another member of in the household, aside from the respondent, that won the lottery.

4.3.2 Transfer of Londö benefits within households

While we observe limited transfer of Londö benefits between households, one might expect higher level of such transactions between members of the same household. For each member of their household, respondents were asked whether any Londö benefit was invested on this member's main activity. We report in Table 23 the share of household members for whom Londö benefits were invested in main activity, restricting the sample to (i) households where only the respondent won at the lottery and (ii) household members 18 years or older. We observe that a significant shares of household members who did not win at the lottery invested Londö benefits in their main

activity. These transactions are heavily gendered. At 14%, the lowest share is for transfers from female winners to other female household members. For transfers to male household members, the shares are similar whether the winner is a man or a women – respectively 20% and 22%. When the lottery winner is a male, the share of female household members reporting investment of benefits in their main activity goes remarkably up to 33% (Table A7 of the appendix shows that these differences are statistically significant). These results suggest that transfers of benefits take place between household members, more so from men to women, and less from women to women.

Table 23: Investment in households in which no person but the respondent entered the lottery

		Respondent lottery status: *Lost* (1)	*Won* (2)
Have Londö benefits been invested in the main activity of other HH members?	*No*	2,212 99.5%	2,201 82.0%
	Yes	12 0.5%	777 26.1%

Note: the sample producing these statistics comes from respondent's answers to questions about the other members of the household. We only consider members from those households that did not have anyone enter a lottery aside from the respondent and those members 18+ that have a main activity.

5 Conclusion

The paper provides robust empirical evidence of the impact of a social protection intervention, the Londö public works program, in a heavily conflicted and fragile setting. Londö is unique in many ways: it is implemented in one of the poorest countries in the world, the Central African Republic, currently affected by one of the worst humanitarian crises; its' beneficiaries are selected through large public lotteries and bicycles are provided to participants to travel to the worksites.

Surveying more than 6,000 participants to the Londö lotteries 2 to 21 months after the intervention, we identify significant impacts on households' assets (productive assets, durable good, livestock and savings). We find no evidence of an employment jump-start effect, but beneficiaries are found to work about a half day longer per month. We also document an increase in monthly earnings ~10%. This increase in income is reflected in significant improvements in beneficiaries' resilience and satisfactions indicators. Exploring distributional impacts, we find suggestive evidence that the bottom of the wealth and income distributions showed lower impacts, this segment of the sample showing higher share of widows and female head of household from smaller households.

Males' mobility is positively impacted by the program, which is not the case for females, a pattern we explain by negative gender norms, gendered risks and a large gender gap in skills. This important result contrasts with recent positive findings on the impact of bicycles transfers on girls schooling and women empowerment.

Finally, we fail to detect any impact on social cohesion indicators and social contract outcomes. This result is compatible with two competing theories, namely the absence of an impact on these outcomes or the existence of large positive spillovers within communities. We find high level of

social cohesion, which might reflect high level of cohesion pre-intervention, or a strong impact for the community as a whole.

These results suggest that public works interventions might have lasting productive impacts in FCV economies, a contribution to the ongoing debate on workfare cost efficiency, considering the high implementation costs associated. An important question remains on the added value of the work requirements, and whether the impacts found would vanish in the context of an unconditional cash transfer. The gendered impacts identified, both along the welfare distribution and on mobility, call for tailored policy designs in fragile contexts, where women are overly represented among the ultra-vulnerable.

References

Abadie, Alberto, Susan Athey, Guido W. Imbens and Jeffrey Wooldridge, 2017. "When Should You Adjust Standard Errors for Clustering?". NBER Working Paper No. 24003.

Alik-Lagrange, Arthur, Orazio Attanasio, Costas Meghir, Sandra Polanya-Reyes and Marcos Vera-Hernandez. 2016. "Works pays: different benefits of a workfare program in Colombia". Mimeo.

Al-Yriani Lamis, Alain de Janvry, and Elisabeth Sadoulet. 2015. The Yemen Social Fund for Development: An Effective Community-based Approach Amidst Political Instability. International Peacekeeping, 22(4): 321-336.

Azam, Mehtabul. 2012. The Impact of Indian Job Guarantee Scheme on Labor Market Outcomes: Evidence from a Natural Experiment. Working Paper No. 6548. Institute for the Study of Labor (IZA).

