Policy Evaluation using Subjective Well-being: Evidence from a Home Upgrading Project *

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August 4, 2024

Abstract

This paper develops a subjective well-being (SWB) valuation framework that accounts for adaptation and disappointment from implementation delays. Using the framework to evaluate a home upgrading government program for low-income households in the Dominican Republic, we find that (i) the benefit-cost ratio is 0.42 using rental income but 1.23 (0.54) for households without delays using the preferred measure of satisfaction with housing quality (quality of family life) and (ii) ignoring adaptation and delay disappointment may lead to significant measurement error in program benefits. Policy evaluation should thus incorporate SWB measures and account for adaptation and delay disappointment.

Keywords: cost-benefit, subjective well-being, adaptation, implementation delays, housing.

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1 Introduction

What measures of welfare should governments use to evaluate specific policies? While experts have traditionally relied on objective measures such as income, there is a growing urgency to incorporate subjective measures that capture broader aspects of well-being (Stiglitz, Sen, and Fitoussi, 2009; Fleurbaey and Blanchet, 2013; Adler and Fleurbaey, 2016).

For a home upgrading program, for example, income-based benefits can be measured by the change in property value or rental income due to the program. Alternatively, beneficiaries could be asked to state their willingness to pay (WTP) for the program. While WTP measures may incorporate essential aspects of well-being not captured by income measures, they are often elicited hypothetically before the program is implemented, and if respondents are unsure about its benefits, responses will likely be inaccurate.[1]

Program benefits could also be measured using subjective well-being (SWB) proxies, such as satisfaction with quality of life. While scholars have argued about the utility notion that these proxies elicit, it is clear that the anticipation of a future event impacts SWB (Bentham, 1970).[2] But because some positive events (i.e. government program) may occur well after its anticipated date, individuals may feel disappointed while waiting for it (see e.g. Loomes and Sugden, 1986), a situation we call 'delay disappointment'.[3]

[1] Studies have shown that individuals are unable to accurately predict welfare from future consumption, even for different everyday goods and services such as yogurt, music, and ice cream (see e.g. Kahneman and Snell, 1992).

[2] Jevons (1905) was one of the first to apply the idea that anticipation is an important part of utility in the study of intertemporal trade-offs, denoting the anticipation of future events as 'anticipal pleasure' when future consumption involves positive utility, e.g. a vacation, and as 'anticipal pain' when it involves negative utility, e.g. a visit to the dentist for a root canal treatment.

[3] Other studies that measure the impact on well-being of events that are beyond an individual's control include Deaton, Fortson, and Tortora (2010) and Kimball, Nunny, and Silverman (2015) that study the effect of the death of a family member or Stone, Schwartz, Broderick, and Deaton (2010) that study the effect of aging. Ludwig, Duncan, Gennetian, Katz, Kessler, Kling, and Sanbonmatsu (2012, 2013) study the effect of the Moving to Opportunity experiment on well-being and Dolan

Kimball and Willis (2006) assume that SWB questions are related to affective utility (Kahneman, Wakker, and Sarin, 1997) and that SWB can be expressed as the sum of a permanent (or long-run) component and a transitory component that depends on recent news (i.e, event announcement). If the event is unexpectedly delayed, however, the permanent component of SWB may be lower. At any rate, SWB may change in the short run after an event, but it will eventually return to its long-run level (Easterlin, 2003; Graham, 2016). This offset of the gains (or losses) in SWB after an event is called adaptation and explains, for example, why lottery winners are happier the day of the lottery than several months later (Frederick and Loewenstein, 1999; Di Tella, MacCulloch, and Oswald, 2003; Clark, Frijters, and Shields, 2008; Di Tella, Haisken-De New, and MacCulloch, 2010; Kimball et al., 2015; Galiani, Gertler, and Undurraga, 2018).[4]

To fix ideas, Figure 1 considers the SWB of an individual before and after the announcement of a positive event (i.e. government program) at time A, under three different implementation dates T. In all three cases, SWB jumps after the announcement at A and then increases due to anticipation until the expected program implementation date T^e. In Panel (a) of Figure 1, the program is implemented *before* the expected date (i.e $T < T^e$), and so SWB jumps at T by the sum of a permanent increase β_P and a transitory increase β_T. After T, SWB declines due to adaptation until it reaches the long-term level β_P. In Panel (b), the program is implemented precisely at the expected time (i.e., $T = T^e$), with SWB first increasing in anticipation of the program and then declining afterward due to adaptation. In Panel (c), the program implementation is unexpectedly delayed (i.e., $T > T^e$). Due to delay disappointment, SWB declines after T^e until T, reaching a lower level than before the announcement at A. As before, SWB jumps at T by the sum of the permanent increase β_P and the transitory increase β_T and declines steadily after T

and Metcalfe (2008) study urban regeneration also on well-being.

[4]See also Diener, Lucas, and Napa (2006) for a review of the evidence on the limits of adaptation.

due to adaptation until reaching the long-term level.[5]

This paper evaluates a randomized control trial of a public home upgrading program in the Dominican Republic using an income-based measure (i.e., the monthly rental price that individuals would charge for leasing their house) and two measures of SWB (i.e., satisfaction with housing quality and with quality of family life). We take the standard questions used to measure the impact of housing programs (e.g. Cattaneo, Galiani, Gertler, Martinez, and Titiunik, 2009; Galiani et al., 2018) and tailor their wording so that it corresponds most closely to flow utility (Benjamin, Debnam Guzman, Fleurbaey, Heffetz, and Kimball, 2023; Kahneman et al., 1997). We thus assume that a program beneficiary with SWB given by Panel (a) of Figure 1 would report flow utility $\beta_P + \beta_T$ at time T if SWB were normalized to zero before the announcement date A. Lifetime utility ("experienced" utility, according to Kahneman et al., 1997) could then be computed by integrating under the SWB curve.

The program we study, implemented by ProSoli, upgrades the homes of low-income households by replacing dirt floors with new cement floors and applying a fresh coat of paint to the windows and exterior walls of the house. Small geographical clusters of 3 to 6 eligible study households were assigned to receive the home improvements (treatment group) or not (control group). To assess potential spillovers, some households in treated clusters were not assigned to receive the program (similarly to households in control clusters), thus creating exogenous variation in the distance between targeted (i.e. offered treatment) and untargeted households. ProSoli did not tell untargeted households about the program. However, they could have felt frustrated if they learned about it, especially if they lived in treatment clusters close to targeted households.

After an initial visit to collect baseline data and announce the program to tar-

[5] In contrast, if one used an income-based measure of welfare such as rental income, Figure 1 would simply consist of a step function with value zero until T and $\beta_P > 0$ measured in USD from T onwards, regardless of delays.

geted households, the program was launched in November 2019 but was paused in March 2020 due to COVID-19. By March 2020, ProSoli had upgraded about half of the targeted houses and, importantly, had never communicated the plan to delay the program implementation to the rest of the targeted households. Construction eventually resumed in July 2020 and concluded in April 2021, delivering the program to all intended targeted households up to 17 months after its announcement. COVID-19 lockdown measures thus created exogenous variation in the time that elapsed between the announcement of the program and its eventual implementation. Two rounds of follow-up data allow us to measure within-household variation in exposure time to the program after its implementation.

We evaluate the program using a SWB-based valuation method from the literature that implicitly assumes cardinality and interpersonal comparability of SWB measures (Frijters, Clark, Krekel, and Layard, 2020). The framework uses the marginal rate of substitution between the program and income to back out a monthly amount in USD that would leave an individual indifferent between being a beneficiary or not on a given month (see e.g. Fujiwara and Campbell, 2011; Dolan and Fujiwara, 2016, for reviews). While the literature typically assumes a fixed monthly amount, we allow it to vary over time. We model the monthly amount by incorporating delay disappointment to the flow utility model developed by Kimball et al. (2015) and estimate its parameters using data from the randomized control trial. We then measure the change in lifetime well-being due to the program by computing the present value of the (infinite) stream of the estimated, time-varying monthly amounts using a monthly interest rate inferred from self-reported data on rental income and property values.

We uncover several key findings. First, the program's cost-benefit analysis depends on the welfare measure used to compute its benefits. We find plausibly larger effects when using either measure of SWB compared to income-based measures such as rental income, possibly because SWB measures incorporate aspects

of well-being such as perceived improvements in health outcomes or status (Cattaneo et al., 2009; Layard, 2005) not captured in income-based measures. While the benefit-cost ratio is only 0.42 when using rental income (present value of benefits is USD 761 and costs are USD 1,800), the benefit-cost ratio is 1.23 (0.54) using the preferred measure of satisfaction with housing quality (quality of family life) for households that did not experience delays. Second, satisfaction with housing quality is more sensitive to delays than satisfaction with the quality of family life. When using satisfaction with housing quality, the 5-month delay experienced by the median beneficiary erases all of the SWB gains of a beneficiary who did not face delays. In addition, ignoring implementation delays results in program benefits that are only 33% of the actual benefits among beneficiaries who did not experience delays. Using satisfaction with the quality of family life instead, the median beneficiary only experiences a decline in SWB of 5% compared to one that did not experience delays, and program benefits estimated ignoring delays, are 97% of the actual benefits among beneficiaries who did not experience delays. Finally, ignoring adaptation can lead to overestimating the program benefits, especially when these are measured soon after implementation. As seen in Figure 1, adaptation results in a steady decline of SWB gains over time from the program. If SWB is measured soon after the event and adaptation is ignored, the large measured gain in SWB will be taken as permanent, thus inflating the present value of lifetime gains. When both delays and adaptation are ignored, the present value of lifetime gains could be higher or lower than when both are considered, depending on how sensitive SWB is to unexpected delays. When using satisfaction with housing quality, the proxy for SWB that is sensitive to delays, the present value of lifetime benefits for beneficiaries that did not experience delays are larger at USD 2,212.08 when adaptation and delays are taken into account compared to USD 1,381.47 when they are both ignored. In contrast, when we use satisfaction with the quality of family life, which is less sensitive to delays, the present value of lifetime benefits

is lower at USD 980.28 when adaptation and delays are considered compared to USD 1,662.03 when both are ignored. More broadly, ignoring adaptation and delay disappointment can lead to misleading estimates of program benefits.

This paper thus contributes to the ongoing debate about whether policy-making should only rely on revealed preference measures such as GDP or rental income or whether, instead, subjective well-being measures provide additional insights (Stiglitz et al., 2009; Adler and Fleurbaey, 2016). We use the SWB-based valuation framework from the literature (Fujiwara and Campbell, 2011; Dolan and Fujiwara, 2016) and incorporate adaptation and implementation delays, important aspects that shape SWB but are typically ignored in the literature. Our approach underscores the importance of considering both and provides a rationale for the large estimates found in the literature.

The paper also contributes, albeit tangentially, to the literature on 'anticipatory' utility (see, for instance, Loewenstein, 1987; Caplin and Leahy, 2001; Brunnermeier and Parker, 2005; Koszegi, 2006; Koszegi and Rabin, 2009). While this literature is mostly theoretical, our paper takes a stylized model of SWB to actual data. In this sense, it also contributes to the literature that studies the impact of life events on SWB over time (see, e.g. Kimball et al., 2015; Galiani et al., 2018). These papers examine the degree to which SWB eventually returns to the level before the event, often exploiting variation found in the data in the time elapsed since the event. In contrast, our paper studies adaptation by relying on multiple measurements after the event for the same household.

The rest of the paper proceeds as follows: Section 2 describes the design of the randomized control trial and the well-being measures that will be used to evaluate the program. Section 3 reports reduced-form estimates, while Section 4 describes our valuation framework. Section 5 reports the program's cost-benefit analysis based on the estimates in Section 4, and Section 6 concludes.

2 Experimental design and data

In collaboration with the cash transfer program ProSoli of the Government of the Dominican Republic, we designed and implemented a randomized controlled trial of ProSoli's home upgrading program for its beneficiaries. The program upgraded dirt (and badly damaged cement) floors with new cement floors and painted the windows and exterior walls of the house. The program is based on Piso Firme in Mexico (Cattaneo et al., 2009). Unlike Piso Firme which mostly focused on peri-urban neighborhoods or slums, the program in the Dominican Republic also included rural areas.[6]

Study households were grouped into 336 small geographical areas or clusters. While 80% of the clusters were randomly assigned to receive the program (treatment group), the remaining 20% were assigned to the control group. To assess potential spillovers, 20% of study households in treatment clusters were randomly not targeted to receive the program. As a result, the average distance between untargeted households in treatment and control clusters and the closest targeted household was 0.5 km and 1.4 km, respectively (p-value of t-test of equality of means is 0.000).

Panel A of Figure A1 shows a map with the location of all study households while Panel B zooms in on a map of two study provinces with the location of study households in different colors depending on their treatment status.

Figure A2 describes the timeline of data collection and interventions. Baseline data was collected in person between October 2019 and February 2020 for 1,192 households. The preferred respondent was the head of household, and if unavailable, the primary holder of the Prosoli beneficiary card.[7]

[6] ProSoli implemented the program in the provinces of Santo Domingo, San Cristóbal, Santiago, Monte Plata, Barahona and Baoruco.

[7] The initial list used beneficiary data from 2018 and contained 2,172 households. By the time of the visit, however, many households had already upgraded their floors with cement, while others could not be located or lived in a house that could not be upgraded due to its difficult access or

At the end of the baseline visit, targeted households were offered the home upgrading program and told that ProSoli staff and the construction crew would soon contact them to schedule the intervention. A few days before the intervention, Prosoli staff visited targeted households and asked them to sign a letter accepting the program. During the visit, households also agreed to remove all household items from the house floors before the arrival of the construction crew and to keep them overnight outside the house while the newly cemented floors dried. During these visits, ProSoli staff were often accompanied by a construction crew member who informed the household about the exact construction dates and lent them a tarp to cover the household items that had to be left outside the house overnight. Upgrading the floor took half a day, but the cement took 24 hours to dry. For this reason, the paint job, which only took an average of two hours, was done by different crew members the day after once the cement had dried. A few days after the construction, ProSoli staff visited beneficiary households to assess the quality of the work. Construction crews were then paid based on this quality assessment.

