CEIS Tor Vergata Research Papers

ISSN 2610-931X

CEIS Tor Vergata

RESEARCH PAPER SERIES

Vol. 20, Issue 3, No. 537 – August 2022

Exposure to Climate Shocks, Poverty and Happiness: The ”Three Little Pigs” Effect

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Exposure to climate shocks, poverty and happiness: the "three little pigs" effect

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Abstract

We evaluate the impact of climate shocks on household subjective wellbeing on a sample of farmers in a Small Island Developing State (SIDS) of the Pacific (the Solomon Islands). We find that both subjective (self-assessed exposure to climate shocks) and objective (past cumulative extended dry spells) environmental stress indicators significantly reduce respondent's subjective wellbeing. Using the compensating surplus approach we calculate that this loss requires several years of crop income to be compensated. Subjective wellbeing is more severely impacted for farmers with poor dwellings (ie. with thatch walls, signalling shelters less resistant to environmental shocks as in the well known Disney tale), below median income or durable asset and for farmers living more isolated and not being members of formal agricultural associations. Farmers hit by climate shocks experienced in significantly higher proportion nutrition problems in their households. These findings support the hypothesis of the strong interdependence between environmental and social shocks.

Keywords: climate shock, subjective wellbeing, compensating surplus, small scale Pacific islands.

JEL Codes: I31 (general welfare wellbeing); Q01 (sustainable development); Q20 renewable resources and conservation.

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1 Introduction

Evaluating and understanding the effects of climate threats on quality of life and the connections they have with social challenges is an under-investigated issue of paramount importance in the era of ecological transition.

A relatively unexplored direction of research in this field looks at the problem from the point of view of individuals with lower level of income and durable assets, a perspective different from that of individuals living in high income countries where it can be thought that sensitivity to the environmental problem is a luxury good (Martinez-Alier, 1995) as postulated by the environmental Kutznets curve literature (for a critique to it see Stern, 2004). From this point of view preferences of low income individuals in small scale island societies in the Pacific are particularly interesting given the relatively high vulnerability to natural disasters, environmental degradation and extreme climate events of this geographical area, as well as the challenges related to poor housing conditions and nutritional insecurity of its inhabitants.

Our paper provides an original contribution in this direction by evaluating the impact of climate shocks on subjective household wellbeing for a sample of rural farmers living in the Solomon Islands and calculating with the compensating surplus approach the amount needed to offset the subjective household wellbeing loss generated by exposure to climate shocks. A related research hypothesis in our empirical analysis is whether poorer income and wealth status is likely to amplify the negative climate shock effect and therefore whether there is interdependence between environmental and social concerns.

The approach followed in our work consists of measuring the economic surplus required to compensate the disutility arising from climate shocks based on subjective (household) wellbeing estimates. The literature on the determinants of subjective wellbeing has significantly grown in social sciences for several reasons. A main reason for it is that subjective wellbeing is a comprehensive measure that helps to discover neglected objective factors affecting life satisfaction, while having per se at the same time significant effects on objective outcomes. In addition to it, the focus on subjective wellbeing helps to broaden substantially the scope of socioeconomic research since life satisfaction depends on a much wider range of factors beyond revealed preferences in observable consumption choices such as, for instance, perceived risks, procedural utility, gap between expectations and realisations, mastery, intentionality, quality of relationships and missed alternatives.