Beegle, Kathleen G., Emanuela Galasso and and Jessica Ann Goldberg. 2017. Direct and indirect effects of Malawi's public works program on food security. Journal of Development Economics, 128: 1-23.

Besley, Timothy, and Stephen Coate, 1992. "Workfare vs. Welfare: Incentive Arguments for Work Requirements in Poverty Alleviation Programs" American Economic Review 82(1): 249–61.

Besley, Timothy, and Stephen Coate. 1995. "The Design of Income Maintenance Programmes," Review of Economics Studies 62: 187–221.

Blattman, Chris and Laura Rallston. 2015. "Generating employment in poor and fragile states: Evidence from labor market and entrepreneurship programs". Mimeo.

Daidone, Silvio, Benjamin Davis, Sudhanshu Handa, and Paul Winters. 2019. "The Household and Individual-level Productive Impacts of Cash Transfer Programs in Sub-Saharan Africa". American Journal of Agricultural Economics, January 2019, 0 (0): 1–31.

Datt, Gaurav and Martin Ravallion. 1994. "Transfer Benefits from Public-Works Employment: Evidence for Rural India." The Economic Journal, 104(427): 1346-69.

Deininger, Klaus and Yanyan Liu. 2013. "Welfare and poverty impacts of India's national rural employment guarantee scheme: Evidence from Andhra Pradesh." IFPRI discussion papers 1289.

Emond, Catherine, Wei Tang, and Susan Handy. 2009. "Explaining Gender Difference in Bicycling Behavior." Transportation Research Record: Journal of the Transportation Research Board 2125 (November):16–25. https://doi.org/10.3141/2125-03.

Evans, David, Brian Holtemeyer and Katrina Kosec. 2019. “Cash transfers increase trust in local government”. World Development. February 2019, 114: 138-155.

Fetzer, Thiemo, “Can Workfare Programs Moderate Conflict? Evidence from India”, forthcoming, Journal of the European Economics Association.

HarvestChoice. 2015. "Tropical Livestock Units (TLU, 2005)." International Food Policy Research Institute, Washington, DC., and University of Minnesota, St. Paul, MN.

Imbert, Clément and John Papp. 2015. “Labor Market Effects of Social Programs: Evidence from India's Employment Guarantee.” American Economic Journal: Applied Economics, 7(2): 233-63.

Imbens, Guido W. and Jeffrey M. Wooldridge. 2009. “Recent developments in the econometrics of program evaluation.” Journal of Economic Literature 47 (1): 5-86.

IPIS. 2018. “Central African Republic: A Conflict Mapping.” Antwerp, August 2018. http://ipisresearch.be/wp-content/uploads/2018/09/1809-CAR-conflict-mapping_web.pdf

Jalan, Jyotsna and Martin Ravallion. 2003. “Estimating the Benefit Incidence of an Antipoverty Program by Propensity-Score Matching.” Journal of Business & Economic Statistics, 21(1): 19-30.

McDonald, Noreen C. 2012. “Is There a Gender Gap in School Travel? An Examination of US Children and Adolescents.” Journal of Transport Geography, Special Section On Child & Youth Mobility, 20 (1):80–86.

McKenzie, David, 2012. "Beyond baseline and follow-up: The case for more T in experiments." Journal of Development Economics, Elsevier, vol. 99(2): 210-221.

Muralidharan, Karthik. 2017. "Field Experiments in Education in Developing Countries." Handbook of Economic Field Experiments 2 (3): 323-385.

Rinku, Murgai, Martin Ravallion and Dominique van de Walle. 2016. "Is Workfare Cost-effective against Poverty in a Poor Labor-Surplus Economy?" World Bank Economic Review, World Bank Group, 30(3): 413-445.

Ravallion, Martin. 2019. "Guaranteed employment or guaranteed income?" World Development, March 2019, 115 (C): 209-221.

Ravi, Shamika and Monika Engler. 2015. “Workfare as an Effective Way to Fight Poverty: The Case of India’s NREGS”. World Development. 67: 57-71

Riverson, John; Mika Kunieda; Peter Roberts; Negede Lewi; Wendy Walker. 2006. “Gender Dimensions of Transport in Developing Countries: Lessons from World Bank Projects”. Journal of the Transportation Research Board. 1956: 149-156.

Rubin, Donald B. 1974. “Estimating the Causal Effects of Treatments in Randomized and Non-randomized Studies.” Journal of educational psychology 66: 688-701.

