Quantitative Evaluation of the Social Fund for Development Labor Intensive Works Program (LIWP)

Executive Summary

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LIWP Program Design

The Labor Intensive Public Works Program (LIWP) in Yemen was designed using the "'twin-track"' approach of combining short-term relief with long-term investments. The program transfers funds to poor rural households by creating temporary employment opportunities in projects that benefit the local community. Income from program wages provides short term protection against negative consumption shocks, while the public works projects themselves provide medium to long term benefits for the community in adapting to water scarcity.

LIWP projects include reclamation of agricultural lands from harmful plants, protection of irrigation canals and water sources, improvement of rural roads, paving of rural markets, rainwater harvesting, construction of shallow wells, and terrace repair. The construction projects funded by LIWP were chosen by targeted communities in consultation with SFD technical staff.

The second phase of LIWP included 190 communities that had been recently hit by shocks to food consumption. Communities were selected in consultation based on village-level poverty indicators from the 2004 population census followed up by field verification.

Within the selected communities, LIWP was designed to reach poor households via self-targeting. This was done by setting wages lower than the prevailing wage in the area for unskilled work, so that only households without alternative employment would participate.

Evaluation Design

The primary challenge in impact evaluation is to identify changes which are attributable to the program intervention. In this impact evaluation, we are fortunate in having access to a randomized control trial (RCT) of the LIWP program. We also collected data via household surveys both prior to and after the project to compare changes over time, and use instrumental variables to control for some imperfections in the randomization. Together these estimation strategies allow us to be confident that we are measuring improvements in household and community welfare brought about by the program, rather than any other factors.

The baseline survey for this evaluation was collected in May 2010, and the expost survey was collected in November-December 2011. Between these two dates, the Arab Spring of 2011 was associated in Yemen with widespread protests, incidents of armed conflict, and economic paralysis due to fuel shortages and general instability. Correspondingly, we see in control villages that almost all economic indicators worsened during between the baseline and expost survey. In our analysis, we show that LIWP significantly increased the value of these variables in treatment villages, relative to what happened in control villages.

LIWP Participation and Targeting

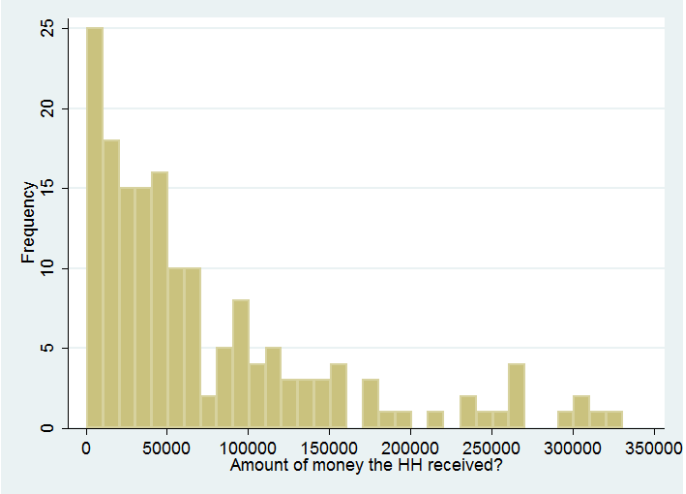
Our analysis begins with an evaluation of the effectiveness of the self-targeting in LIWP. In our survey sample, 74% of households had at least one member participating in LIWP, and 67% participated in the unskilled labor portion of the project, which was the portion designed to deliver benefits to any households willing to participate.

An issue we examine in detail is the variation in benefits received among households participating in the project. In the course of the program implementation, there were changes across time and across project location in the way that workdays were allocated. In general, we find a high amount of variation in both days of work and income received per day. In response to this finding, program staff noted that one factor in the unequal allocation was poor tracking of accumulated project benefits by households combined with higher than expected interest in program participation as a result of the crisis. Another source of variation in benefits was that participants were paid by piece-rate which varied by the type of work, so participants who worked faster or at more difficult tasks received greater than average projects benefits. Future rounds of LIWP will use a new computerized system for tracking, which should result in greater equality of benefits among participants.

The histogram in figure 1 shows the distribution of households participating in the unskilled portion of the project by total LIWP income received.

While some of the variation in program benefits was correlated with number of men in the household, and with average skill level, we also find that **poor households were overall**

Figure 1: Distribution of Money Received from LIWP



more likely to participate in the program and to work for more days and to receive greater income from the program than better-off households.

Figure 2 plots total LIWP income against proxy means score for all households in the sample. Lower proxy means scores are associated with a greater probability that the household is poor. We see that in spite of a great deal of variation, the LIWP benefits were progressive overall, with more benefits going to households with lower scores.