Construction began soon after the end of baseline data collection in November 2019 but paused in March 2020 due to COVID-19. By the time of the lockdown, ProSoli had upgraded half of the targeted houses. Importantly, ProSoli did not tell any targeted households that had not yet received the program by March 2020 about the delays. Construction eventually resumed in July 2020 and concluded in April 2021.

The COVID-19 lockdown measures thus created exogenous variation in the time elapsed from the program's announcement during the baseline visit until the actual intervention. We denote this time, expressed in months, by Δ_D. In the data, Δ_D ranges from 0 to 16 months. While Figure 1 distinguishes between the date of the program announcement A and the expected intervention date T^e, we assume both dates are in the same month because beneficiaries were told that

state of general disrepair.

ProSoli would soon contact them to schedule the home upgrade. As a result, $\Delta_D = T - T^e \approx T - A$.

The first round of (post-construction) follow-up data collection began in February 2020 but had to be stopped two weeks later due to COVID-19. It resumed in May 2020 via telephone and later in person, ending in October 2021. The team reached 1,036 households or 87% of those interviewed at baseline, and attrition rates were not different by treatment status.[8] The second (and last) round of follow-up data was only collected via phone between December 2021 and May 2022 using a reduced team of 4 enumerators. Although the team tried to get the cell phone numbers of all respondents during the first follow-up, many households did not have one, so the team only collected data for 622 households. Again, attrition was not different by treatment status.

Since the team collected two rounds of follow-up data, we also have variation in the time elapsed from the intervention until the survey date(s) ranging from 0 to 30 months, which we denote by Δ_S. Figure A3 plots Δ_D in the X-axis and Δ_S in the Y-axis for targeted and untargeted households in blue and red circles, respectively. The circle's diameter indicates the number of observations with a given (Δ_D, Δ_S) combination. Untargeted households in treatment clusters are assigned the average intervention date among targeted households in their cluster. In contrast, those in control clusters are assigned the average intervention date of their closest treatment cluster. Since households interviewed twice each appears as two different observations in Figure A3, with the same Δ_D but different Δ_S depending on the interview date, as shown in Figure A3, Δ_D's and Δ_S's of targeted and untargeted households are, by design, similar.

Table 2 reports household and dwelling characteristics for untargeted households in control and treatment clusters in columns 1 and 2, respectively, and tar-

[8]We collected 463 interviews via phone from May 2020 to June 2021 and 534 households from mid-July until early October 2021. Households unreachable by phone were visited in person as they lacked cell phones or had connectivity issues.

geted households in column 3. Table 1 reports the definitions of variables used in the analysis. According to column 4 of Table 2, we cannot reject that any differences in means across experimental arms in columns 1-3 is jointly different from zero.

To become a beneficiary of the home upgrading program, a household must have an ICV score (index of quality of life) of 1 on a scale 1-4 (where 1 is the poorest and 4 is the richest), be a recipient of ProSoli and own a house with dirt floors (or badly damaged cement floors) .[9] According to Table 2, most households own the house they live in, 83% of the houses have dirt floors and 71% of households have ICV 1, while the remaining 29% have ICV 2.[10]

2.1 Measures of well-being

Individual preferences are typically estimated from choice data, but in some settings (i.e., externalities, nonmarket goods, and government policies), choice data are unavailable. In our context, choice data are unavailable because beneficiaries had no choice (other than to refuse the program altogether). To evaluate the program, we rely instead on an income-based measure and two different measures of SWB collected after its implementation.[11]

[9]The quality of life index (ICV for its initials in Spanish) is a poverty assessment tool based on answers to a short household instrument (covering housing, education, health, and the environment) and collected by SIUBEN, a government agency. Each answer to a question in the instrument is given a score, and the sum of scores determines the household's poverty level. The ICV is the main tool to target government programs.

[10]Households with ICV 2 were also included in the program because they met all the other eligibility requirements (notably they owned houses with dirt floors) and because ProSoli estimated a budget surplus if the study only included eligible households with ICV 1.

[11]Discussing the trade-offs implied by SWB and choice data, Benjamin, Heffetz, Kimball, and Rees-Jones (2014) makes the important distinction between anticipated SWB, elicited before the respondent experiences the event, similar to choice data, and experienced SWB elicited after experiencing the event. Because experienced SWB is more commonly used, differences between (experienced) SWB and choice data may arise from different information or beliefs at the time of elicitation rather than from differences in what each measure captures. In this paper, all welfare measures used in the cost-benefit analysis are elicited simultaneously during a survey, thus holding constant information and beliefs.

The income-based measure is based on monthly rental income and is one of the most commonly used revealed preference measures in cost-benefit analyses (CBA). The housing rental market in our study areas is essentially unregulated (there are no caps on house rental prices, for example). However, because only a few properties are rented out, instead of using the actual rental price, we ask about the monthly rental price that respondents would charge for leasing out their house. When eliciting this measure, we assume that the housing rental market is relatively efficient, with low transaction costs, and that individuals are relatively informed about rental prices (Van Praag and Baarsma, 2005). Otherwise, changes in the elicited rental prices would have little to do with the perceived home improvements from the upgrading program.[12]

Rental income, however, may not fully capture the program's benefits on outcomes such as child health or social status (Cattaneo et al., 2009). For this reason, there is increasing interest in using SWB survey questions to compute benefits in a CBA (see, e.g, Fujiwara and Campbell, 2011; Dolan and Metcalfe, 2012; Oishi and Diener, 2014; Dolan and Fujiwara, 2016). Layard (2005), for example, argues that maximizing happiness rather than income should be the goal of government policy. Proponents argue that individuals are willing and able to provide meaningful answers to survey questions about their satisfaction in various domains of their life (job, health, marriage, etc) and that these measures provide a more nuanced indicator of the quality of life in a society.

However, the utility notion captured by these questions is a matter of debate. Do they capture the conventional "decision utility" typically used by economists and based on choice data, or do they capture instead "experience utility" based on hedonic and affective experience, first proposed by Bentham and Jevons (Bentham,

[12] The question used to collect monthly rental price data at baseline was open-ended, and respondents received no guidance if they found it difficult to answer. The response in the follow-up survey included a price range determined after conducting focus groups. Follow-up data on rental income were thus of better quality.

1970; Jevons, 1905)?

If SWB measured decision utility (i.e. whether an individual's preferences are satisfied), then they could be interpreted as a WTP measure (see Adler, 2013, who calls this the preference-realization defense of SWB surveys as inputs into policy analysis). Some scholars have equated SWB with decision utility (Blanchflower and Oswald, 2004; Frey, Luechinger, and Stutzer, 2009) assuming that it measures the utility that well-informed, deliberated choices would reveal, if observed. A small but growing literature questions this assumption by finding that choices (real and hypothetical) deviate systematically from the option that people believe would maximize SWB (e.g. Benjamin, Heffetz, Kimball, and Rees-Jones, 2012; Benjamin et al., 2014). These deviations happen because decision utility depends on people's beliefs about the consequences of their choices and these beliefs may be biased. In contrast, experienced utility captures the consequences of decisions or events as people experience them (e.g. Kahneman et al., 1997; Dolan and Kahneman, 2008).

As a result, it may be easier for respondents to answer a SWB question about their own happiness or life satisfaction after the event than a stated preference question (such as the WTP for the program) before the event because SWB questions do not rely on respondents' ability to forecast all relevant consequences of the program (Frey et al., 2009; Stutzer and Frey, 2010).

Kimball and Willis (2006) advocate for using hedonic measures of well-being based on affect, such as responses to questions like "Did you experience a lot of happiness yesterday?" but evaluative questions such as life satisfaction correlate more with income (Kahneman and Deaton, 2010; Graham, 2016; Layard and De Neve, 2023).

We, therefore, use questions related to satisfaction with the current quality of housing and with family life similar to those used in Cattaneo et al. (2009) and Galiani et al. (2018) evaluating a similar home upgrading program. Since respon-

dents may answer such questions either by putting different weights on various life domains, by interpreting the question using different time horizons or by using a different reference social circle (ie. answering for themselves or their family as a whole), we follow Benjamin et al. (2023) and explicitly mention in the question's wording the domain, time horizon, and reference social circle. In particular, the wording of the quality of housing question is "How satisfied are you with the quality of the house that you currently have?" and of the quality of family life is "How satisfied are you with the life quality that your family currently has in this house?". According to Benjamin et al. (2023), the wording of these questions corresponds more closely to flow utility, our key measure in the valuation framework of Section 4.

Similarly to Cattaneo et al. (2009) and Galiani et al. (2018), responses are based on self-reported Likert-scale measures with five points. We thus use the scale measure directly or a simple dummy variable that equals 1 if the respondent is "Satisfied" or "Very satisfied" and 0 otherwise. We prefer this dummy measure because it minimizes the potential problem with cardinality by ignoring interpersonal variation in satisfaction. In addition, to avoid any desirability bias among targeted households, we ask satisfaction questions about house characteristics that were directly affected by the program (floor, color of walls) or not (material of the walls and roof). If respondents answer truthfully, we would expect changes in satisfaction only for those characteristics directly affected by the program.

3 Reduced-form results

We first estimate the following intention-to-treat effects regression

$$\begin{aligned} Y_{ict} &= \gamma_{T0}\Delta_{Dic} + \gamma_{S0}\Delta_{Sic} + \gamma_T \mathbb{T}_{ic} + \gamma_{TT}\mathbb{T}_{ic} \times \Delta_{Dic} + \gamma_{TS}\mathbb{T}_{ic} \times \Delta_{Sict} + \gamma_0 Y_{ic0} \\ &\quad + X'_{ict}\theta + \epsilon_{ict} \end{aligned} \tag{1}$$

where Y_{ict} is a dummy SWB measure for household i living in cluster c at time t, $\mathbb{T}_{ic}$ is a dummy equal to 1 if household i in cluster c was targeted for the program and 0 otherwise, $\Delta_{Sict} = t - T_{ic}$ and $\Delta_{Dic} = T_{ic} - T^e$ are defined in the previous section, and X_{ict} is a vector of covariates including whether the respondent owned the house at baseline, whether the survey at time t was conducted via phone (instead of in-person) and the value of the SWB measure at baseline Y_{ic0}. Equation (1) also includes municipality fixed effects, which capture the average unobservable regional differences in the outcome variable. Standard errors are clustered at the randomization level (i.e. cluster).

The specification includes Δ_{Dic} and Δ_{Sict} to control for time effects created by the COVID-19 pandemic and the lockdown measures. For example, time spent at home during the pandemic could affect measures of SWB, and household heads do report spending from 6.5 hours at home per day in October-December 2019 (pre-pandemic) to 8.2 hours in October-December 2020 (p-value of t-test is 0.000).[13]

The parameters of interest are γ_T, capturing the impact of the program when Δ_{Dic} and Δ_{Sict} are zero and γ_{TT} and γ_{TS} which measure the degree of delay disappointment and adaptation, respectively.

The parameter γ_T in equation (1) is identified because random assignment of the program guarantees treatment exogeneity for all values of Δ_T and Δ_S. Parameters γ_{TT} and γ_{TS} are identified if samples for different values of Δ_T and Δ_S are comparable. Although Δ_T and Δ_S were not randomly assigned, Online Appendix Tables A1 and A2 suggest that we cannot reject the null hypothesis of no differences in household and dwelling characteristics (including SWB measures) between targeted and untargeted households that have Δ_T and Δ_S below or above the median, respectively.[14] In addition, untargeted households in treatment and

[13]Spouses and children (if any) also report spending more time at home during the pandemic, from 6.7 to 7.7 hours for spouses, and from 5 to 10.5 hours for children.

[14]Note that in the case of Δ_S, one would expect balance in Online Appendix Table A2 by design because most households were interviewed twice and thus appear both in the sample above and

control clusters are pooled because, as reported in the next subsection, we find no evidence of spillover effects. We thus conclude that the samples of targeted and untargeted households for different values of Δ_T and Δ_S are statistically comparable before the program, and we can interpret γ_{TT} and γ_{TS} as measures of delay disappointment and adaptation, respectively.

3.1 Estimates

Table 3 reports the results of estimating equation (1). According to Panel A, which focuses on variables related to the take-up of the program, about 72% of targeted households received the program. As expected, a similar percentage reports recent floor and wall upgrades. The share of rooms with dirt floor owned by targeted households declined from 38% (among untargeted households) to less than 10%. In addition, delays in program implementation did not affect the probability that targeted households eventually received the program, as coefficient γ_{TT} on $\Delta_T x \mathbb{T}$ is always indistinguishable from zero in Panel A. In contrast, Aibinu and Jagboro (2002) reports that delays led to lower completion rates which would affect SWB measures directly even in the absence of delay disappointment.[15]

Panel B reports the SWB measures of housing quality that were likely affected by the program. While satisfaction with floor quality, wall color and overall house quality are substantially greater for targeted households, they are significantly lower for households that experienced delays in receiving the program. Households that waited 17 months (the maximum of Δ_T) reported 57% lower satisfaction with overall housing quality than households that did not experienced a delay. Consistent with Kimball et al. (2015) and Galiani et al. (2018), we also find evi-

below the median.

[15]During the intervention, other public and religious organizations (e.g. Instituto Nacional de la Vivienda or INVI) were also offering home upgrading programs. Consistent with this, the results reflect a small increase in the probability that the household received home improvements over time decreasing the share of rooms with dirt floor.

dence of adaptation. After 12 months, about 44% of the increase in satisfaction with housing quality has dissipated. These results suggest that our evaluative measures of SWB do capture flow utility rather than lifetime utility as they are predictably affected by delays and the passage of time.

As expected, Panel C reports no differences in the satisfaction with the quality of house characteristics not affected by the program, such as the quality of the walls or the roof. This lack of impact allays concerns about potential survey response biases.