The validity of the subjective wellbeing approach has been validated by several factors such as i) the positive and significant nexus between life satisfaction and/or happiness with heart responses to stress (Mayman and Manis, 1993), smiling attitudes and other healthy physical reactions (Pavot 1991, Eckman et al., 1990); ii) the observed choice to discontinue activities associated with low levels of well-being (Kahneman et al., 1993; Frijters, 2000; and Shiv and Huber, 2000); iii) the correlation between happiness scores provided by family and friends with the respondent own report (see Sandvik et al., 1993; Diener and Lucas, 1999). In addition to it, self-declared life satisfaction has been shown to produce the same effect as positive feelings on physical measures of brain activity (higher alfa power in the left parefrontal cortex) (Clark et al. 2016). Beyond identifying drivers of subjective wellbeing this empirical literature provides a relevant contribution in measuring shadow values of non market goods, going beyond the limit of contingent evaluation approaches. Using the compensating surplus approach from life satisfaction estimates several authors have calculated along this way the value of climate parameters (Maddison and Rehdanz, 2011), air pollution (Dolan and Laffan, 2016; Luechinger, 2010; Welsch, 2002; Zhang et al., 2017) and airport noise (Fujiwara et al., 2017; Van Praag and Baarsma, 2005).

To our knowledge the only paper looking at the effect of climate shocks on subjective wellbeing in a small scale island society is that of Lohman et al. (2019) who test the impact of environmental disamenities on a sample of subsistence farmers living in an autonomous region of Papua New Guinea. Differently from them we focus on a group of cocoa and coconut farmers having market access to sell their crops and other income sources arising from fishing activity, wages and self-employment of part of the household, plus private or government transfers. More specifically, we can calculate the magnitude of the effect of climate shock on subjective wellbeing in terms of income needed to compensate the fall in life satisfaction produced by environmental disamenities, while Lohman et al. (2019) focus on durable good indexes. We as well contribute originally by testing the hypothesis that exposure to climate shocks has stronger effects on subjective wellbeing of the poorest farmers in the sample (those with lower income, durable asset and poor dwellings).

Our results find support for the hypothesis of a significant nexus between climate shocks and subjective wellbeing when using both respondent's self-reported shocks and an objective measure proxying droughts such as cumulative dry spells in the last five years. We as well show that poor shelters, high altitude proxying farmer isolation, below median income, wealth measured in terms of durable good assets, and lack of membership of formal agricultural associations are crucial factors driving the negative nexus. The interdependence between climate and social shocks is confirmed when showing that respondents suffering from climate shocks report in significantly higher proportion nutrition problems in their household in the same period. With the compensating surplus approach we calculate that several years of crop income are needed to compensate the disutility arising from climate shocks.

2 Background and motivation

Small Island Developing States (SIDS) are a distinct group of developing countries that share common characteristics and challenges: smallness (limited land area), remoteness (relative isolation and connectivity problems), insularity (high sensitivity of the economy to external shocks), oceanic (high risks in receding land area) and diminishing availability of freshwater for agriculture. SIDS are constrained by structural economic, development, and environmental vulnerabilities and their challenges are exacerbated due to globalization and climate change. The geographical area under our inquiry (a small scale island society in the Pacific) is particularly vulnerable to the impact of climate change. Even though the most vivid image of it is represented by press conferences of prime ministers in the water to rise public opinion attention on sea level rise, the environmental vulnerability in these areas covers several other dimensions that include high exposure to tropical cyclones and storms, droughts due to longer dry spells, ocean acidification and salt water inundation (Leal Filho et al. 2020; CSIRO, 2011). Solomon Islands consist of 996 islands spanning a distance of 1 450 kilometers with a land area approximately of 28 480 square kilometers (Coleman and Kroenke, 1981). To date, Solomon Islands have a population of around 686 878 inhabitants, nominal GDP is estimated at approximately 1.546 billion USD (2 258.40 per capita) USD (World Bank, 2020). Extreme climate events like tropical cyclones and associated storm surges (Fritz and Kalligeris, 2008), changing rainfall patterns, droughts, floods (Keen and McNeil, 2016) rising sea levels (Birk, 2012), salt water inundation (Birk and Rasmussen, 2014), heat stress and ocean acidification affect all sectors of the country's economy (Lal et al., 2009) and represent a real threat to the socio-economic development and well-being of the country. For these reasons, Solomon Islands are extremely vulnerable to the adverse impacts of climate change (Barnett, 2011) and heavily dependent on donors in most development programs. For all these reasons the need to intervene through climate change adaptation measures is broadly agreed by scholars and scientists all over the world and strongly sustained by the local government (Leal Filho et al., 2020).