Salon, Deborah, and Sumila Gulyani. 2010. “Mobility, Poverty, and Gender: Travel ‘Choices’ of Slum Residents in Nairobi, Kenya.” Transport Reviews 30 (5): 641–57.

Stoeffler, Quantin, Bradford Mills, and Patrick Premand. 2019. “Poor Households’ Productive Investments of Cash Transfers: Quasi-experimental Evidence from Niger.” Journal of African Economies, April 2019: 1–27

Uteng, Tanu Priya. 2012. “Gender and Mobility in the Developing World”. Background paper to the World Development Report 2012: Gender Equality and Development.

World Bank. Independent Evaluation Group. 2014. “Social Safety Nets and Gender: Learning from Impact Evaluations and World Bank Projects.” In World Bank. 2019. “Central African Republic: Priorities for Ending Poverty and Boosting Shared Prosperity”.

Figure A1: Balance in on Pre-program Wealth Index distribution (Recall)

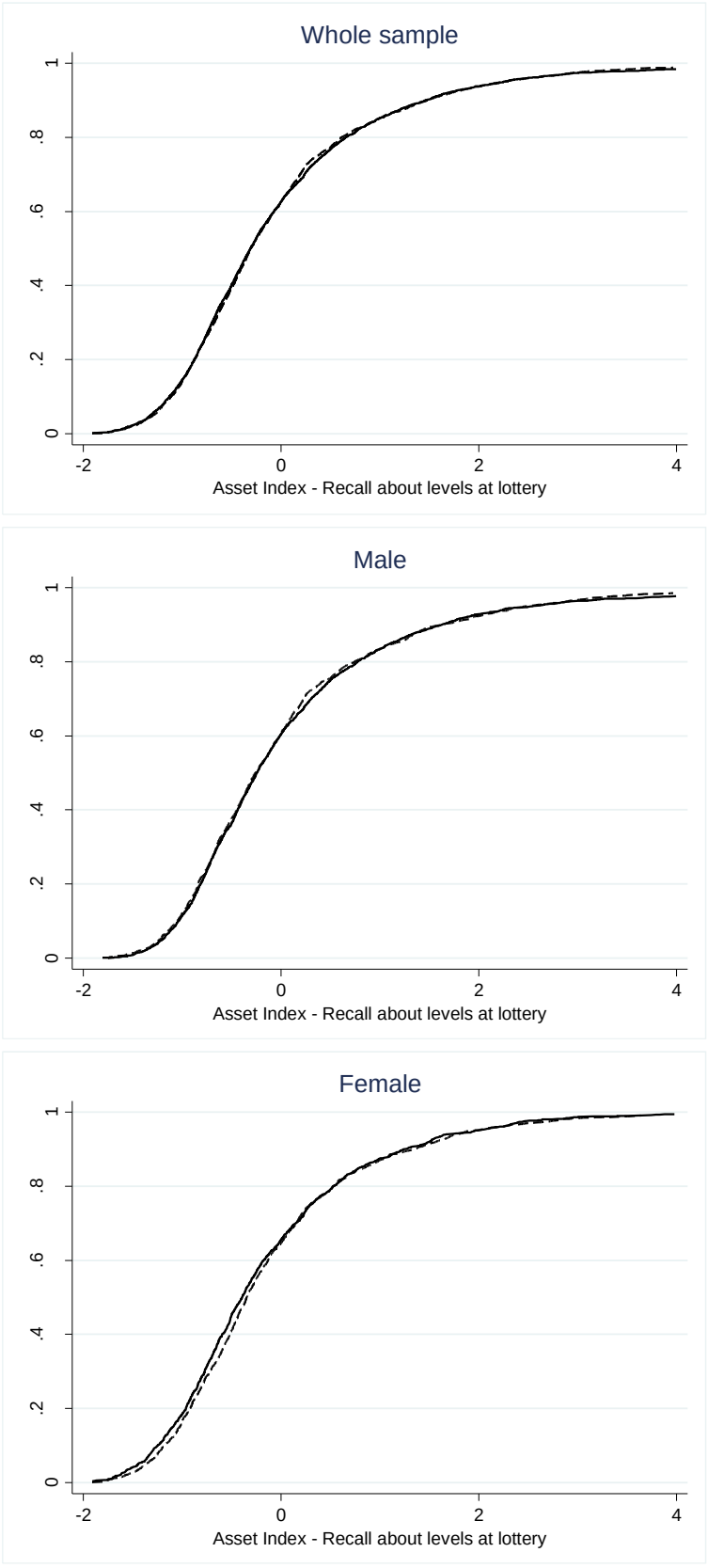


Table A0 - General descriptive statistics

		Male		Female	
		mean	s.e.	mean	s.e.
Age of respondent (years)		32	[0.18]	32	[0.20]
Respondent schooling	*None*	39%	[0.01]	73%	[0.01]
	Primary school	28%	[0.01]	16%	[0.01]
	Junior High School (6e to 3e)	33%	[0.01]	10%	[0.01]
Respondent knows…	*how to read, but not to write*	11%	[0.01]	11%	[0.01]
	how to read and write	48%	[0.01]	12%	[0.01]
Household size		5	[0.04]	5	[0.04]