Finally, Panel D reports satisfaction with quality of family life, trust and the revealed preference measure of rent that households would charge monthly for leasing their house. While households experienced delay disappointment and adaptation with satisfaction with housing quality and to a lesser extent with quality of family life, this is not the case with self-reported monthly rent as it increases by 32% (from a base of 34.4 USD) irrespective of the delay in construction or exposure time to the improved house. This result suggests that while SWB is negatively affected by delays and adapts over time, the rental price only responds to the upgrades made to the house and that these measures capture different aspects of well-being (see Easterlin, 2001; Ferrer-i Carbonell, 2005; Deaton, 2008, for papers that study income as a determinant of well-being). Consistent with the literature, trust behaves like SWB (see, e.g. Helliwell, 2003; Helliwell and Putnam, 2005). Targeted households are more trusting of others immediately after receiving the program if there were no delays. However, with a delay of 12 months, trust among targeted households is no longer statistically different from that of untargeted households. Trust also adapts, but it is weaker and smaller in magnitude.

To see more clearly that not accounting for delay disappointment leads to an underestimation of the program's impact for beneficiaries that did not experience delays, in panels B and D we run a version of equation (1) that ignores delays by omitting Δ_T and its interaction with $\mathbb{T}$ when the dependent variable is satisfaction

with overall house quality and with quality of family life (in rows labelled without Δ_T). The coefficient on the treatment dummy $\mathbb{T}$ in the full specification captures the immediate impact of the program only for beneficiaries that did not experience delays, but when delays are ignored, the coefficient captures the average impacts for *all* beneficiaries. In the full specification, the coefficient on $\mathbb{T}$ for satisfaction with house quality (quality of family life) is 0.425 (0.220) which is significantly higher than 0.243 (0.190) when Δ_T and its interaction with $\mathbb{T}$ are omitted. Intuitively, beneficiaries that received the program without delays had higher satisfaction than those that experienced delays. Hence, ignoring delays in the estimation (as if they had not happened) leads to a lower average estimate of the impact.

We note that our interpretation of the results would be invalid if outcomes for untargeted households also changed as a result of the program, due for example to frustration or envy that their neighbors received the program while they did not. Online Appendix Table A3 exploits our experimental design to address this concern by directly comparing untargeted households in treated and control clusters. We find no differences between untargeted households in either cluster type and thus conclude that there are no spillover effects. We are therefore justified in pooling all untargeted households together in Table 3.

In addition, the adaptation result could be confounded with housing wear and tear since lower perceived levels of housing quality over time could result from actual worsening of quality given the time elapsed since treatment. However, the fact that the coefficient Δ_S reported in column 3 of Table 3 is not statistically different from zero suggests that at least among untargeted households, housing quality did not deteriorate over exposure time. More importantly, housing wear and tear cannot explain delay disappointment because keeping the time elapsed from baseline to follow-up fixed, a delay would shorten the time since the intervention and thus reduce wear and tear.

4 Valuation Method

This section develops a SWB-based valuation framework that attaches monetary values to the benefits of the home upgrading program.

Our starting point is the popular approach in the literature to measure the impacts of non-market goods or a government program (see, e.g. Fujiwara and Campbell, 2011; Dolan and Fujiwara, 2016; Dolan and Metcalfe, 2008). This approach captures the impact of the program on well-being at time t as the amount of money β_t that would leave a beneficiary indifferent between receiving the program or not. In particular, this approach solves for β_t defined in

$$u_t(H_0, y + \beta_t) = u_t(H_1, y) \tag{2}$$

where $u_t(\cdot)$ is the indirect utility function at time t, y is household income, H_0 are housing services consumed in the absence of the program, and H_1 are housing services consumed with the program. For household i in cluster c at time t, the literature assumes that u_{ict} on both sides of Equation (2) takes the form

$$u_{ict} = \alpha_0 + \alpha_1 \ln(y_{ic}) + \alpha_2 H_{ict} + X'_{ic}\theta + \epsilon_{ict}. \tag{3}$$

A potential problem with Equation (3) is that household income y_{ic} may be endogenous if it depends on the housing services H_{ict} consumed. In this case, parameter α_1 would be biased and inconsistent. Instrumental variables, if available, could be used to solve the problem (Dolan and Metcalfe, 2008; Oswald and Powdthavee, 2008). Instead, we exploit the random assignment to the program and use income measured at baseline, which, by design, is orthogonal to the change in housing services induced by the program. In practice, we assume that u_{ict} equals

the SWB measure of flow utility Y_{ict} and run the following regression:

$$Y_{ict} = \alpha_0 + \alpha_1 \ln(v_{ic0}) + \alpha_2 Y_{ic0} + f(\Delta_{Sict}, \Delta_{Dic})\mathbb{T}_{ic} + X'_{ic}\theta + \epsilon_{ict}, \tag{4}$$

where Y_{ic0} and $\mathbb{T}_{ic}$ were defined in Equation (1). The vector of covariates X_{ic}, also defined in Equation (1), now includes a time trend to account for time-varying unobservable variables. Since our SWB questions measure (monthly) flow utility, we use the monthly rental price respondents would charge for leasing out their house at baseline as our monthly household income v_{ic0}.[16]

The function $f(\Delta_{Sict}, \Delta_{Dic})$ measures the impact of the program at time $t > T_{ic}$, when Δ_{Sict} months have elapsed since the program implementation date, for individual i in cluster c who experienced a delay of Δ_{Dic} months. We incorporate delay disappointment to the model of Kimball et al. (2015) and Galiani et al. (2018) by modeling both adaptation and disappointment with exponential decay as in Figure 1. In particular,

$$f(\Delta_{Sict}, \Delta_{Dic}) = \beta_P + \beta_T e^{-\delta_T \Delta_{Sict}} + \beta_D (e^{-\delta_D \Delta_{Dic}} - 1). \tag{5}$$

The second and third terms of Equation (5) capture hedonic adaptation and delay disappointment, respectively. Note that the first two terms are always non-negative while the third term is always non-positive because $e^{-\delta_D \Delta_{Dic}} \leq 1$. Equation (5) is valid for $t > T_{ic}$, consistent with the timing of our post-intervention follow-up data collection.[17]

[16] Due to the poor quality of the rental income data from the baseline (see Footnote 12), we instead run a regression of rental income measured at follow-up against the number of bedrooms and windows and the material of the walls and roof for the control group, and use the predicted values for the full sample.

[17] The analogous expression when $T^e \leq t \leq T_{ic}$ is $f(0, \Delta_{Dic}) = \beta_P + \beta_T + \beta_D (e^{-\delta_D (t - T^e)} - 1)$. With only post-intervention follow-up data, we cannot test if β_P and β_T change due to delays. We thus estimate β_D assuming that β_P and β_T are fixed. With pre-intervention data, one could estimate β_D directly and allow for different values of β_P and β_T depending on whether or not individuals experienced delays.

We estimate Equation 4 via nonlinear least squares and probit when the dependent variable Y_{ict} is a dummy and via an ordered probit when Y_{ict} is a Likert scale. We cluster standard errors at the randomization level (i.e., cluster), and because monthly rental income v_{ic0} is a generated regressor (see Footnote 16), we report bootstrapped standard errors with 100 repetitions (see Online Appendix for details).

We compute the monthly gain β_t (expressed in USD) by replacing Equation (4) above as $u_t(\cdot)$ in both sides of Equation (2) and solving for β_t. When the monthly gain includes delay disappointment, we compute β_{pt} for different percentiles p of the delay distribution Δ_T, namely, no delay (0 months), 25th percentile (3 months), 50th percentile (5 months) and 75th percentile (8 months). We obtain

$$\beta_{ict} = e^{\frac{\widehat{f}(\Delta_{Sict}, \Delta_{Dic})}{\widehat{\alpha_1}} + \ln(v_{ic0})} - \bar{v_0} \quad \text{and} \quad \beta_{pt} = \frac{1}{N} \sum_{c=1}^{C} \sum_{i=1}^{N_c} \beta_{ict},$$

where the dependency on ic is made explicit, $\bar{v_0}$ is the average rental income at baseline in the sample, C is the number of clusters in the sample, and N_c the number of study participants in cluster c. In practice, we compute individual monthly gains β_{icpt} for each participant, time period $t = 1$ until $t = 500$ and delay percentile p.[18] Then, for a given p and t, we compute the monthly gain β_{pt} by taking the average of individual β_{icpt} in the sample. The cumulative or lifetime gain from T onwards when we account for adaptation and delay disappointment depends on Δ_{Tp} and can be expressed as

$$\mathbb{B}_p = \sum_{t=1}^{\infty} \beta_{pt} \left(\frac{1}{1+R} \right)^t.$$

[18]To be clear, instead of using the actual delay Δ_{Dic} experienced by individual i in cluster c, we assign Δ_{Tp} months of delay to each individual. We could instead use the actual delays Δ_{Dic} but because baseline rental income v_{ic0} is uncorrelated with delays (see Table A1), the results are very similar and thus not reported.

4.1 Estimates

We begin by first estimating the monthly interest rate needed to calculate the cumulative or lifetime impact of the program. Instead of assuming an arbitrary interest rate, we use data from households' self-reported monthly rental prices v_{ic} and house values V_{ic} and the fact that in a well-functioning rental market,

$$V_{ict} = \frac{v_{ict}}{R}$$

and so R is the average of v_{ict}/V_{ict} in the data. Due to data quality issues (see Footnote 12), we use the values of v_{ict} and V_{ict} from follow-up rounds and find a monthly interest rate of $R = 1.43\%$. As expected, we find very similar interest rates if we split the sample by treatment and control groups ($R = 1.41\%$ and $R = 1.47\%$, respectively, p-value = 0.713) or by follow-up round ($R = 1.46\%$ using the first round and $R = 1.39\%$ using the second round, respectively, p-value = 0.565).

Table 4 reports the estimated parameters when the dependent variable is satisfaction with overall house quality (Panel A) or satisfaction with the quality of family life (Panel B). Columns 1 and 2 ignore adaptation and delay disappointment (i.e. $f(\Delta_{Sict}, \Delta_{Dic}) = \beta_P$) and correspond to the "Pooled coefficient" in Table 4 of Galiani et al. (2018) with the difference that Galiani et al. (2018) does not include the log of rental income $\ln(v_{ic0})$ in its specification. Columns 3 and 4 ignore delay disappointment only (i.e. $f(\Delta_{Sict}, \Delta_{Dic}) = \beta_P + \beta_T e^{-\delta_T \Delta_{Sict}}$), corresponding to the first three columns on Table 4 in Galiani et al. (2018). Columns 5 and 6 include both adaptation and delay disappointment with $f(\Delta_{Sict}, \Delta_{Dic})$ modeled as in Equation (5). Odd-numbered columns report estimates from a non-linear least squares regression using the dummy variable as the dependent variable. In contrast, even-numbered columns estimate an ordered probit using the Likert scale

and include the estimated cutoff values.[19,20]

As expected, coefficient α_1 is positive and significant in all columns and relatively stable using either proxy of SWB and regardless of the functional form $f(\Delta_{Sict}, \Delta_{Dic})$. Columns 1 and 2 report a positive and significant coefficient β_P. In columns 3-6, however, unlike Table 4 in Galiani et al. (2018), we cannot reject using either proxy for SWB that $\beta_P = 0$ when estimated but restricted to be non-negative. As a result, we restrict $\beta_P = 0$ in columns 3-6.

In columns 3 and 4, the transitory effect β_T is always positive and precisely estimated, while the hedonic adaptation rate, while positive, is less precisely estimated. When estimating β_D and δ_D in Equation 5, both are imprecisely estimated, indicating that they are not jointly identified. If we had SWB data between the expected (T^e) and actual (T) implementation dates, we could have exploited differences in the time elapsed since T^e to estimate both parameters. Still, with only data post T, only one parameter is identified (i.e. the decline in SWB immediately before T relative to SWB before the program's announcement). As a result, columns 5 and 6 fix $\delta_D = 1$ and estimate β_D. Parameter β_D is positive and precisely estimated only in Panel A but not in Panel B, indicating that beneficiaries care more about delays when asked about their satisfaction with housing quality than with family life. We also note that the transitory effect β_T is higher in columns 5 and 6 compared to columns 3 and 4. This is because columns 3 and 4 ignore delay disappointment, so β_T is a weighted average of the temporary increase in satisfaction for individuals who experienced delays and those who did not. In contrast,

[19]Unlike the specification in Equation 1 reported in Table 3, none of the specifications of Table 4 include the 28 municipality fixed effects because the estimation routines in STATA did not converge when estimating Equation (4) with monthly impact in Equation (5) using either SWB measure. Online Appendix Table A4 reports similar results to those in Table 3 when using the specification in Equation (1) without the municipality fixed effects.

[20]Online Appendix Table A6 shows that the estimates using non-linear least squares in the odd-numbered columns of Table 4 (in odd-numbered columns) are comparable to the estimates using a (non-linear) probit. Estimates in column 6, Panel B, are omitted because using the probit model, the estimate of the delay effect is $\beta_D = 0.000$ when restricted to be non-negative, and so the rest of the estimates coincide with those in column 4, Panel B.

β_T in columns 5 and 6 only captures the (higher) temporary increase in satisfaction for individuals who did not experience delays.

4.1.1 The role of the pandemic

Because delays were due to the COVID-19 pandemic and families were forced to spend more time at home during the lockdowns, beneficiaries that experienced delays could be particularly upset with the government for having to endure the lockdowns with dirt floors while waiting for the home upgrades. In contrast, those who received the upgrades on time could be particularly grateful. In this case, our estimate of β_D may overestimate the impact of delays.

To investigate this possibility, we re-estimate the model in columns 5 and 6 of Table 4, allowing for differences in the estimates depending on whether the household had children up to age 10. Intuitively, families with small children should put more value on the upgrades during the lockdowns than those without children. Column 7 of Online Appendix Table A7 reports that households with and without children are different, but as expected, the randomization produced comparable targeted and untargeted households, irrespective of whether they had young children or not. In practice, we estimate the following version of Equation (5):

$$f(\Delta_{Sict}, \Delta_{Dic}) = \beta_{PK}\mathbb{1}_{icK} + (\beta_T + \beta_{TK}\mathbb{1}_{icK})e^{-\delta_T\Delta_{Sict}} + (\beta_D + \beta_{DK}\mathbb{1}_{icK})(e^{-\Delta_{Dic}} - 1),$$

where $\mathbb{1}_{icK}$ is a dummy with value one if household i in cluster c has children up to age 10 and zero otherwise, $\beta_P = 0$, and δ_T is fixed to the value in the specification of columns 5 and 6 of Table 4, depending on whether SWB is a dummy or a Likert scale.