3 Descriptive statistics

We use data from a sample of around 1,300 farmers located in three provinces of the Solomon Islands: Guadalcanal, Makira/Ulawa, and Malaita. Data have been collected between the 9th of July and 3rd of October 2021 as part of the activities of the IFAD's Impact Assessment on the project "Rural Development Programme - Phase II (RDP II)".

The interviews occurred in a difficult period and soon after the consequences of the COVID-19 that in the Solomon Island were exacerbated by the contextual Tropical Cyclone Harold (TC) hitting the country on April 2, 2020, two weeks after the pandemic was declared on March 11, 2020. TC Harold caused strong damage to crops, food gardens, housing, buildings and roads across Honiara, Western Province, Guadalcanal, Makira/Ulawa, Rennell and Bellona therefore some of the Provinces of the RDP II study.

Descriptive statistics of the sample are provided in Table 2, while variable legend in Table 1. Education levels are extremely low since around one half of respondents has only six years of education corresponding to elementary school attendance, 17 percent no education at all, only 23 percent high education and 10 percent more than that. The average number of household members is 5.4, 85 percent of the respondents are married, while the strong gender imbalance among respondents (10 percent female only) depends on the fact that household heads are mainly male due to local culture characteristics. The average respondent age is 46 years. Gross yearly household income[1] is 24 099.00 dollars in local currency unit (LCU), corresponding approximately to 7.49 US dollars per day per household (at the exchange rate of 30th July 2021 of 8.06 LCU per US dollar) which corresponds to an individual income of 1.51 dollars per day in PPP, 20 percent below the per capita 1.90 dollars per day, the International Poverty Line revisited by Ravallion et al.(2011)[2]. The average official standard of living of Solomon Islands is estimated at 2020

[1]The measurement of yearly gross household income is assisted by experts administering the survey in place and is created as a sum of values on the different estimated sources of income.

[2]It is the headline poverty threshold, and defines the World Bank's goal of ending global extreme poverty by 2030.

is 2.62 dolllars per day in PPP confirming that IFAD rural development projects target the poorest farmers. What has however to be considered is also that the survey occurs during the COVID-19 pandemics that reduced farmers access to product market and thereby their wage and self-employment income sources. As well, the actual standard of living of respondents is slightly higher if we evaluate at market prices the relevant share of cocoa, coconut and fishing that is self-consumed. When we compute farmers income augmented by the market value of self-consumed cocoa and coconut crops (using average sale prices in kg at the household market village) we estimate that the value of self-consumption adds around 10 percent to household income from all sources.

Our dependent variable is subjective wellbeing measured as the respondent's evaluation of quality of life of her/his household. [3] This variable is quite different from the standard cognitive subjective wellbeing indicator used to measure life satisfaction. Its distribution is as well different, not right skewed, as almost all the observed life satisfaction sampling distributions, and closer to a normal distribution with a mode around the central value of five.

A crucial issue in our research is whether using objective or subjective data of climate shocks. The available subjective measure is the response on whether the household suffered a climate shock in the last year. We do not have an explicit question about it but it is likely that some of the respondents have in mind the Harold typhoon when answering to this question. Subjective perception of exposure to climate shocks and of their impact on respondent's living situation provides however, to our opinion, a much richer information than that related to a specific objective climate shock, as it is a comprehensive measure including all the dimensions affecting the considered geographical areas including storms, typhoons, sea level rise, ocean acidification and drought, as well as perception of exposure to such climate shock given household characteristics.

[3] The question is asked only at the household level and formulated as follows *"Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. Suppose we say that the top of the ladder represents the best possible life for you and your household, and the bottom of the ladder represents the worst possible life for you and your household. On which step of the ladder would you say your household stands now ?"*.

Beyond capturing a much richer set of unobservable objective factors affecting the impact of climate shocks on the respondent, the subjective climate shock variable is also by definition the variable more likely to affect household subjective wellbeing.