# of male household members		2	[0.03]	2	[0.03]
# of female household members		2	[0.03]	3	[0.03]
Respondent marital status	*Divorced*	1%	[0.00]	4%	[0.00]
	Free union	43%	[0.01]	48%	[0.01]
	Married (monogamous)	21%	[0.01]	9%	[0.01]
	Married (polygamous)	5%	[0.00]	3%	[0.00]
	Single	28%	[0.01]	25%	[0.01]
	Widow	2%	[0.00]	12%	[0.01]
Polygamous household at the time of the lottery?		10%	[0.01]	19%	[0.01]
Respondent religion	*Christian*	87%	[0.01]	88%	[0.01]
	Muslim	12%	[0.01]	10%	[0.01]
Relationship to Household head	*Head*	87%	[0.01]	26%	[0.01]
	Spouse of head	0%	[0.00]	58%	[0.01]
	Son/Daughter of head	9%	[0.01]	11%	[0.01]
Home tenure status	*Hosted for free (friends, family)*	10%	[0.01]	9%	[0.01]
	Landlord	85%	[0.01]	83%	[0.01]
	Tenant	4%	[0.00]	7%	[0.00]
Residence in rural area		19%	[0.01]	13%	[0.01]
Permanent resident - didn't move in the past 12 months		97%	[0.00]	98%	[0.00]
Violent events affecting household, past 12 months before lottery					
	Attack of village by armed groups	51%	[0.01]	63%	[0.01]
	Severe illness or accident (conflict related)	37%	[0.01]	35%	[0.01]
	Theft of a high value good	42%	[0.01]	57%	[0.01]
	Death of a member of household	34%	[0.01]	35%	[0.01]
Respondent primary activity	*Agriculture, including livestock*	69%	[0.01]	70%	[0.01]
	Non-agriculture, trade	5%	[0.00]	21%	[0.01]
	Non-agriculture, non-trade	19%	[0.01]	1%	[0.00]
	None, Student	7%	[0.00]	9%	[0.01]
	Sample size	3,285		2,826	