Columns 1-3 (4-6) of Online Appendix Table A8 use satisfaction with overall house quality (quality of family life) as measures of SWB. Columns 1 and 4 use the 614 panel observations from households with children up to age 10. Columns 2

and 5 use the remaining 1,044 panel observations from households without children. Column 3 (6) reports the p-value of a t-test that the estimates in columns 1 and 2 (4 and 5) are equal.

When using satisfaction with the quality of the house as a proxy for SWB, the temporary and delay effects are *lower* among households with children. In contrast, households with children have larger permanent, temporary and delay effects when using satisfaction with the quality of family life.[21] According to columns 3 and 6, however, these differences in estimates are never statistically significant. Since delays impacted families with and without children alike, the cost-benefit analysis in Section 5 uses the estimates of Table 4 instead of those in Online Appendix Table A8.

5 Cost-Benefit analysis

We first compute the program's benefit-cost ratio using rental income as the proxy for SWB. According to column 4 of Table 3, Panel D, the increase in rental income is 10.96 USD (i.e. the coefficient of $\mathbb{T}$ in equation 1). Therefore, the present value (PV) is $10.96/R = 761$ USD. Since the cost of the program is 1,800 USD per beneficiary household, the benefit-cost ratio of the program is only 0.42 when evaluated using self-reported rental income, and so by this measure, the program is not cost-effective.

Table 5 reports the PV gains in USD based on the estimates in Table 4. Regardless of the SWB measure (Satisfaction with quality of housing in Panels A1 and A2 or with quality of family life in Panels B1 and B2) and how they are computed (using a dummy variable in Panels A1 and B1 or a Likert scale in Panels A2 and B2), PV gains tend to be larger when compared to those using rental income. This

[21] We could not reject that delay effects $\beta_D = 0$ for households without children when restricted to be non-negative, so we fix $\beta_D = 0$ in column 5.

is perhaps because SWB measures incorporate aspects of well-being such as perceived improvements in health outcomes or status (Cattaneo et al., 2009; Layard, 2005) that are not captured in self-reported rental income.

In column 1, PV gains may overestimate program benefits by ignoring both adaptation and disappointment, especially when measured soon after its implementation. As seen in Figure 1, SWB gains decline after the program's implementation due to adaptation. As a result, if SWB gains are measured soon after the program's implementation and taken as permanent (because adaptation is ignored), then the present value of lifetime gains will be inflated. Comparing the estimates in column 1 to those in column 2 that also ignore disappointment but include adaptation, we see that estimates in column 1 are always larger than in column 2. The benefit-cost ratio in column 1 is 0.77 (0.92) using our preferred measure of satisfaction with housing quality (i.e. dummy) in Panel A1 (quality of family life in Panel B1) as a proxy for SWB. In column 2, the analogous benefit-cost ratio is lower at 0.40 (0.53). Columns 3-6 take into account both adaptation and delay disappointment. Column 3 assumes no delays, column 4 a delay equal to the 25th percentile of its distribution (3 months), column 5 a delay equal to the median delay (5 months), and column 6 a delay equal to the 75th percentile of its distribution (8 months).[22] For households that did not experience delays in column 3, the benefit-cost ratio is 1.23 (0.54) using the dummy variable of satisfaction with housing quality in Panel A1 (quality of family life in Panel B1).

While estimated PV gains are very sensitive to delays in panels A1 and A2 using satisfaction with housing quality as a proxy for SWB, they are less so in panels B1 and B2, which use satisfaction with the quality of family life. In Panel A1, the 5-month delay experienced by the median beneficiary completely eliminates the gains in SWB of a beneficiary that did not experience delays. In contrast, ignoring

[22] In particular, column 3 reports $\sum_{t=1}^{\infty} \beta_T e^{-\delta_T t}(1+R)^{-t}$ while columns 4-6 report, for a delay of Δ_p months, $\sum_{t=1}^{\infty} \left(\beta_T e^{-\delta_T t} + \beta_D(e^{-\Delta_p} - 1)\right)(1+R)^{-t}$.

delay disappointment in Panels B1 and B2 is less of an issue as median delays only reduce PV gains by 5% compared to a beneficiary that did not experience delays.

Online Appendix Table A9 replicates the gains using non-linear least squares in the odd-numbered columns of Table 5 (in panels A1 and B1) and reports in panels A2 and B2 the gains computed from the estimates of a (non-linear) probit model the even-numbered columns of Online Appendix Table A6. As expected, the gains in Panel A1 and A2 using satisfaction with quality of housing and in Panel B1 and B2 using satisfaction with quality of life are very similar.

6 Conclusion

Given the recent interest in using self-reported measures of well-being to evaluate different government policies, this paper provides a framework for policy evaluation that can be used to compare income-based measures to self-reported measures of well-being. The framework incorporates adaptation and delay disappointment, one of the reasons why government programs may fall short of citizens' expectations, leading to protests (Archibong, Moerenhout, and Osabuohien, 2022) or worse.

We use the framework to evaluate a home upgrading program with a benefit-cost ratio of 0.42 when evaluated with a standard income-based measure such as rental income. In contrast, depending on the SWB measure used, we find higher benefit-cost ratios of 1.23 and 0.54 for beneficiaries that did not experience delays, perhaps because rental income does not capture all of the benefits generated by the program (Cattaneo et al., 2009; Layard, 2005).

Since the delays studied were due to the COVID-19 pandemic, one could argue that beneficiaries experiencing delays would recognize them as beyond the government's control and thus justified. In contrast, we find lower satisfaction among beneficiaries who experienced delays, especially with the quality of housing.

Ignoring delay disappointment will likely underestimate program benefits for individuals who did not experience delays, especially if the well-being measure is sensitive to delays. When we use our preferred variable to measure satisfaction with the quality of housing, program benefits that ignore delays are only 33% of the actual benefits for beneficiaries who did not experience delays. This figure, however, is 97% when using the preferred measure of satisfaction with the quality of family life.

Ignoring adaptation, in contrast, will likely overestimate program benefits, especially if these are measured soon after its implementation because higher initial benefits are taken as permanent when, in fact, they decline over time due to adaptation. According to our results, accounting for adaptation leads to program benefits that are 48% (43%) lower when using our preferred variable to measure satisfaction with quality of housing (satisfaction with quality of life). This may explain why SWB gains from the literature that does not consider adaptation tend to be large.

Our findings thus suggest that subjective well-being measures are useful in assessing the full impact of government programs and that adaptation and citizens' disappointment with implementation delays should be considered.

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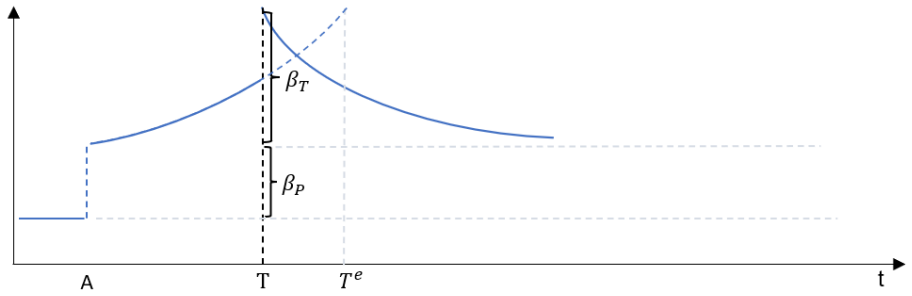
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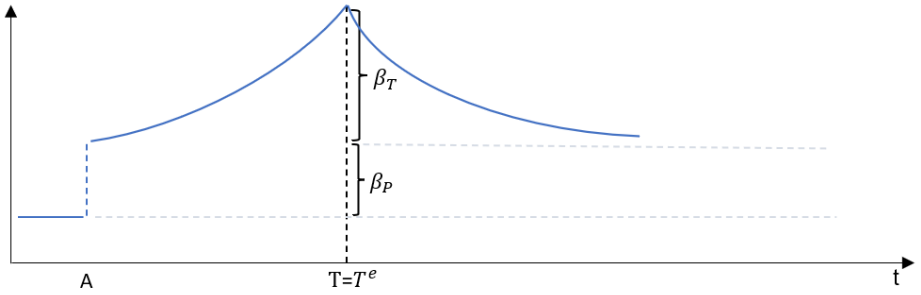
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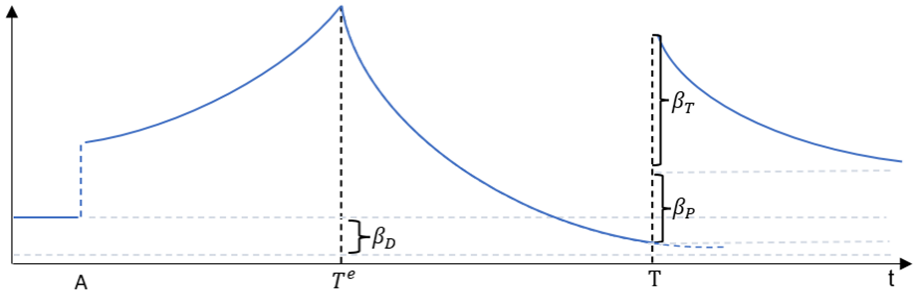
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(a) $T < T^e$



(b) $T = T^e$



(c) $T > T^e$

Notes: The curve in blue shows self-reported well-being (SWB) before and after the announcement of a good event at time A. In all three panels, SWB jumps after the announcement at A, and then increases until the expected date of the event T^e. In Panel (a), the event takes place at T *before* the expected date T^e and so SWB jumps at T by the sum of the permanent increase in SWB β_P and the transitory increase β_T. After T, SWB declines until long-term level β_P is reached. In Panel (b), the event occurs at the expected time ($T = T^e$), and SWB first increases in anticipation of the event and then it declines once it occurs. In Panel (c) the event occurs *after* it is expected ($T > T^e$) and SWB would eventually decline by β_D if the event never took place. When T arrives, SWB jumps by $\beta_P + \beta_T$.

Figure 1: SWB over time

Table 1: Variable definitions

Variable	Definition
Household characteristics	
Household size	Number of family members living in the household as reported by respondent.
Household head is female (1=Yes)	Dummy equal to 1 if the gender of the household head is female.
Education of head of household (years)	Number of years of complete education by the household head.
Satisfied with ... (Likert scale)	Measures based on the response to the following question: "How satisfied are you with... (i) the quality of the house that you currently have; (ii) the current quality of your floor; (iii) the current quality of your walls; (iv) the current quality of your roof; and (v) the life quality of your family now in this house. Would you say you are "Very Unsatisfied", "Unsatisfied", "Neither satisfied nor unsatisfied", "Satisfied", or "Very satisfied?"
Satisfied with ... (1=Yes)	The same measures on a 5-point Likert scale above converted into a dummy variable that equals 1 if the respondent reports that being "Satisfied" or "Very satisfied" and 0 otherwise.
Quality of Life Index (ICV)	Index computed by SIUBEN to assess the poverty status of a given household based on the following characteristics: availability of electricity and water, waste management, fuel used, hosueholds goods, type of house, household head education, schooling of children, type of floor, walls and roof, type of toilet used and household size divided by house size. The ICV ranges from 1 (lowest quality of life) to 4 (highest).
Hours at home per day	Number of hours that the head of the household reported staying at home on a typical day.
Trust in others (from 1 to 10)	Based on the response to the following question: "Do you believe most people would take advantage of you, if they could, or would they try to be fair to you?". The answer is a scale from 1 to 10 where 1 reports a strong belief that others would take advantage of the respondent, and 10 a strong disbelief.
House characteristics	
House with dirt floor (1=Yes)	House has at least one room with dirt floor.
Number of rooms in the house	Number of rooms in the house excluding bathroom and kitchen.
Share of bedrooms with dirt floor	Number of bedrooms with dirt floor over total number of bedrooms in the house.
Walls made of wood or zinc (1=Yes)	Main material of external walls is either wood or zinc.
House is owned (1=Yes)	Dummy that takes value 1 if house is owned and fully paid, 0 otherwise.
Monthly rent if leased (USD)	Based on the response to the following question: "If you were leasing your house, how much would you ask for it monthly?". Respondents could answer using ranges of monthly rents. The value in this variable uses the mid-point in each range.
Most important repair was not floor upgrade (1=Yes)	Based on the response to the following question: "What is the most important upgrade or repair that you would do to the house?" The measure is a dummy variable that equals 1 if the respondent did not answer floor upgrade.
Distance to closest targeted household (in km)	Km to closest targeted household computed using the GPS location obtained during the baseline survey.

Table 2: Orthogonality Check: Untargeted vs Targeted

	(1)	(2)	(3)	(4)
	Untargeted HHs in...			
	Control Clusters	Treated Clusters	Targeted HHs	p-value of F-test
Household Characteristics				
Household size	3.263	3.354	3.482	0.230
Household head is female	0.449	0.466	0.455	0.802
Education of head of household (years)	3.122	3.024	2.812	0.590
Satisfied with overall house quality (1=Yes)	0.280	0.236	0.270	0.442
Satisfied with quality of the house floor (1=Yes)	0.119	0.129	0.085	0.221
Satisfied with wall quality (1=Yes)	0.169	0.163	0.177	0.871
Satisfied with roof quality (1=Yes)	0.145	0.163	0.169	0.919
Satisfied with quality of family life (1=Yes)	0.178	0.209	0.186	0.719
Quality of Life Index (ICV)	1.333	1.260	1.307	0.275
Hours at home per day	6.576	6.315	6.445	0.927
House Characteristics				
House with dirt floor (1=Yes)	0.822	0.826	0.847	0.704
Number of rooms	2.619	2.472	2.551	0.681
Share of bedrooms with dirt floor	0.713	0.715	0.754	0.598
Walls made of wood or zinc (1=Yes)	0.559	0.551	0.536	0.887
House is owned (1=Yes)	0.932	0.944	0.959	0.687
Monthly rent if leased (USD)	85.037	41.478	65.071	0.118
Most important repair was not floor upgrade (1=Yes)	0.441	0.472	0.430	0.597
Number of households	118	178	740	1036

Notes: See Table 1 for variable definitions. Columns 1-3 report means while column 4 reports the p-value of an F-test that means across groups in columns 1-3 are jointly different from zero. Municipality fixed effects are included. Standard errors are clustered at the cluster level. (*** $p<0.01$, ** $p<0.05$, * $p<0.1$).