In order to chech whether that our findings are not biased by respondent's perception we build an objective climate indicator. More specifically, we use information on the geographical location of each respondent (longitude, latitude, altitude) and select local objective climate variables among available geo-localized indicators of drought spells, temperature change and other measures of extreme events. However, given the relative geographical proximity of all our sample respondents, most of these data present limited cross-sectional variation even though their time change is extremely useful to illustrate the climate scenario of the Solomon Islands. A variable with sufficient cross-sectional variability is the cumulative number of dry decades in the last five years suffered by respondents.

3.1 Econometric findings

In order to test the impact of climate shocks on subjective wellbeing we estimate the following OLS specification:

$$\begin{aligned} HW_{i,j,k,l} &= \alpha_0 + \alpha_1 \textit{Climate Shock}_{i,j,k,l} + \alpha_2 \textit{Non Climate Shock}_{i,j,k,l} \\ &+ \alpha_3 \textit{HH Size}_{i,j,k,l} + \alpha_4 \textit{Female Headed}_{i,j,k,l} + \alpha_5 \textit{Married}_{i,j,k,l} \\ &+ \alpha_6 \textit{Age}_{i,j,k,l} + \alpha_7 \textit{Age Squared}_{i,j,k,l} + \alpha_8 \textit{Education Years=0}_{i,j,k,l} \\ &+ \alpha_9 \textit{Education Years=6}_{i,j,k,l} + \alpha_{10} \textit{Education Years=13}_{i,j,k,l} \\ &+ \alpha_{11} \textit{Agricultural Association Member}_{i,j,k,l} + \alpha_{12} \textit{Gross Income}_{i,j,k,l} \\ &+ \alpha_{13} \textit{Area}_{i,j,k,l} + \alpha_{14} \textit{No Toilette}_{i,j,k,l} + \alpha_{15} \textit{Thatch Roof}_{i,j,k,l} \\ &+ \alpha_{16} \textit{Nutrition Problem}_{i,j,k,l} + \eta_l + \epsilon_i \end{aligned}$$

where the dependent variable is the (0-10) response of the i-th farmer living in province j, ward k and village l on the wellbeing of her/his household and our main regressor of interest (Climate Shock) is a dummy for those who report to have suffered from a climate shock. Controls include declared exposure to non climate - health or economic - shocks (Non Climate Shock) and standard socio-demographic variables such as household size, a (0/1) dummy for married status, a (0/1) dummy for female gender, age and age squared to account for the potentially nonlinear impact of the variable on subjective wellbeing (see among others Blanchflower, 2021), three education dummies capturing three of the four education levels reported in the sample (zero years, six years and thirteen years), with higher education being the omitted benchmark and a (0/1) dummy that picks up respondents being members of formal agribusiness partnerships[4]. The four variables capturing economic factors are gross total income, a (0/1) dummy with unit value for households responding that some members were unable to eat were unable to eat healthy and nutritious/preferred foods because of lack of money or other resources, a durable good index [5] and the respondent total area of cultivated plantation in hectares. This broad set of flow and stock variables measuring economic conditions helps to capture different dimensions of the economic phenomenon and measurement of these indicators is assisted by researchers administering the survey to account for the computing difficulties of household respondents. This benchmark specification is augmented with province, ward and village fixed effects in columns 1-3 of Table 3 respectively.

Estimated findings show that exposure to climate shocks is negatively and significantly correlated with life satisfaction. Goodness of fit of our estimates improves progressively up to the last fully augmented specification including village fixed effects (column 3) where more than one third of the variability of the dependent variable is explained. Results from the other control

[4]The RDP II project aims at developing agribusiness partnerships in order *"to strengthen the linkages between smallholder farming houses and markets"* and to *"to assist farming households to engage in productive partnerships with commercial enterprises"*. In terms of activities/inputs, these involve the provision of technical and financial support to commercial enterprises and farming households to enable them to form and function as partnerships. This support is targeted at farming households ("co-partners") and provided through commercial enterprises ("lead partners").