Table A1: Impact of program on durable goods index components

	Respondent won lottery (ITT)			Difference	Adjusted	Control Mean		
	Whole	*Male*	*Female*	*Male – Female*	R sq.	*Whole*	*Male*	*Female*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Durable Goods Index	0.30***	0.36***	0.24***	-0.12	0.29	-0.39	-0.14	-0.65
	(0.04)	(0.06)	(0.05)	(0.08)				
Chairs/coffee table	0.04	0.14**	-0.08	-0.23**	0.11	1.76	1.79	1.74
	(0.05)	(0.06)	(0.07)	(0.09)				
Table	0.14***	0.17***	0.12***	-0.05	0.11	0.84	0.98	0.70
	(0.03)	(0.04)	(0.04)	(0.06)				
Bed	0.05*	0.05	0.05	-0.00	0.26	0.73	0.82	0.64
	(0.03)	(0.04)	(0.03)	(0.05)				
Mattress	0.06**	0.07**	0.04	-0.04	0.26	0.65	0.74	0.56
	(0.02)	(0.04)	(0.03)	(0.04)				
Straw mat	0.08**	0.08*	0.07	-0.02	0.21	2.22	2.21	2.24
	(0.03)	(0.05)	(0.05)	(0.06)				
Iron	0.02**	0.01	0.03***	0.02	0.12	0.13	0.16	0.09
	(0.01)	(0.01)	(0.01)	(0.02)				
Cookstove	0.00	0.01	-0.01	-0.02	0.08	0.20	0.26	0.14
	(0.01)	(0.02)	(0.01)	(0.02)				
Radio	0.03**	0.03	0.03	0.00	0.12	0.26	0.32	0.20
	(0.01)	(0.02)	(0.02)	(0.03)				
Cell phone	0.04***	0.06***	0.02	-0.04	0.16	0.24	0.28	0.19
	(0.01)	(0.02)	(0.02)	(0.03)				
Toilets (outside)	0.01	0.02	0.01	-0.01	0.08	0.90	0.93	0.86
	(0.01)	(0.01)	(0.01)	(0.02)				
Moto	0.00	0.01	-0.00	-0.01	0.04	0.07	0.07	0.07
	(0.01)	(0.01)	(0.01)	(0.01)				
Bicycle	0.61***	0.67***	0.55***	-0.12***	0.35	0.14	0.17	0.12
	(0.01)	(0.02)	(0.02)	(0.02)				
Land (non-exploited)	-0.04	-0.05	-0.02	0.03	0.08	0.67	0.72	0.62
	(0.03)	(0.04)	(0.04)	(0.06)				
Land (built-up)	0.03*	0.04	0.02	-0.02	0.08	0.82	0.84	0.81
	(0.02)	(0.02)	(0.02)	(0.03)				

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. We drop the following index components due to low prevalence : fridge, ventilator, antenna, videocassette recorder, computer, internet connection, car, TV, inside toilet, and pirogue. Indices are predictions constructed from the scores of a principal component analysis, standardized by mean and standard deviation of the control group.

Table A2: Impact of program on productive asset index components

	Respondent won lottery (ITT)			Difference	Adjusted	Control Mean		
	Whole	*Male*	*Female*	*Male – Female*	R sq.	*Whole*	*Male*	*Female*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Productive Assets Index	0.13***	0.25***	0.00	-0.25***	0.22	-0.14	-0.04	-0.23
	(0.03)	(0.04)	(0.04)	(0.06)				
Plow	0.00	0.01	0.00	-0.00	0.16	0.04	0.06	0.02
	(0.01)	(0.01)	(0.01)	(0.01)				
Ox	0.03***	0.04***	0.02	-0.03	0.32	0.1	0.12	0.07
	(0.01)	(0.02)	(0.01)	(0.02)				
Hoe	0.15***	0.28***	0.01	-0.27***	0.17	2.29	2.36	2.22
	(0.05)	(0.06)	(0.06)	(0.09)				
Wind mill	-0.02**	-0.01	-0.03**	-0.02	0.03	0.07	0.05	0.09
	(0.01)	(0.01)	(0.01)	(0.02)				
Sewing machine	0.01	0.02*	-0.00	-0.02*	0.00	0.03	0.03	0.03
	(0.01)	(0.01)	(0.01)	(0.01)				
Machete	0.07***	0.14***	-0.01	-0.15***	0.17	1.33	1.42	1.24
	(0.03)	(0.04)	(0.03)	(0.05)				
Wheelbarrow	0.02**	0.02**	0.01	-0.01	0.04	0.06	0.06	0.06
	(0.01)	(0.01)	(0.01)	(0.01)				
Land (cultivated)	0.08***	0.15***	0.01	-0.14**	0.18	1.65	1.70	1.61
	(0.03)	(0.04)	(0.04)	(0.06)				

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. We drop the following index components due to low prevalence : tractor, sprayer, and hulling mill. Indices are predictions constructed from the scores of a principal component analysis, standardized by mean and standard deviation of the control group.

Table A3: Impact of program on tropical livestock units

	Respondent won lottery (ITT)			Difference	Adjusted	Control Mean		
	Whole	*Male*	*Female*	*Male – Female*	R sq.	*Whole*	*Male*	*Female*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tropical Livestock Unit	0.06***	0.05**	0.08***	0.03	0.10	0.20	0.26	0.15
	(0.01)	(0.02)	(0.02)	(0.02)				
Cattle	0.02	-0.00	0.04**	0.04*	0.01	0.03	0.04	0.01
	(0.01)	(0.02)	(0.02)	(0.02)				
Sheep and goats	0.22***	0.19	0.26***	0.07	0.12	0.91	1.21	0.61
	(0.07)	(0.11)	(0.09)	(0.14)				
Pigs	0.12***	0.08	0.17***	0.09	0.09	0.34	0.42	0.26
	(0.04)	(0.06)	(0.06)	(0.08)				
Chicken	0.56***	0.82***	0.27	-0.55*	0.16	3.52	4.01	3.03
	(0.15)	(0.22)	(0.20)	(0.29)				

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. We drop rabbits in the table due to low prevalence.