Table 3: Reduced-form estimates

	(1) Dep.var. among untargeted HHs	(2) Δ_D	(3) Δ_S	(4) $\mathbb{T}$	(5) $\Delta_D x \mathbb{T}$	(6) $\Delta_S x \mathbb{T}$	(7) N. Obs	(8) N. HHs
	Mean *SD*	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)		
Panel A. Take-up of Program								
Household received home improvements from PROSOLI	*0.000* *0.000*	-0.016 (0.016)	0.000 (0.001)	0.715*** (0.048)	-0.005 (0.005)	-0.000 (0.002)	1,629	1007
Household received home improvements from any organization	*0.0229* *0.150*	-0.016 (0.016)	0.002* (0.001)	0.710*** (0.049)	-0.003 (0.005)	-0.002 (0.002)	1,629	1007
Share of rooms with dirt floor	*0.378* *0.326*	-0.004 (0.013)	-0.004* (0.002)	-0.308*** (0.059)	0.000 (0.005)	0.006** (0.003)	1,658	1036
Walls recently painted (1=Yes)	*0.019* *0.136*	-0.011 (0.017)	0.002 (0.001)	0.683*** (0.050)	-0.003 (0.005)	-0.003 (0.002)	1,629	1007
Floor recently upgraded / repaired (1=Yes)	*0.000* *0.000*	-0.017 (0.015)	0.000 (0.001)	0.705*** (0.048)	-0.004 (0.005)	0.000 (0.002)	1,629	1007
Panel B. Satisfaction with housing quality affected by program								
Satisfied with overall house quality (1=Yes)	*0.246* *0.431*	0.016 (0.012)	0.005* (0.003)	0.411*** (0.093)	-0.013** (0.007)	-0.015*** (0.004)	1,658	1036
(Without Δ_D)	*0.246* *0.431*		0.001 (0.003)	0.252*** (0.056)		-0.010*** (0.003)	1,658	1036
Satisfied with floor quality (1=Yes)	*0.198* *0.399*	0.009 (0.014)	0.002 (0.003)	0.569*** (0.090)	-0.008 (0.006)	-0.012*** (0.004)	1,658	1036
Satisfied with wall color (1=Yes)	*0.159* *0.366*	-0.001 (0.011)	-0.002 (0.003)	0.398*** (0.078)	-0.012** (0.005)	-0.009** (0.004)	1,658	1036
Panel C. Satisfaction with housing quality not affected by program								
Satisfied with wall quality (1=Yes)	*0.169* *0.376*	-0.011 (0.012)	-0.001 (0.003)	0.154* (0.082)	0.001 (0.005)	-0.004 (0.004)	1,658	1036
Satisfied with roof quality (1=Yes)	*0.184* *0.388*	-0.008 (0.013)	-0.000 (0.003)	0.113 (0.080)	-0.000 (0.005)	-0.004 (0.003)	1,658	1036
Panel D. Satisfaction with quality of family life, trust and rental income								
Satisfied with quality of family life (1=Yes)	*0.205* *0.404*	-0.011 (0.013)	-0.000 (0.003)	0.219** (0.087)	-0.001 (0.006)	-0.007* (0.004)	1,658	1036
(Without Δ_D)	*0.205* *0.404*		-0.000 (0.003)	0.201*** (0.056)		-0.007** (0.003)	1,658	1036
Trust in others (from 1 to 10)	*6.543* *3.156*	0.193* (0.108)	0.103*** (0.025)	1.332** (0.661)	-0.112** (0.045)	-0.058* (0.031)	1,658	1036
Monthly rent if leased (USD)	*34.88* *26.06*	2.604* (1.505)	1.029*** (0.229)	10.955* (6.044)	-0.243 (0.553)	-0.320 (0.278)	965	603

Notes: See Table 1 for variable definitions. Columns 2-6 report the coefficients and standard errors in parenthesis from the following regression: $Y_{ict} = \gamma_{T0}\Delta_{Dic} + \gamma_{S0}\Delta_{Sic} + \gamma_T\mathbb{T}_{ic} + \gamma_{TT}\mathbb{T}_{ic} \times \Delta_{Dic} + \gamma_{TS}\mathbb{T}_{ic} \times \Delta_{Sict} + \gamma_0 Y_{ic0} + X'_{ic0}\theta + \epsilon_{ict}$, where Y_{ict} is the outcome of household i living in cluster c at time t, Δ_{Dic} is the time elapsed in months from the announcement to the intervention. Untargeted households are assigned the average Δ_D in their (closest treatment) cluster if located in a treatment (control) cluster. Δ_{Sic} is the time elapsed from the intervention until the interview date, and the dummy $\mathbb{T}_{ic}$ takes the value 1 if household i in cluster c is targeted. When available, Y_{ic0} is the value of the outcome at baseline, and X_{ic0} is a vector of covariates with the baseline variables that were unbalanced according to Online Appendix Tables A2 and A1. Columns 2-6 for rows labeled "Without Δ_D" report the coefficients and standard errors in parenthesis os the same regression without Δ_D and its interaction with $\mathbb{T}$: $Y_{ict} = \gamma_{S0}\Delta_{Sic} + \gamma_T\mathbb{T}_{ic} + \gamma_{TS}\mathbb{T}_{ic} \times \Delta_{Sict} + \gamma_0 Y_{ic0} + X'_{ic0}\theta + \epsilon_{ict}$. The specifications also include municipality fixed effects. Standard errors in parentheses are clustered at the cluster level. Coefficients with *, **, and *** indicate that they are statistically significant at 10, 5, and 1%, respectively. .

Table 4: Parameter estimates

	Model:	(1) Neither adaptation nor disappointment		(3) Adaptation but no disappointment		(5) Adaptation and disappointment	
	Dep. Var.:	Dummy	Scale	Dummy	Scale	Dummy	Scale
Panel A: Satisfied with quality of housing							
Log Rental income	α_1	0.192***	0.823***	0.188***	0.821***	0.187***	0.821***
		(0.056)	(0.118)	(0.056)	(0.125)	(0.050)	(0.112)
Permanent Effect	β_P	0.087***	0.229***				
		(0.022)	(0.059)				
Transitory Effect	β_T			0.161***	0.312**	0.298***	0.612***
				(0.058)	(0.158)	(0.070)	(0.232)
Hedonic adaptation rate	δ_T			0.040	0.020	0.030**	0.021
				(0.024)	(4.667)	(0.014)	(0.109)
Delay Effect	β_D					0.122**	0.262*
						(0.052)	(0.148)
Cutoff 1	k_1		1.337***		1.357***		1.457***
			(0.489)		(0.506)		(0.468)
Cutoff 2	k_2		2.425***		2.445***		2.546***
			(0.499)		(0.506)		(0.475)
Cutoff 3	k_3		3.514***		3.535***		3.638***
			(0.490)		(0.511)		(0.475)
Cutoff 4	k_4		4.891***		4.912***		5.019***
			(0.501)		(0.506)		(0.491)
Panel B: Satisfied with quality of family life							
Log Rental income	α_1	0.165***	0.535***	0.164***	0.529***	0.164***	0.529***
		(0.052)	(0.127)	(0.049)	(0.129)	(0.057)	(0.126)
Permanent Effect	β_P	0.087***	0.369***				
		(0.022)	(0.074)				
Transitory Effect	β_T			0.117***	0.500***	0.120	0.520***
				(0.045)	(0.091)	(0.082)	(0.160)
Hedonic adaptation rate	δ_T			0.019	0.019*	0.019	0.019*
				(0.024)	(0.011)	(33.36)	(0.045)
Delay Effect	β_D					0.002	0.017
						(0.048)	(0.110)
Cutoff 1	k_1		-0.181		-0.155		-0.149
			(0.527)		(0.526)		(0.518)
Cutoff 2	k_2		0.962		0.989*		0.995*
			(0.527)		(0.531)		(0.517)
Cutoff 3	k_3		2.120***		2.147***		2.154***
			(0.532)		(0.529)		(0.514)
Cutoff 4	k_4		3.468***		3.497***		3.504***
			(0.534)		(0.538)		(0.511)

Notes: Panel A (B) uses satisfaction with overall house quality (quality of family life) as a measure of SWB. Odd-numbered columns estimate the following regression: $Y_{ict} = \alpha_0 + \alpha_1 \ln(v_{ic0}) + f(\Delta_{Sict}, \Delta_{Dic})\mathbb{T}_{ic} + X'_{ic}\theta + \epsilon_{ict}$ using a dummy as dependent variable Y_{ict} via a nonlinear least squares.This is our preferred specification. Even-numbered columns use a Likert scale as the dependent variable and estimate via a (non-linear) ordered probit a similar specification without the constant (see Online Appendix for details). Columns 1 and 2 use $f(\Delta_{Sict}, \Delta_{Dic}) = \beta_P$ for individual i in cluster c at time t. Columns 3 and 4 use $f(\Delta_{Sict}, \Delta_{Dic}) = \beta_T e^{-\delta_T \Delta_{Sict}}$, but restricting $\beta_P = 0$ as in both columns β_P is estimated at 0 when constrained to be non-negative ($\beta_P \geq 0$). Columns 5 and 6 use $f(\Delta_{Sict}, \Delta_{Dic}) = \beta_T e^{-\delta_T \Delta_{Sict}} + \beta_D(e^{-\Delta_{Dic}} - 1)$ and again $\beta_P = 0$ because it is estimated at 0 for both columns when constrained to be non-negative. Standard errors are bootstrapped with 100 replications, clustered at the cluster level, and reported below the coefficients in parentheses. Coefficients with *, **, and *** indicate that they are statistically significant at 10, 5, and 1%, respectively.

Table 5: Welfare gains in USD

Model:	(1) Neither adaptation nor disappointment	(2) Adaptation but no disappointment	(3) Adaptation and disappointment No Delay	(4) 25p	(5) 50p	(6) 75p
Panel A1: Satisfaction with quality of housing (Dummy)						
Month 0	19.73	47.25	136.85	62.60	55.39	54.37
	(13.92)	(20.85)	(43.42)	(24.71)	(22.90)	(22.64)
Month 12	19.73	24.10	70.70	24.95	20.51	19.87
	(13.92)	(15.02)	(26.75)	(15.23)	(14.11)	(13.95)
Month 24	19.73	13.18	40.33	7.66	4.49	4.04
	(13.92)	(12.26)	(19.10)	(10.87)	(10.08)	(9.96)
PV Gains	1381.47	719.35	2212.08	173.72	-24.04	-52.18
	(974.14)	(815.79)	(1191.78)	(678.35)	(628.54)	(621.45)
Panel A2: Satisfaction with quality of housing (Likert scale)						
Month 0	10.88	15.85	38.52	20.68	18.62	18.32
	(11.69)	(12.94)	(18.65)	(14.15)	(13.64)	(13.56)
Month 12	10.88	11.88	27.26	12.13	10.39	10.13
	(11.69)	(11.94)	(15.81)	(12.00)	(11.56)	(11.50)
Month 24	10.88	8.96	19.69	6.39	4.85	4.63
	(11.69)	(11.20)	(13.90)	(10.55)	(10.17)	(10.11)
PV Gains	761.67	424.88	951.53	115.13	18.63	4.59
	(818.03)	(741.61)	(874.27)	(663.60)	(639.29)	(635.75)
Panel B1: Satisfaction with quality of life (Dummy)						
Month 0	23.74	36.14	37.33	36.43	36.31	36.29
	(14.92)	(18.05)	(18.35)	(18.12)	(18.09)	(18.09)
Month 12	23.74	26.48	27.27	26.49	26.39	26.37
	(14.92)	(15.61)	(15.81)	(15.62)	(15.59)	(15.59)
Month 24	23.74	19.72	20.26	19.57	19.48	19.47
	(14.92)	(13.91)	(14.05)	(13.87)	(13.85)	(13.85)
PV Gains	1662.03	953.68	980.28	937.00	931.18	930.32
	(1044.81)	(874.81)	(881.51)	(870.61)	(869.14)	(868.92)
Panel B2: Satisfaction with quality of life (Likert scale)						
Month 0	34.53	54.91	58.31	55.73	55.39	55.34
	(17.64)	(22.78)	(23.63)	(22.98)	(22.90)	(22.88)
Month 12	34.53	38.84	40.97	38.86	38.58	38.54
	(17.64)	(18.73)	(19.26)	(18.73)	(18.66)	(18.65)
Month 24	34.53	28.15	29.54	27.75	27.51	27.48
	(17.64)	(16.03)	(16.38)	(15.93)	(15.87)	(15.87)
PV Gains	2417.59	1372.50	1442.51	1333.63	1319.13	1316.98
	(1235.13)	(980.30)	(997.94)	(970.51)	(966.86)	(966.32)

Notes: Panels A1 and A2 (B1 and B2) use satisfaction with overall house quality (quality of family life) as measures of SWB. Panels A1 and B1 use our preferred dummy variable, while Panels A2 and B2 use the Likert scale. Column 1 uses the model without adaptation nor disappointment in columns 1 and 2 of Table 2. Column 2 uses the model with adaptation but no disappointment in columns 3 and 4 of Table 2. Columns 3-6 use the model with adaptation and disappointment of columns 5 and 6 in Table 2 under different assumptions about the length of delays. Column 3 assumes no delays, column 4 a delay equal to the 25th percentile of the delay distribution (3 months), column 5 a delay equal to the median delay (5 months), and column 6 a delay equal to the 75th percentile of the delay distribution (8 months). The rows labeled Month n report the monthly welfare gains in month n. Standard errors are reported below the estimates in parentheses.

Online Appendix for Policy Evaluation using Subjective Well-being: Evidence from a Home Upgrading Project

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A. Estimation

We aim to estimate Equation (4) in the text when Y_{ict} is measured with a dummy or a Likert scale. When measured with a dummy, we use non-linear least squares (NLLS) or a probit model; when it is a scale, we use an ordered probit model. Here, we describe the log-likelihood for the ordered probit and probit models.