[5]The assets used to compute the durable good index include: regular mobile phone, smartphone, tv, refrigerator, bicycle, car.

variables show that economic factors are strongly significant while all socio-demographic factors are not (except for the weak significance of the married status and household size). More specifically, gross income, poor dwelling proxied by thatch walls and cultivated land extension are significant. Membership of formal agricultural associations is as well positive and significant and it is likely to capture services that can help members to improve market access and bargain power, reduce risks and absorb shocks. This is consistent with the role of local associations (such as the most known Kastom Gaden Association) providing technical assistance to farmers and giving continuity to FAO and IFAD rural development projects.

Respondent's evaluation of being victim of a climate shock in the past can be biased by personal perception and therefore be subject to measurement bias. We therefore use latitude and longitude of each respondent in the sample to obtain objective climate indicators for each respondent using GIS (Geographic Information System Mapping) data. The most relevant climate indicator concerning our object of research relates to the yearly number of dry spells proxying one of the three main climate change factors that can adversely affect inhabitants of the Solomon islands (sea level rise, droughts and storms). We therefore introduce among explanatory variables cumulative dry decades in the last five years before the interview. As explained in our description of the sample all participants to the survey are coconut or cocoa farmers and draw a dominant part of their income from these two crops. Long dry spells generated by climate warming have severe negative effects on both productions since they determine a reduction in soil moisture and decreased soil fertility that can lead to cocoa seedling mortality. In addition to it they wither the plants and reduce the yield and the weight of coconuts.

The cumulative dry spell variable is negative and significant once introduced in our benchmark specification (Table 4). The significance of the objective climate variable is important as cumulative dry spells are obviously exogenous and therefore the identification strategy is in this case hardly questionable. Moreover, the subjective climate variable (perceived exposure to climate shocks) remains significant after this change. This last finding suggests that cumulative dry spells, as expected, do not cover the entire perception of climate shocks, consistently with the fact that the subjective question is also likely to capture as well the effect of typhoons and sea level rise. The subjective evaluation of climate shocks on subjective wellbeing can as well capture the perception of future climate risk and the idiosyncratic effect of past climate shocks on the specific respondent situation due to the characteristics of its land area, living conditions of household members, type of crops and breakdown of sources of income.

In the estimates that follow we wonder what factors can worsen or mitigate the impact of climate shocks on subjective wellbeing. To this purpose we interact in different estimates the climate shock variable with proxies of low housing quality (thatch walls), unit dummies for membership of formal agricultural associations, altitude (a proxy of isolation and poorer market access), below median values of income and durable asset index. Related findings show that the effect is stronger on individuals living at higher altitudes, with poor dwellings, income or wealth below median and non members of formal agricultural associations (Table 5). The interdependence between the disutility created by climate shocks and poorer income and/or wealth conditions rejects the hypothesis that environmental concerns are a luxury good. The rationale for our findings is that rural farmers have experienced these shocks in the past and are well aware of the economic consequences of climate shocks on their lives and economic activities. They therefore realize that, if they are poorer or more isolated, they have lower opportunities to tackle them effectively. The rationale for the effect of poor housing quality is straightforward and fits perfectly what happens in the well known three little pig story of the famous Disney tale. Exposure to "environmental" shocks (the wolf blow in the tale, climate shocks in the farmers reality that include events such as the recent Harold typhoons) is perceived as more harmful for those farmers having dwellings with lower probability to resist to extreme meteorological events (the omitted benchmarks of thatch walls are wood, unburned or burned bricks).

Membership of formal agricultural societies is also shown to be relevant reducing the impact of climate shocks on subjective wellbeing and this is consistent with what explained above concerning role, activities and strategies of these societies. Our interpretation is confirmed in estimates where the interaction is with the objective climate variable of cumulative dry spells (Table 6) . To provide further evidence of the interdependence between climate and social shocks we investigate the correlation between reporting climate shocks and nutrition problem in the last year (Table 7). We find that respondents exposed to climate shocks also reported in significantly higher proportion (13 percent against 6 percent) hunger problems for at least one member in their household, situations in which members run out of food (13 against 9 percent), ate less than wanted (23 against 16) or where members had to skip meals (23 against 18 percent).