We also find that within-community inequality decreased in communities with active LIWP work during the month preceding the survey. **The average Gini index of monthly income fell by about 0.08, compared to a baseline value of about 0.5.**

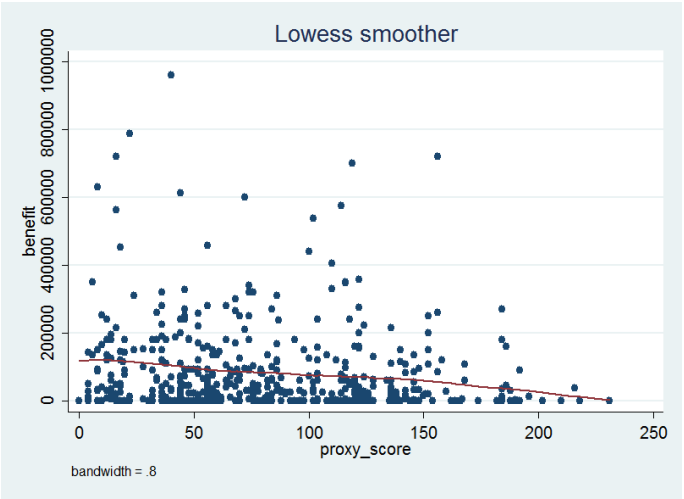
LIWP Impact on Employment and Income

The direct goal of the LIWP program was to provide employment. One potential concern is that employment in LIWP may have substituted for other alternative employment. We find, however, that the LIWP program increased total days on average worked by approximately the amount of program employment.

We also find that, due to the timing of the crisis, LIWP wages ended up being more attractive than originally designed so that the program also had the effect of increasing average wages and shifting the structure of the workforce away from work in the lowest paid sectors. This unexpected attractiveness of LIWP work may also have contributed to the difficulty in fairly allocating benefits.

By providing additional days of work at good wages, LIWP protected wage income from the negative effect of the crisis. **We find positive program impacts of approximately**

Figure 2: Distribution of Program Benefits by Poverty Score



Non-parametric regression of proxy-means test score on total program income

5000 riyals per month or $23 in a subset of projects which were active at the time of the survey and estimate a program impact for the past year of approximately $500 across all projects. While these are reasonable magnitudes, we note that the impact is not statistically significant.

One of the program goals was particularly to target employment towards women. We find that LIWP **increased the probability of being employed** (outside of self-employment in agriculture) **by approximately 5 percentage points for men and 3 percentage points for women**. The impact is only marginally statistically significant, but the magnitude, especially for women, is meaningful, as women's employment started from a baseline of about 3% in treatment communities compared to approximately 65% for men.

We find a **positive and statistically significant impact on school enrollment for boys under age 15 of about 8 percentage points, and no significant change in enrollment for girls**. Children under 15 were not officially allowed to participate in LIWP, so it is reassuring to find that increased employment opportunities for adults allowed children to continue to attend school.

As a result of the economic crisis and declines in wage income, other income sources such as agricultural production, rental of assets, remittances, and charity became more important for households in Yemen. To the extent that LIWP cushioned wage income, we should not be surprised to see that there is less reliance on other sources of income in treated communities after the crisis. In fact, we find that **LIWP reduced the share of households receiving income from charity by about 10 percentage points**. This impact is marginally statistically significant at the 10% level.

LIWP Impact on Household Asset Ownership and Indebtedness

Another method of coping with the negative income shock caused by the crisis is decapitalization of assets. We examine whether the program could partially protect households from selling off assets and/or increase investment. We find a significant impact on decreasing indebtedness, and also on increasing ownership of motor vehicles.

In analyzing changes in durable good ownership, the most notable finding is that there was net selling of taxis and/or minibuses in control communities, while in treatment communities, more households acquired taxis and/or minibuses. Combining all durable goods in the survey into a single index based on estimated values shows a **strong program effect of approximately 31 thousand riyals ($146) on durable good ownership**.

Regarding animal assets, we find that LIWP did not have a significant impact on livestock ownership. Unlike most other economic indicators, livestock assets in general increased between baseline and expost. In particular, some categories of assets increased more in control communities than in treatment communities. This may be evidence of a retreat to agricultural production caused by the loss of alternative employment, from which treatment communities were partially sheltered by LIWP.

Even more than decapitalization of assets, consumption smoothing via borrowing was an important coping mechanism for responding to the economic crisis. The vast majority (approximately 80%) of sampled households were indebted, and the rate of indebtedness increased between baseline and expost. Households in treatment communities ended with substantially less debt than households in control communities. **We find large and statistically significant program effect on decreasing average outstanding debt of households in treatment communities by about 26 thousand riyal or $123**. This is a decrease of about 60%, relative to control communities where average household debt in the expost survey was about 43 thousand riyal or $202. While credit in Yemen is generally interest-free, there is a cost to households of holding a high amount of debt since storekeepers will limit the total amount of credit extended, and, for some types of debt there is a possibility of imprisonment if the debt is not paid in time.