Let's first define H_{ict} as

$$H_{ict} = \alpha_0 + \alpha_1 \ln(v_{ic0}) + \alpha_2 Y_{ic0} + f(\Delta_{Sict}, \Delta_{Dic})\mathbb{T}_{ic} + X'_{ic}\theta, \tag{A1}$$

where all the variables and $f(\Delta_{Sict}, \Delta_{Dic})$ are defined in Section 4.

The probability that individual i in cluster c at time t reports satisfaction level $Y_{ict} = j$ for $j = 2, ..., 4$, when Y_{ict} is measured with a Likert scale, can be written as

$$\begin{aligned} p_{ictj} = \Pr(Y_{ict} = j) &= \Pr\left(\kappa_{j-1} < H_{ict} + u \leq \kappa_j\right) \\ &= \Phi\left(\kappa_j - H_{ict}\right) - \Phi\left(\kappa_{j-1} - H_{ict}\right), \end{aligned}$$

where $\Phi(\cdot)$ is the standard normal cumulative distribution function. When $j = 1$, then $p_{ictj} = \Phi\left(\kappa_1 - H_{ict}\right)$, and when $j = 5$, $p_{ictj} = 1 - \Phi\left(\kappa_4 - H_{ict}\right)$.

The log-likelihood can be written as

$$\ln L = \sum_{c=1}^{C} \sum_{i=1}^{N_c} I_j(Y_{ict}) \ln p_{ictj},$$

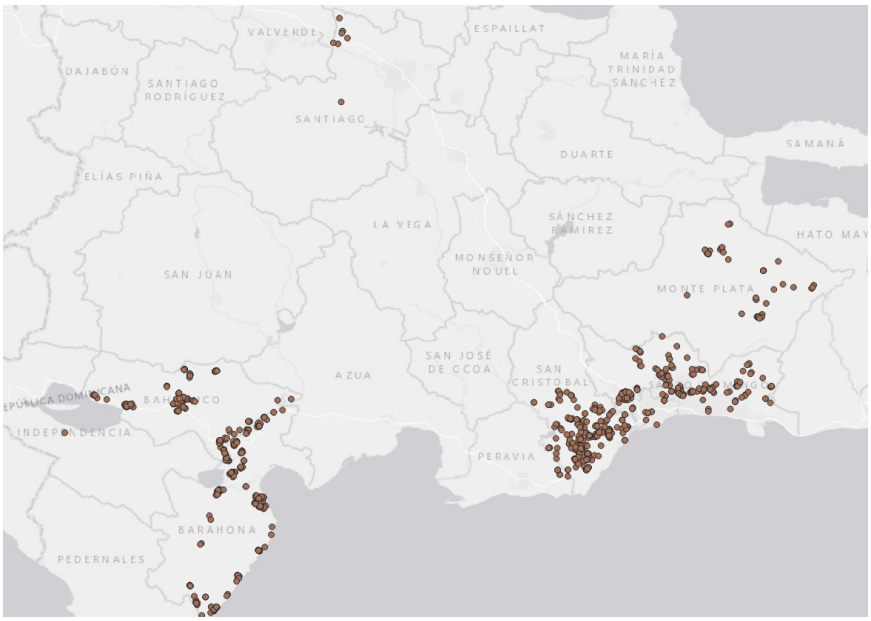
where

$$I_j(Y_{ict}) = \begin{cases} 1, & \text{if } Y_{ict} = j \\ 0, & \text{otherwise.} \end{cases}$$

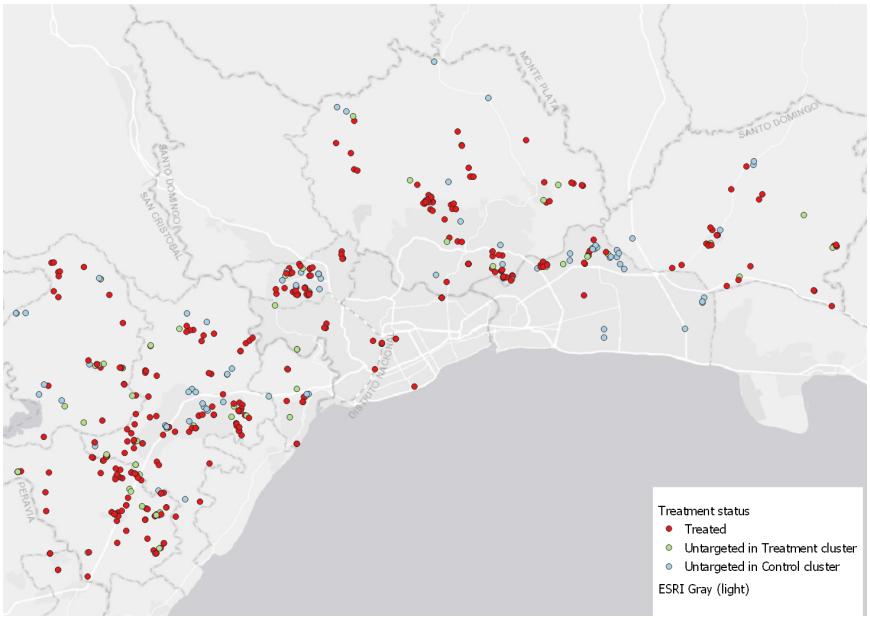
When Y_{ict} is measured with a dummy, the log-likelihood for the probit model is

$$\ln L = \sum_{c=1}^{C} \sum_{i=1}^{N_c} \ln \left(Y_{ict} \Phi(H_{ictj}) + (1 - Y_{ict}) \left(1 - \Phi(H_{ictj})\right)\right).$$

The coefficients in the log-likelihood $\alpha_0, \alpha_1, \alpha_2$ as well as $\beta_P, \beta_T, \beta_D$ and δ_T in $f(\Delta_{Sict}, \Delta_{Dic})$, vector θ and cutpoints $\kappa_j, j = 1, ..., 4$ (when the dependent variable is a Likert scale), are estimated using maximum likelihood. Since the monthly rental income at baseline v_{ic0} is a generated regressor (see Footnote 16 in the text), standard errors are bootstrapped and clustered at the cluster c level with 100 repetitions.



(a) All study municipalities



(b) Detail of two study municipalities

Notes: Panel (a) shows a map with the location of all study households and Panel (b) shows a map of two provinces with the location of study households in different colors depending on whether they were untargeted in either targeted or untargeted clusters (in grey and blue circles, respectively) or targeted households (in red circles).

Figure A1: Map with location of study clusters

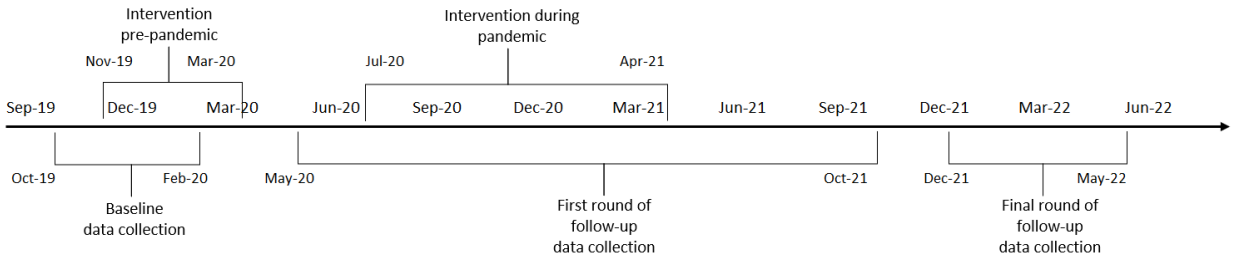
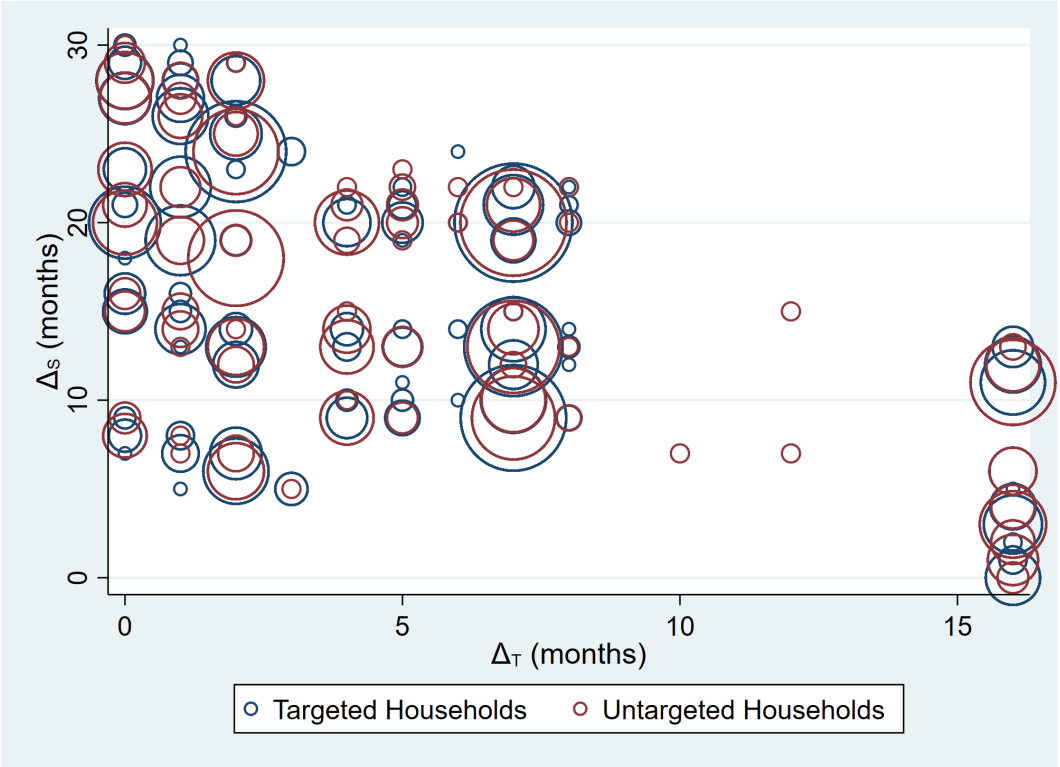


Figure A2: Timeline of Activities



Notes: This figure plots Δ_S against Δ_T in months for targeted (untargeted) households in blue (red) circles. The size of the circle indicates the number of observations with a given (Δ_T, Δ_S) combination.

Figure A3: Δ_S VS Δ_T

Table A1: Orthogonality Check: Δ_D

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Time elapsed from announcement until intervention (Δ_D)						
	Below Median		Above Median		p-value	p-value	p-value
	Untargeted HHs	Targeted HHs	Untargeted HHs	Targeted HHs	of t-test (1)=(2)	of t-test (3)=(4)	of t-test (1&2)=(3&4)
Household Characteristics							
Household size	3.340	3.467	3.292	3.500	0.502	0.272	0.887
Household head is female	0.403	0.403	0.526	0.514	0.934	0.843	0.377
Education of head of household (years)	2.780	2.789	3.381	2.837	0.836	0.082	0.450
Satisfied with overall house quality (1=Yes)	0.195	0.182	0.321	0.369	0.669	0.733	0.690
Satisfied with quality of the house floor (1=Yes)	0.088	0.041	0.168	0.134	0.111	0.248	0.888
Satisfied with wall quality (1=Yes)	0.138	0.110	0.197	0.251	0.522	0.321	0.471
Satisfied with roof quality (1=Yes)	0.126	0.123	0.191	0.221	0.877	0.704	0.518
Satisfied with quality of family life (1=Yes)	0.113	0.123	0.294	0.256	0.471	0.312	0.690
Quality of Life Index (ICV)	1.258	1.241	1.326	1.378	0.856	0.817	0.747
Hours at home per day	6.252	6.156	6.613	6.766	0.856	0.942	0.314
House Characteristics							
House with dirt floor (1=Yes)	0.843	0.887	0.803	0.803	0.190	0.799	0.246
Number of rooms in the house	2.472	2.613	2.599	2.483	0.192	0.683	0.530
Share of bedrooms with dirt floor	0.777	0.818	0.642	0.682	0.504	0.458	0.103
Walls are made of wood or zinc (1=Yes)	0.472	0.477	0.650	0.603	0.695	0.400	0.708
House is owned (1=Yes)	0.931	0.959	0.949	0.960	0.317	0.782	0.021
Monthly rent if leased (USD)	71.865	74.002	41.934	53.879	0.936	0.300	0.396
Most important repair was not floor upgrade (1=Yes)	0.415	0.315	0.511	0.557	0.140	0.372	0.402
F-test of joint significance (p-value)					0.737	0.313	0.654
Number of households	159	390	137	350	358	303	661

Notes: See Table 1 for variable definitions. For each characteristic, column 5 (6) reports the p-values of the t-test of equality of means between targeted and untargeted households below (above) the median. Column 7 reports the p-values of the t-test of equality of means between all households above and below the median. The bottom of column 5 (6) also reports the p-value of the F-test that all variables are joint significant when running a regression of a dummy with a value of 1 if the household is targeted and below (above) the median and 0 if untargeted and below (above) the median against all household and dwelling characteristics reported in the table. Column 7 reports the p-value of the same test with a dummy with a value of 1 if the household is below the median and 0 if it is above. Municipality fixed effects are included. Standard errors are clustered at the cluster level. (*** $p<0.01$, ** $p<0.05$, * $p<0.1$).