Table A4: Program impact on measures of social cohesion

	Respondent won lottery (ITT)			Difference	Control means			Adjusted
	Whole	*Male*	*Female*	*Female – Male*	*Whole*	*Male*	*Female*	R sq.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Respondent feels comfortable about…								
Having neighbors of another religion	0.01	0.02*	0.00	-0.02	0.84	0.85	0.83	0.13
	(0.01)	(0.01)	(0.01)	(0.02)				
Living with someone of another religion	0.01	0.01	0.00	-0.01	0.83	0.82	0.83	0.15
	(0.01)	(0.01)	(0.01)	(0.02)				
Working with someone of another religion	0.01	0.02	0.01	-0.01	0.85	0.86	0.84	0.11
	(0.01)	(0.01)	(0.01)	(0.02)				
Marrying someone of another religion	0.01	0.02	0.00	-0.02	0.82	0.82	0.81	0.14
	(0.01)	(0.01)	(0.01)	(0.02)				
SUM OF THE ABOVE	0.04	0.07	0.02	-0.05	3.31	3.32	3.29	0.15
	(0.04)	(0.05)	(0.05)	(0.07)				
PCA INDEX	0.08	0.11	0.05	-0.06	-0.12	-0.11	-0.13	0.15
	(0.05)	(0.07)	(0.07)	(0.10)				
Respondent feels comfortable about…								
Having neighbors of another ethnicity	0.00	0.01	0.00	-0.01	0.92	0.92	0.91	0.05
	(0.01)	(0.01)	(0.01)	(0.01)				
Living with someone of another ethnicity	0.00	0.01	-0.01	-0.02	0.91	0.92	0.91	0.06
	(0.01)	(0.01)	(0.01)	(0.01)				
Working with someone of another ethnicity	0.01	0.02*	0.00	-0.02*	0.92	0.92	0.92	0.06
	(0.01)	(0.01)	(0.01)	(0.01)				
Marrying someone of another ethnicity	-0.00	-0.00	0.00	-0.00	0.90	0.91	0.89	0.07
	(0.01)	(0.01)	(0.01)	(0.02)				
SUM OF THE ABOVE	0.00	0.03	-0.03	-0.06	3.63	3.65	3.61	0.06
	(0.03)	(0.04)	(0.04)	(0.06)				
PCA INDEX	0.04	0.06	0.02	-0.04	-0.02	0.00	-0.03	0.05
	(0.05)	(0.07)	(0.07)	(0.10)				

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. PCA indices are created from the four statements in their respective panels and are standardized with respect to the mean and standard deviation of the control group.