3.2 Calculus of the compensating surplus

To calculate the shadow value of exposure to climate shocks we follow a standard approach in the literature (Welsch 2001, Luechinger 2007). More specifically, the coefficient of the climate shock dummy tells us how much exposure to climate shock reduces subjective wellbeing, net of the impact of all the other control variables. We therefore consider the positive and significant impact of gross income on the same dependent variable and, using the ratio of the two relevant coefficients (climate shock dummy and gross income) we calculate how much income is needed to fully compensate the fall produced by exposure to climate shocks. Note that we use a linear specification for the relationship between income and subjective wellbeing for two reasons. First, sample respondents have a standard of living below the absolute poverty line at the moment of our interview and therefore it is implausible that their income level is in the locus of diminishing returns of income on happiness (as it has been shown to occur for high income respondent in rich countries). Second, we find support for this hypothesis by testing that specification of (1) with linear gross income effect dominates the specification with nonlinear gross income effect, where the income squared variable is not significant.

Using the total income and climate shock coefficients of the estimated specifications we calculate the compensating surplus. The effect of the subjective declaration of exposure to climate shocks is much higher than that of the objective measure of the five year cumulative decades of dry spells. The negative effect on household wellbeing generated by exposure to climate shocks in the year before the interview needs more than 6 years of household income to be compensated (between 76 and 125 months of income using magnitudes of coefficients estimated in Table 3) (Table 8). The number of household income months needed to compensate for the disutility of exposure to climate shock grows when we consider the interactions with low income, low durable asset, high altitude and lack of participation to local agricultural associations. Consider again that what our coefficient captures is not just the historical effect on household income of the climate shocks suffered in the previous year (and we know that they include the Harold typhoon) but also the expected exposure to future climate shocks that can produce substantial negative effects on the household head evaluation of household wellbeing. The impact of dry spells requires on the contrary around 7 months to be compensated, much less than the overall climate shock effect, consistently with the fact that it captures only one dimension of the problem. We can however consider the latter magnitude a lower bound of the causal effect of climate shocks on subjective wellbeing since the objective variable is exogenous and not affected by endogeneity problems. Interacted values are however much larger showing that interaction of dry spells with poor economic conditions have severe effects on household subjective wellbeing.

4 Discussion and robustness checks

A well-known limit of the compensating surplus approach is that it depends from the marginal utility of income estimated in subjective wellbeing estimates. This implies that, in principle, for extremely rich individuals with a very low marginal utility of additional income and high environmental concerns the compensating surplus can grow up to extremely high levels. Another interesting point in our findings is that if we introduce altitude among regressors we find that the variable has not significant effects on subjective wellbeing. Therefore it seems that sea level rise does not worry respondents or is not captured by the altitude variable. On the contrary, altitude proxy remoteness and distance from product markets and therefore significantly increases the impact of climate shocks on household wellbeing.

As is well known in the subjective wellbeing literature specification with the 0-10 dependent variable should be estimated with ordered probit but, considering the high number of discrete values, ordinary least squares yield values that are not substantially different. In a further robustness check we correct total gross income with the market value of crops not sold but directly consumed in the household evaluating them at the local village market price. We as well perform other robustness checks using log income and linear income augmented for self consumption. Our main findings related to both climate shock and the interaction between thatch roof and climate shocks are robust and do not change when using the modified specifications (Tables 9 and 10 replicating respectively Tables 3 and 4). In a final robustness check we introduce as control the durable good index and observe that our main findings of both Tables 3 and 4 remain significant (Table 11).