LIWP Impact on Household Expenditures

We also look at how program income increased household welfare, particularly focusing on food security.

When we asked participants directly how they spent the money received from work on LIWP, we find that most income went towards food, debt repayment, and medical care. Considering spending on food, debt, and medicine to be less discretionary than spending in

Table 1: Self-reported Use of LIWP Income by Participating Households

	Food	Equipment	Animals	Marriage	Debt	Home Improvement	Furniture	Other
	0.94	0.04	0.08	0.04	0.4	0.03	0.04	0.04
N	394	392	391	391	393	391	391	391

Share of participating households that reported using program income for different categories of spending. In the survey, participants were given a list of categories including food, debt, medicine, household items, clothing, and could indicate more than one category where they spent program income.

Table 2: Self-reported Use of LIWP Income (Continued)

	Food, Debt, or Medical Only	Food, Debt, or Medical and Other	Other only
	0.59	0.36	0.04
N	391	391	391

Share of participating households that reported using program income for different categories of spending.

the other categories (such as clothing, household furniture, etc.) we recombined reported spending into three super-categories: food, debt, or medicine only; food, debt, or medicine and other, and other only. This arrangement shows that **almost 60% of participants spent income from the program only on food, medicine, or debt repayment**. See tables 1 and 2.

LIWP Impact on Food Security

We find that LIWP was successful in increasing food security in treatment villages, particularly as measured in average calories consumed per day.

In the aftermath of the crisis, both treatment and control communities experienced an increase in self-reported food shortage, but LIWP mitigated the severity of this shortage. Households that reported they had experienced food shortage were asked about how they had coped with the shortage of food. Between baseline and expost, the number of households in which both children and adults skipped meals due to food shortage more than doubled, reaching almost 10% in control communities. **We find that LIWP is associated with decreasing the rate of severe food shortage by 3.6 percentage**

points. We note that this change is not statistically significant due to the small number of observations.

The household survey included a detailed module on household daily consumption of staple carbohydrates. We estimate average daily calorie consumption per capita based on reported data on the dry volume consumption of staple carbohydrates. **We find a program impact of between 320 and and 435 calories per day, equivalent to a 11-13% increase in calorie consumption in treated communities relative to untreated communities.** This change is statistically significant, and represents a meaningful increase in average consumption.

Impact of LIWP Constructed Infrastructure

In addition to the immediate benefits of increased income and employment, the LIWP program was designed to construct infrastructure that will deliver long term benefits to the participating communities. Reported satisfaction with the LIP projects was quite high and we can show that water-related projects significantly improved access to water.

Most community projects included multiple component projects. The most common type of project was terrace repair, followed by rural road improvement. The full list of project types can be found in table 3. **The vast majority of respondents indicated that their local project was needed by the community.** 95% of respondents indicated that the project was beneficial to the community as a whole and 80% indicated that their household benefited directly from the project. Households that did not benefit generally mentioned either that they were far from the project location to benefit, or that due to the project type, only landowners benefited directly. Survey responses to questions about the project usefulness are reported in table 4.

At the time of the expost survey, most projects were still incomplete. Out of 44 treatment communities, only 8 were officially completed at the time of the survey, and an additional 7 were completed less than two months after this expost survey. This is a small sample on which to test for project impacts. To avoid selection bias, we compare outcomes in the communities with completed projects to outcomes in their paired community from the stratification step of randomization.

Water-related projects included constructing water storage tanks and cisterns, rainwater harvesting tanks, and improvement of shallow wells. One of the main costs for villagers with poor access to water is the time spent in fetching water. **The average length of the trip to fetch water in the rainy season was shortened as a result of the LIWP intervention.** During the rainy season, the length of time fell within the subsample of certainly completed projects by an average of 9 minutes, and within the full sample of probably complete projects by 18 minutes.

Table 3: Types of Projects in Surveyed Communities

	Number of Projects
Rural Roads	16
Tanks/ Springs	8
Cistern/ Kareif	12
Dam / Barrier	5
Surface /Shallow wells	12
Water Channels	3
Terraces	19
Removing Harmful Plants	1
Total Projects	82
Total Communities	44

Table 4: Self-reported Benefits of LIWP Infrastructure Projects

Share of HHs who say project was needed by the community as a whole	**95.5%**
Share of HHs who benefit directly from the project or plan to benefit in the future	**79.5%**
Of households that do not benefit:	
Share that do not benefit because too far from project location	**40%**
Share that do not benefit because do not own land	**40%**
Share that do not benefit because project was not completed	**26.2%**

In addition, the increased access to water resulted in 1-2 fewer months of water shortage per year. This represents a decrease of about 50% compared to an average for 3-4 months on average of water shortages. This change was statistically significant.

We expect that the benefits of road projects and land clearing projects such as decreased transportation costs and increased availability of agricultural land would also have become apparent had the expost survey had been conducted later, as we have a very small sample of completed projects of this type in the present analysis.