Table A6: Program impact on measures of social cohesion

	Respondent won lottery (ITT)			Difference	Control means			Adjusted R sq.
	Whole	*Male*	*Female*	*Female – Male*	*Whole*	*Male*	*Female*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Respondent feels very confident in								
the village council	0.01	-0.00	0.02	0.03	0.60	0.60	0.60	0.16
	(0.01)	(0.02)	(0.02)	(0.02)				
the police	-0.00	-0.01	0.00	0.02	0.67	0.66	0.68	0.16
	(0.01)	(0.02)	(0.02)	(0.02)				
the army	-0.01	-0.01	-0.01	0.01	0.69	0.70	0.68	0.15
	(0.01)	(0.02)	(0.02)	(0.02)				
the court	0.02	0.01	0.02	0.01	0.65	0.68	0.63	0.14
	(0.01)	(0.02)	(0.02)	(0.02)				
the village chief	0.01	-0.00	0.02	0.02	0.75	0.76	0.73	0.14
	(0.01)	(0.02)	(0.02)	(0.02)				
their religious leader	0.00	-0.01	0.01	0.02	0.80	0.80	0.80	0.15
	(0.01)	(0.01)	(0.01)	(0.02)				
TOTAL OF THE ABOVE	0.03	0.00	0.06	0.06	4.10	4.13	4.08	0.18
	(0.06)	(0.08)	(0.08)	(0.11)				
PCA INDEX	0.04	-0.01	0.10	0.11	-0.09	-0.01	-0.17	0.17
	(0.06)	(0.08)	(0.08)	(0.11)				
In the last 12mo the respondent has had contact with								
a village council member	0.00	0.02	-0.02*	-0.04**	0.25	0.39	0.10	0.21
	(0.01)	(0.02)	(0.01)	(0.02)				
a national assembly debuty	0.01	0.03**	-0.01	-0.04**	0.19	0.31	0.07	0.26
	(0.01)	(0.02)	(0.01)	(0.02)				
a government official	0.02**	0.04***	0.00	-0.04**	0.15	0.25	0.05	0.19
	(0.01)	(0.02)	(0.01)	(0.02)				
a political party official	0.02*	0.04***	-0.01	-0.05***	0.15	0.24	0.05	0.20
	(0.01)	(0.02)	(0.01)	(0.02)				
the village chief	-0.01	0.01	-0.03*	-0.04	0.46	0.65	0.26	0.23
	(0.01)	(0.02)	(0.02)	(0.02)				
their religious leader	-0.01	0.01	-0.03	-0.04	0.50	0.68	0.33	0.23
	(0.01)	(0.02)	(0.02)	(0.02)				
TOTAL OF THE ABOVE	0.03	0.15**	-0.10*	-0.25***	1.69	2.52	0.87	0.31
	(0.05)	(0.07)	(0.06)	(0.09)				
PCA INDEX	0.02	0.10	-0.07*	-0.17**	-0.22	0.56	-0.99	0.30
	(0.05)	(0.07)	(0.04)	(0.08)				
The respondent strongly agrees that								
the court can make decisions the people must follow	0.02*	0.04**	0.01	-0.02	0.60	0.69	0.51	0.14
	(0.01)	(0.02)	(0.02)	(0.02)				
the police has the right to make people respect the law	0.02*	0.04**	0.01	-0.03	0.60	0.68	0.52	0.12
	(0.01)	(0.02)	(0.02)	(0.02)				
the village council can collect consumption tax	0.02*	0.04**	0.00	-0.04	0.58	0.64	0.51	0.12
	(0.01)	(0.02)	(0.02)	(0.02)				
the village council has the right to collect parking tax	0.02	0.02	0.02	-0.00	0.55	0.65	0.45	0.13
	(0.01)	(0.02)	(0.02)	(0.02)				
TOTAL OF THE ABOVE	0.09*	0.13**	0.03	-0.10	2.31	2.64	1.98	0.16
	(0.04)	(0.06)	(0.07)	(0.09)				
PCA INDEX	-0.04	0.01	-0.10	-0.11	0.09	0.01	0.17	0.17
	(0.06)	(0.08)	(0.08)	(0.11)				

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), whether other household members participated in the lottery, and lottery fixed effects. PCA indices are created from the four statements in their respective panels and are standardized with respect to the mean and standard deviation of the control group.

Table A7. Program impact on the investment in other household members' main activities

	Londö benefits have been invested in the household member's main activity *(yes=1)*	
	(1)	(2)
Respondent won lottery *(yes=1)*	0.25***	0.19***
	(0.01)	(0.02)
Respondent is female *(yes=1)*		-0.02
		(0.01)
HH member is female (*yes=1)*		0.00
		(0.01)
Respondent won & is female		0.02
		(0.03)
Respondent won and HH member is female		0.15***
		(0.03)
Respondent & HH member are female		0.01
		(0.01)
Respondent won & respondent and HH member are female		-0.22***
		(0.03)
Observations	5,200	
Adjusted R sq.	0.21	
Implied ITT:		
Female HH members with male respondents	0.33***	
	(0.01)	
Male HH members with female respondents	0.21***	
	(0.01)	
Female HH members with female respondents	0.14***	
	(0.02)	

Note: Robust s.e. in parentheses; * p<0.1, ** p<0.05, *** p<0.01; controls include gender, HH size, age, whether the respondent had any schooling, whether the respondent is the household head, residence type (rural or urban), and lottery fixed effects. Only those members that were aged 18+ and had main activities were included for analysis. The analysis does not include households that had a second member, in addition to the respondent, enter the lottery. The implied ITT estimates are linear combinations from the coefficients above. Monetary variables are measured in Francs CFA and are top 1% winsorized.