Table A2: Orthogonality Check: Δ_S

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Time elapsed from intervention until follow-up interview (Δ_S)						
	Below Median		Above Median		p-value	p-value	p-value
	Untargeted HHs	Targeted HHs	Untargeted HHs	Targeted HHs	of t-test (1)=(2)	of t-test (3)=(4)	of t-test (1&2)=(3&4)
Household Characteristics							
Household size	3.356	3.519	3.279	3.442	0.140	0.238	0.745
Household head is female	0.503	0.481	0.415	0.428	0.753	0.892	0.461
Education of head of household (years)	3.207	2.788	2.914	2.839	0.297	0.830	0.256
Satisfied with overall house quality (1=Yes)	0.289	0.333	0.218	0.201	0.180	0.515	0.148
Satisfied with quality of the house floor (1=Yes)	0.148	0.121	0.102	0.045	0.427	0.069	0.068
Satisfied with wall quality (1=Yes)	0.161	0.222	0.170	0.127	0.129	0.214	0.570
Satisfied with roof quality (1=Yes)	0.176	0.205	0.136	0.130	0.412	0.522	0.288
Satisfied with quality of family life (1=Yes)	0.236	0.227	0.156	0.142	0.973	0.615	0.611
Quality of Life Index (ICV)	1.333	1.332	1.245	1.278	0.784	0.739	0.738
Hours at home per day	6.718	6.630	6.116	6.241	0.718	0.878	0.546
House Characteristics							
House with dirt floor (1=Yes)	0.826	0.809	0.823	0.890	0.742	0.188	0.880
Number of rooms in the house	2.517	2.488	2.544	2.620	0.914	0.409	0.099
Share of bedrooms with dirt floor	0.680	0.703	0.749	0.809	0.667	0.358	0.836
Walls are made of wood or zinc (1=Yes)	0.664	0.579	0.442	0.490	0.026	0.141	0.263
House is owned (1=Yes)	0.946	0.964	0.932	0.955	0.922	0.791	0.385
Monthly rent if leased (USD)	36.502	53.645	79.191	76.543	0.210	0.809	0.794
Most important repair was not floor upgrade (1=Yes)	0.510	0.496	0.408	0.357	0.946	0.556	0.361
F-test of joint significance (p-value)					0.277	0.810	0.355
Number of households	149	387	147	353	335	326	661

Notes: See Table 1 for variable definitions. For each characteristic, column 5 (6) reports the p-values of the t-test of equality of means between targeted and untargeted households below (above) the median. Column 7 reports the p-values of the t-test of equality of means between all households above and below the median. The bottom of column 5 (6) also reports the p-value of the F-test that all variables are joint significant when running a regression of a dummy with a value of 1 if the household is targeted and below (above) the median and 0 if untargeted and below (above) the median against all household and dwelling characteristics reported in the table. Column 7 reports the p-value of the same test with a dummy with a value of 1 if the household is below the median and 0 if it is above. Municipality fixed effects are included. Standard errors are clustered at the cluster level. (*** $p<0.01$, ** $p<0.05$, * $p<0.1$).

Table A3: Reduced-form results for untargeted households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep.var. among untargeted HHs in control clusters	Δ_D	Δ_S	Untargeted HH in Treated Cluster (1=Yes)	$\Delta_D x \mathbb{TC}$	$\Delta_S x \mathbb{TC}$	N. Obs	N. HHs
	Mean *SD*	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)		
Panel A. Take-up of Program								
Household received home improvements from any organization	*0.166*	0.003	0.002	0.026	-0.003	-0.001	480	290
	0.208	(0.006)	(0.001)	(0.037)	(0.002)	(0.002)		
Share of rooms with dirt floor	*0.324*	-0.019	-0.007**	-0.103	0.004	0.008	484	294
	0.137	(0.020)	(0.003)	(0.109)	(0.008)	(0.005)		
Walls recently painted (1=Yes)	*0.154*	-0.003	0.002	0.033	-0.003	-0.001	480	290
	0.259	(0.004)	(0.001)	(0.037)	(0.002)	(0.002)		
Panel B. Satisfaction with housing quality affected by program								
Satisfied with overall house quality (1=Yes)	*0.445*	0.015	0.006	-0.071	0.007	-0.001	484	294
	0.089	(0.021)	(0.006)	(0.180)	(0.013)	(0.007)		
Satisfied with floor quality (1=Yes)	*0.406*	0.012	0.001	-0.200	0.019*	0.003	484	294
	0.135	(0.028)	(0.004)	(0.145)	(0.009)	(0.006)		
Satisfied with wall color (1=Yes)	*0.367*	0.008	-0.004	-0.046	0.002	0.004	484	294
	0.101	(0.025)	(0.004)	(0.136)	(0.009)	(0.005)		
Panel C. Satisfaction with housing quality not affected by program								
Satisfied with wall material (1=Yes)	*0.355*	-0.006	-0.000	0.002	0.006	-0.001	484	294
	0.064	(0.025)	(0.004)	(0.147)	(0.009)	(0.006)		
Satisfied with roof quality (1=Yes)	*0.391*	-0.002	0.002	0.151	-0.011	-0.006	484	294
	0.073	(0.025)	(0.004)	(0.145)	(0.009)	(0.006)		
Panel D. Satisfaction and Trust								
Satisfied with quality of family life in the house (1=Yes)	*0.400*	-0.012	-0.002	-0.030	0.001	0.002	484	294
	0.063	(0.024)	(0.004)	(0.159)	(0.010)	(0.006)		
Trust in others (from 1 to 10)	*3.085*	0.380**	0.067*	-0.787	-0.053	0.067	484	294
	0.085	(0.165)	(0.034)	(1.194)	(0.069)	(0.052)		
Monthly rent if leased (USD)	*25.71*	6.985*	0.862***	-11.923	0.896	0.366	279	172
	0.231	(3.570)	(0.304)	(11.119)	(1.072)	(0.456)		

Notes: This table replicates Table 3 using only the sample of untargeted households. See Table 1 for variable definitions. Columns 2-6 report the coefficients and standard errors in parenthesis from the following regression: $Y_{ict} = \gamma_{T0}\Delta_{Dic} + \gamma_{S0}\Delta_{Sic} + \gamma_T \mathbb{TC}_{ic} + \gamma_{TT}\mathbb{TC}_{ic} \times \Delta_{Dic} + \gamma_{TS}\mathbb{TC}_{ic} \times \Delta_{Sict} + \gamma_0 Y_{ic0} + X'_{ic0}\theta + \epsilon_{ict}$, where Y_{ict} is the outcome of household i in cluster c at time t, Δ_{Dic} is the time elapsed in months from the assigned date of the announcement until the assigned date of the intervention. Untargeted households in treated clusters are assigned the average Δ_D in their cluster. Otherwise, they are assigned the average Δ_D of the closest treated cluster. Δ_S is the time elapsed from the assigned intervention date until the interview date, and the dummy $\mathbb{TC}_{ic}$ takes the value 1 if cluster c where untargeted household i lives is treated. When available, Y_{ic0} is the value of the outcome at baseline, and X_{ic0} is a vector of covariates with the baseline variables that were unbalanced according to Online Appendix Tables A2 and A1. The specification also includes municipality fixed effects. Standard errors in parentheses are clustered at the cluster level. Coefficients with *, **, and *** indicate that they are statistically significant at 10, 5, and 1%, respectively.

Table A4: Reduced-form results of delay on satisfaction, no fixed effects

	(1) Dep.var. among untargeted HHs	(2) Δ_D	(3) Δ_S	(4) $\mathbb{T}$	(5) $\Delta_D x \mathbb{T}$	(6) $\Delta_S x \mathbb{T}$	(7) N. Obs	(8) N. HHs
	Mean *SD*	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)		
Panel A. Take-up of Program								
Household received home improvements from PROSOLI	*0.000*	0.000	0.000	0.735***	-0.007	0.000	1,629	1007
	0.000	(.)	(.)	(0.045)	(0.004)	(0.002)		
Household received home improvements from any organization	*0.0229*	-0.001	0.002	0.733***	-0.006	-0.001	1,629	1007
	0.150	(0.001)	(0.001)	(0.045)	(0.004)	(0.002)		
Share of rooms with dirt floor	*0.378*	0.001	-0.004	-0.311***	0.003	0.005*	1,658	1036
	0.326	(0.004)	(0.002)	(0.064)	(0.005)	(0.003)		
Walls recently painted (1=Yes)	*0.0187*	-0.001	0.002*	0.700***	-0.005	-0.002	1,629	1007
	0.136	(0.001)	(0.001)	(0.046)	(0.004)	(0.002)		
Floor recently upgraded / repaired (1=Yes)	*0.000*	0.000	0.000	0.727***	-0.007	0.001	1,629	1007
	0.000	(.)	(.)	(0.045)	(0.004)	(0.002)		
Panel B. Satisfaction with housing quality affected by program								
Satisfied with overall house quality (1=Yes)	*0.246*	0.002	0.006*	0.407***	-0.014**	-0.015***	1,658	1036
	0.431	(0.006)	(0.003)	(0.092)	(0.007)	(0.004)		
Satisfied with floor quality (1=Yes)	*0.198*	-0.007	0.003	0.585***	-0.009	-0.012***	1,658	1036
	0.399	(0.004)	(0.003)	(0.087)	(0.006)	(0.004)		
Satisfied with wall color (1=Yes)	*0.159*	-0.004	-0.001	0.401***	-0.011**	-0.009**	1,658	1036
	0.366	(0.004)	(0.003)	(0.081)	(0.005)	(0.004)		
Panel C. Satisfaction with housing quality not affected by program								
Satisfied with wall material (1=Yes)	*0.169*	-0.006*	-0.001	0.150*	0.001	-0.004	1,658	1036
	0.376	(0.004)	(0.003)	(0.082)	(0.005)	(0.004)		
Satisfied with roof quality (1=Yes)	*0.184*	-0.010**	0.000	0.112	-0.000	-0.005	1,658	1036
	0.388	(0.004)	(0.003)	(0.078)	(0.005)	(0.003)		
Panel D. Satisfaction and Trust								
Satisfied with quality of family life (1=Yes)	*0.205*	-0.009*	0.000	0.226**	-0.002	-0.007*	1,658	1036
	0.404	(0.005)	(0.003)	(0.088)	(0.006)	(0.004)		
Trust in others (from 1 to 10)	*6.543*	0.135***	0.103***	1.267*	-0.091**	-0.061**	1,658	1036
	3.156	(0.034)	(0.025)	(0.660)	(0.043)	(0.031)		
Monthly rent if leased (USD)	*34.88*	2.156***	1.090***	8.313	-0.275	-0.233	965	611
	26.06	(0.384)	(0.218)	(5.655)	(0.520)	(0.267)		

Notes: This table replicates Table 3 without municipality fixed effects. See Table 1 for variable definitions. Columns 2-6 report the coefficients and standard errors in parenthesis from the following regression: $Y_{ict} = \gamma_{T0}\Delta_{Dic} + \gamma_{S0}\Delta_{Sic} + \gamma_T \mathbb{T}_{ic} + \gamma_{TT}\mathbb{T}_{ic} \times \Delta_{Dic} + \gamma_{TS}\mathbb{T}_{ic} \times \Delta_{Sict} + \gamma_0 Y_{ic0} + X'_{ic0}\theta + \epsilon_{ict}$, where Y_{ict} is the outcome of household i living in cluster c at time t, Δ_{Dic} is the time elapsed in months from the announcement to the intervention. Untargeted households are assigned the average Δ_D in their (closest treatment) cluster if located in a treatment (control) cluster. Δ_{Sic} is the time elapsed from the intervention until the interview date, and the dummy $\mathbb{T}_{ic}$ takes the value 1 if household i in cluster c is targeted. When available, Y_{ic0} is the value of the outcome at baseline, and X_{ic0} is a vector of covariates with the baseline variables that were unbalanced according to Online Appendix Tables A2 and A1. Standard errors in parentheses are clustered at the cluster level. Coefficients with *, **, and *** indicate that they are statistically significant at 10, 5, and 1%, respectively.

Table A5: Reduced-form results of delay on satisfaction, balanced panel sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep.var. among untargeted HHs	Δ_D	Δ_S	$\mathbb{T}$	$\Delta_D x \mathbb{T}$	$\Delta_S x \mathbb{T}$	N. Obs	N. HHs
	Mean *SD*	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)	Coef. (s.e.)		
Panel A. Take-up of Program								
Household received home improvements from PROSOLI	*0.000* *0.000*	-0.014 (0.017)	-0.000 (0.001)	0.711*** (0.049)	-0.004 (0.005)	0.001 (0.001)	1,244	622
Household received home improvements from any organization	*0.0158* *0.125*	-0.018 (0.017)	0.001 (0.001)	0.708*** (0.050)	-0.002 (0.005)	-0.000 (0.002)	1,244	622
Share of rooms with dirt floor	*0.379* *0.330*	-0.006 (0.014)	-0.006** (0.003)	-0.283*** (0.067)	-0.001 (0.005)	0.004 (0.003)	1,244	622
Walls recently painted (1=Yes)	*0.0158* *0.125*	-0.010 (0.018)	0.001 (0.001)	0.649*** (0.053)	-0.001 (0.005)	-0.000 (0.002)	1,244	622
Floor recently upgraded / repaired (1=Yes)	*0.000* *0*	-0.016 (0.017)	-0.001 (0.001)	0.712*** (0.049)	-0.004 (0.005)	0.001 (0.002)	1,244	622
Panel B. Satisfaction with housing quality affected by program								
Satisfied with overall house quality (1=Yes)	*0.229* *0.421*	0.025* (0.015)	0.005 (0.004)	0.455*** (0.105)	-0.015** (0.007)	-0.016*** (0.004)	1,244	622
Satisfied with floor quality (1=Yes)	*0.187* *0.390*	0.029* (0.017)	0.005 (0.004)	0.677*** (0.109)	-0.012 (0.008)	-0.016*** (0.005)	1,244	622
Satisfied with wall color (1=Yes)	*0.153* *0.360*	0.009 (0.013)	-0.003 (0.003)	0.415*** (0.091)	-0.015** (0.006)	-0.008** (0.004)	1,244	622
Panel C. Satisfaction with housing quality not affected by program								
Satisfied with wall quality (1=Yes)	*0.150* *0.358*	0.007 (0.013)	-0.001 (0.003)	0.209** (0.106)	-0.004 (0.007)	-0.004 (0.004)	1,244	622
Satisfied with roof quality (1=Yes)	*0.166* *0.372*	0.008 (0.014)	-0.000 (0.003)	0.169* (0.096)	-0.003 (0.006)	-0.005 (0.004)	1,244	622
Panel D. Satisfaction and Trust								
Satisfied with quality of family life (1=Yes)	*0.187* *0.390*	0.005 (0.015)	0.000 (0.003)	0.200* (0.101)	-0.001 (0.007)	-0.005 (0.004)	1,244	622
Trust in others (from 1 to 10)	*6.647* *3.165*	0.149 (0.137)	0.096*** (0.028)	1.389* (0.790)	-0.125** (0.051)	-0.056 (0.036)	1,244	622
Monthly rent if leased (USD)	*35.44* *25.41*	2.222 (1.570)	1.022*** (0.238)	15.037** (7.237)	-0.414 (0.672)	-0.355 (0.280)	725	371

Notes: This table replicates Table 3 using the balanced sample of respondents with both rounds of follow-up data. See Table 1 for variable definitions. Columns 2-6 report the coefficients and standard errors in parenthesis from the following regression: $Y_{ict} = \gamma_{T0}\Delta_{Dic} + \gamma_{S0}\Delta_{Sic} + \gamma_T \mathbb{T}_{ic} + \gamma_{TT}\mathbb{T}_{ic} \times \Delta_{Dic} + \gamma_{TS}\mathbb{T}_{ic} \times \Delta_{Sict} + \gamma_0 Y_{ic0} + X'_{ic0}\theta + \epsilon_{ict}$, where Y_{ict} is the outcome of household i living in cluster c at time t, Δ_{Dic} is the time elapsed in months from the announcement to the intervention. Untargeted households are assigned the average Δ_D in their (closest treatment) cluster if located in a treatment (control) cluster. Δ_{Sic} is the time elapsed from the intervention until the interview date, and the dummy $\mathbb{T}_{ic}$ takes the value 1 if household i in cluster c is targeted. When available, Y_{ic0} is the value of the outcome at baseline, and X_{ic0} is a vector of covariates with the baseline variables that were unbalanced according to Online Online Appendix Tables A2 and A1. The specification also includes municipality fixed effects. Standard errors in parentheses are clustered at the cluster level. Coefficients with *, **, and *** indicate that they are statistically significant at 10, 5, and 1%, respectively.