5 Conclusions and direction for future research

The global economic system has entered an era of strong correlated and interdependent shocks concerning climate, poverty for a relevant part of its population, and pandemics. An investigation on the consequences of climate shocks in this scenario is of utmost importance to understand their impact and to design policies that can address the problem and reduce farmers exposure. To provide a contribution to this literature we evaluate the impact of climate shocks on a sample of poor farmers in a small scale island society (the Solomon Islands) during the COVID-19 period. The focus of our investigation on low income individuals particularly exposed to climate shocks is extremely important to evaluate the interdependence between environmental and socioeconomic problems. Our findings show that respondents' evaluation of exposure to climate shocks reduces significantly their wellbeing. With the compensating surplus approach we calculate that the shadow value of the loss generated by this disutility corresponds to several years of crop market sales. We as well show that similar findings are obtained when using an objective measure (cumulative dry spells) that proxies one of the climate shock dimensions (droughts created by the temperature rise) in the area. In addition to it, we find significant interdependence between environmental and social shocks since respondents with poorer dwelling (proxied by thatch walls), below median income and (durable good) wealth are those more severely hit in subjective wellbeing. The interaction is confirmed by the fact that those suffering from climate shocks report in significantly higher proportion nutrition problems in the same period. Our findings suggest from this point of view that a loss of subjective wellbeing finds clear correspondence in environmental and social problems.

The significance of our exogenous objective climate measure leaves no doubt about the relevance of policies of climate adaptation (in particular adaptation of crops to drought and longer time spells) for the local farmers and the compensating surplus approach provides a tentative estimate of the social return of these policies. The interdependence between our main findings and the role of housing, income, wealth and membership of agricultural organisations provides additional policy suggestions. First, policies aimed to improve housing and standard of living can help to reduce farmers exposure to climate shocks and its consequence on household wellbeing. Second, local agricultural organisations can play an important role in providing services and being a bridge between FAO/IFAD rural development programs and local farmers helping the latter to consolidate knowledge and innovation in their productive activity that reduce exposure to climate shocks.

Future research will test whether similar effects of climate shocks on subjective wellbeing can be found for other low income areas and populations.

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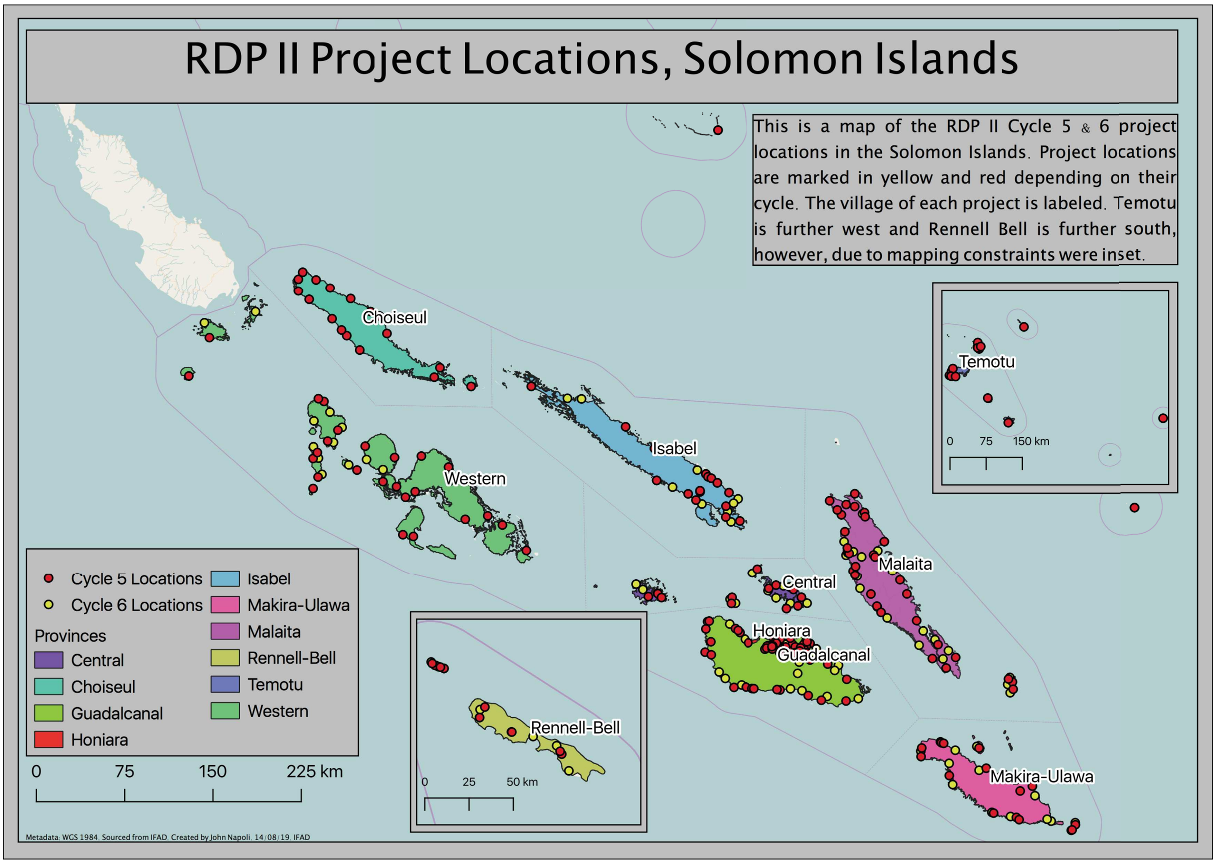
6 Figures