Table A6: Parameter estimates using SWB measured with dummy variable

		(1)	(2)	(3)	(4)	(5)	(6)
	Model:	Neither adaptation nor disappointment		Adaptation but no disappointment		Adaptation and disappointment	
	Model:	NLLS	Probit	NLLS	Probit	NLLS	Probit
Panel A: Satisfied with quality of housing							
Log Rental income	α_1	0.192***	0.538***	0.188***	0.527***	0.187***	0.527***
		(0.056)	(0.149)	(0.056)	(0.164)	(0.050)	(0.139)
Permanent Effect	β_P	0.087***	0.262***				
		(0.022)	(0.091)				
Transitory Effect	β_T			0.161***	0.454***	0.298***	0.837**
				(0.058)	(0.156)	(0.070)	(0.347)
Hedonic adaptation rate	δ_T			0.040	0.036	0.030**	0.029
				(0.024)	(0.061)	(0.014)	(1.938)
Delay Effect	β_D					0.122**	0.339
						(0.052)	(0.225)
Panel B: Satisfied with quality of family life							
Log Rental income	α_1	0.165***	0.492***	0.164***	0.487***	0.164***	
		(0.052)	(0.127)	(0.049)	(0.161)	(0.057)	
Permanent Effect	β_P	0.087***	0.279***				
		(0.022)	(0.082)				
Transitory Effect	β_T			0.117***	0.359***	0.120	
				(0.045)	(0.122)	(0.082)	
Hedonic adaptation rate	δ_T			0.019	0.016	0.019	
				(0.024)	(0.113)	(33.36)	
Delay Effect	β_D					0.002	
						(0.048)	

Notes: Panel A (B) uses satisfaction with overall house quality (quality of family life) as a measure of SWB. Odd-numbered columns replicate the odd-numbered columns of Table 4 estimated via nonlinear least squares. Even-numbered columns use the same dummy as the dependent variable Y_{ict} but estimate Equation 4 in the text using a (non-linear) probit. Columns 1 and 2 use $f(\Delta_{Sict}, \Delta_{Dic}) = \beta_P$ for individual i in cluster c at time t. Columns 3 and 4 use $f(\Delta_{Sict}, \Delta_{Dic}) = \beta_T e^{-\delta_T \Delta_{Sict}}$, but restricting $\beta_P = 0$ as in both columns β_P is estimated at 0 when constrained to be non-negative ($\beta_P \geq 0$). Columns 5 and 6 use $f(\Delta_{Sict}, \Delta_{Dic}) = \beta_T e^{-\delta_T \Delta_{Sict}} + \beta_D(e^{-\Delta_{Dic}} - 1)$ and again $\beta_P = 0$ because it is estimated at 0 for both columns when constrained to be non-negative. Standard errors are bootstrapped with 100 replications, clustered at the cluster level and reported below the coefficients in parentheses. Coefficients with *, ** and *** indicate that they are statistically significant at the 10, 5 and 1%, respectively.

Table A7: Orthogonality Check: Households with and without children

	(1) HH with children	(2)	(3) HH without children	(4)	(5) p-value	(6) p-value	(7) p-value
	Untargeted HHs	Targeted HHs	Untargeted HHs	Targeted HHs	of t-test (1)=(2)	of t-test (3)=(4)	of t-test (1&2)=(3&4)
Household Characteristics							
Household size	4.885	5.312	2.350	2.492	0.074	0.105	0.000
Household head is female	0.522	0.558	0.421	0.400	0.509	0.599	0.000
Education of head of household (years)	3.414	3.261	2.838	2.567	0.819	0.176	0.000
Satisfied with overall house quality (1=Yes)	0.265	0.258	0.246	0.277	0.640	0.592	0.415
Satisfied with quality of the house floor (1=Yes)	0.142	0.096	0.115	0.079	0.459	0.123	0.076
Satisfied with wall quality (1=Yes)	0.195	0.181	0.148	0.174	0.731	0.434	0.102
Satisfied with roof quality (1=Yes)	0.168	0.162	0.148	0.174	0.820	0.776	0.451
Satisfied with quality of family life (1=Yes)	0.212	0.173	0.187	0.193	0.444	0.755	0.350
Quality of Life Index (ICV)	1.275	1.329	1.298	1.295	0.405	0.615	0.246
Hours at home per day	6.469	6.435	6.388	6.450	0.726	0.972	0.774
House Characteristics							
House with dirt floor (1=Yes)	0.841	0.838	0.814	0.852	0.694	0.248	0.891
Number of rooms in the house	2.743	2.738	2.399	2.450	0.935	0.315	0.000
Share of bedrooms with dirt floor	0.721	0.750	0.710	0.756	0.916	0.306	0.847
Walls are made of wood or zinc (1=Yes)	0.504	0.508	0.585	0.552	0.862	0.557	0.181
House is owned (1=Yes)	0.903	0.946	0.962	0.967	0.231	0.964	0.046
Monthly rent if leased (USD)	55.753	81.805	59.896	54.957	0.556	0.791	0.270
Most important repair was not floor upgrade (1=Yes)	0.451	0.450	0.464	0.419	0.640	0.354	0.279
F-test of joint significance (p-value)					0.969	0.633	0.000
Number of households	113	260	183	480	257	404	661

Notes: See Table 1 for variable definitions. For each characteristic, column 5 (6) reports the p-values of the t-test of equality of means between targeted and untargeted households with (without) children up to 10 years old. Column 7 reports the p-values of the t-test of equality of means between all households with or without children. The bottom of column 5 (6) also reports the p-value of the F-test that all variables are joint significant when running a regression of a dummy with a value of 1 if the household is targeted and with (without) children and 0 if untargeted and below (above) the median against all household and dwelling characteristics reported in the table. Column 7 reports the p-value of the same test with a dummy with a value of 1 if the household is below the median and 0 if it is above. Municipality fixed effects are included. Standard errors are clustered at the cluster level. (*** $p<0.01$, ** $p<0.05$, * $p<0.1$).

Table A8: Structural estimates by presence of children

SWB measure:	(1)	(2)	(3)	(4)	(5)	(6)
	Satisfied with overall house quality (1=Yes)			Satisfied with quality of family life (1=Yes)		
Sample:	Households with Children	Households without Children	p-value (1) = (2)	Households with Children	Households without Children	p-value (4) = (5)
Panel A: Dep. Var. is a dummy						
Permanent Effect	0.453	0.000	0.205	0.326	0.000	0.534
	(0.357)	(N/A)		(0.524)	(N/A)	
Transitory Effect	0.303	0.813***	0.380	0.207	0.163	0.954
	(0.543)	(0.305)		(0.707)	(0.231)	
Delay Effect	0.307	0.373*	0.836	0.161	0.000	0.286
	(0.216)	(0.217)		(0.245)	(N/A)	
Panel B: Dep. Var is a Likert scale						
Permanent Effect	0.234	0.000	0.516	0.115	0.000	0.747
	(0.360)	(N/A)		(0.357)	(N/A)	
Transitory Effect	0.429	0.533**	0.846	0.580	0.381**	0.699
	(0.519)	(0.217)		(0.495)	(0.192)	
Delay Effect	0.291	0.228	0.800	0.199	0.000	0.139
	(0.179)	(0.170)		(0.158)	(N/A)	

Notes: Columns 1-3 (4-6) use satisfaction with overall house quality (quality of family life) as measures of SWB. Columns 1 and 4 use the 614 (of the total 1,658 panel observations) of households with children up to age 10. Columns 2 and 5 use the 1,044 panel observations of households without children. Panel A (B) reports the structural parameter estimates of the permanent, transitory and delay effect in $f(\Delta_{Sict}, \Delta_{Dic}) = \beta_{PK}\mathbb{1}_{icK} + (\beta_T + \beta_{TK}\mathbb{1}_{icK})e^{-\delta_T \Delta_{Sict}} + (\beta_D + \beta_{DK}\mathbb{1}_{icK})(e^{-\Delta_{Dic}} - 1)$ when the the proxy for SWB is a dummy (Likert scale). Parameters $\beta_P = 0$ and δ_T are fixed to the values in the specifications of columns 5 and 6 of Table 4, depending on the SWB measure used. The permanent effect in columns 1 and 4 is β_{PK} (because $\beta_P = 0$ in columns 2 and 5). The transitory effect in columns 1 and 4 (2 and 5) is $\beta_T + \beta_{TK}$ (β_T) while the delay effect in columns 1 and 4 (2 and 5) is $\beta_D + \beta_{DK}$ (β_D). Columns 3 and 6 report the p-value of a test that the coefficient $\beta_{jK} = 0$, for $j = P, T$ or D. Standard errors are bootstrapped with 100 replications, clustered at the cluster level and reported below the coefficients in parentheses. Coefficients with *, ** and *** indicate that they are statistically significant at the 10, 5 and 1%, respectively.

Table A9: Welfare gains using SWB measured with dummy variable

Model:	(1) Neither adaptation nor disappointment	(2) Adaptation but no disappointment	(3) Adaptation and disappointment No Delay	(4) 25p	(5) 50p	(6) 75p
Panel A1: Satisfaction with quality of housing (NL regression from Table 3)						
Month 0	19.73	47.25	136.85	62.60	55.39	54.37
	(13.92)	(20.85)	(43.42)	(24.71)	(22.90)	(22.64)
Month 12	19.73	24.10	70.70	24.95	20.51	19.87
	(13.92)	(15.02)	(26.75)	(15.23)	(14.11)	(13.95)
Month 24	19.73	13.18	40.33	7.66	4.49	4.04
	(13.92)	(12.26)	(19.10)	(10.87)	(10.08)	(9.96)
PV Gains	1381.47	719.35	2212.08	173.72	-24.04	-52.18
	(974.14)	(815.79)	(1191.78)	(678.35)	(628.54)	(621.45)
Panel A2: Satisfaction with quality of housing (Probit)						
Month 0	21.64	47.67	136.42	63.16	56.02	55.00
	(14.40)	(20.95)	(43.31)	(24.85)	(23.06)	(22.80)
Month 12	21.64	25.84	72.37	26.41	21.92	21.29
	(14.40)	(15.45)	(27.17)	(15.60	(14.47)	(14.31)
Month 24	21.64	14.87	42.11	9.04	5.82	5.35
	(14.40)	(12.69)	(19.55)	(11.22)	(10.41)	(10.29)
PV Gains	1515.12	783.71	2277.82	233.84	34.53	6.15
	(1007.81)	(832.00)	(1208.34)	(693.50)	(643.29)	(636.14)
Panel B1: Satisfaction with quality of life (NL regression from Table 3)						
Month 0	23.74	36.14	37.33	36.43	36.31	36.29
	(14.92)	(18.05)	(18.35)	(18.12)	(18.09)	(18.09)
Month 12	23.74	26.48	27.27	26.49	26.39	26.37
	(14.92)	(15.61)	(15.81)	(15.62)	(15.59)	(15.59)
Month 24	23.74	19.72	20.26	19.57	19.48	19.47
	(14.92)	(13.91)	(14.05)	(13.87)	(13.85)	(13.85)
PV Gains	1662.03	953.68	980.28	937.00	931.18	930.32
	(1044.81)	(874.81)	(881.51)	(870.61)	(869.14)	(868.92)
Panel B2: Satisfaction with quality of life (Probit)						
Month 0	26.49	37.91				
	(15.61)	(18.49)				
Month 12	26.49	29.04				
	(15.61)	(16.26)				
Month 24	26.49	22.53				
	(15.61)	(14.62)				
PV Gains	1854.37	1101.05				
	(1093.26)	(911.93)				

Notes: Panels A1 and A2 (B1 and B2) use the dummy variable of satisfaction with overall house quality (quality of family life) as measures of SWB. Panels A1 and B1 replicate the results in Table 3, estimating the model with a nonlinear regression. use our preferred dummy variable, while Panels A2 and B2 use the Likert scale. Column 1 uses the model without adaptation nor disappointment in columns 1 and 2 of Table 2. Column 2 uses the model with adaptation but no disappointment in columns 3 and 4 of Table 2. Columns 3-6 use the model with adaptation and disappointment of columns 5 and 6 in Table 2 under different assumptions about the length of delays. Column 3 assumes no delays, column 4 a delay equal to the 25th percentile of the delay distribution (3 months), column 5 a delay equal to the median delay (5 months) and column 6 a delay equal to 75th percentile of the delay distribution (8 months). The rows labeled Month n report the monthly welfare gains in month n. Standard errors are reported below the estimates in parentheses.