Figure 1: RDP II Project areas on the map of Solomon Islands



Notes: The figure shows the area of the Solomon Islands where the RDP II Project was implemented by IFAD.

7 Tables

Table 1: Variable Legend

Dependent Variable	
Present SWB	Household subjective wellbeing according to the household head respondent today (0-10 scale).
Subjective climate measure	
Climate Shock	(0/1) dummy for households declaring they were affected by climate shocks in the last year.
Objective climate measure	
Dry Spells	Number of decades of cumulative dry spells in the last five years
Dry Above Median	(0/1) dummy if the number of dry spells in the last five years is higher than the median of twelve.
Household Characteristics	
HH Size	Number of household members.
Female Headed	0/1 dummy for female household head.
Married	0/1 dummy for married status.
Age	Age of respondent
Education Years	Total number of respondent's education years (dummies =0, =6, =13 and higher than 13).
Agricultural Association Member	0/1 dummy for membership of agricultural societies.
Agriculture and Welfare	
Gross Income	Gross yearly household income from crops, fishing, self-employment, transfers and other income in LCU
Area	Land size of the household in ha.
No Toilet	(0/1) dummy if the household has no access to a regular toilet.
Thatch Roof	(0/1) dummy if the main material of the roof of the main dwelling is made of thatch.
Durable Asset Index	Durable assets index, PCA, normalized 0-1. The assets used to compute the durable good index include: regular mobile phone, smartphone, tv, refrigerator, bicycle, car.
Nutrition Problem	(0/1) dummy where the respondent answered to the question: "During last year, was there a time when anyone in your household were unable to eat healthy and nutritious/preferred foods because of a lack of money or other resources?
Non-Climate Shock	(0/1) dummy for households declaring they were affected by non-climate shocks in the last year
Low Crop Income	(0/1) dummy if the gross crop income is lower than the median of 2700.
Below Median Asset	(0/1) dummy if the durable index is lower than the median of 0.118.
NUTRITION DUMMIES:	(0/1) dummies where the respondent answered to the question: "During last year, was there a time when anyone in your household...
Nutrition 1: worried about food	... were worried about not having enough food to eat because of lack of money or other resources?
Nutrition 2: unhealthy food	... were unable to eat healthy and nutritious/preferred foods because of a lack of money or other resources?
Nutrition 3: few food	... ate only a few kinds of foods because of a lack of money or other resources?
Nutrition 4: skipped meals	... had to skip a meal because there was not enough money or other resources to get food?
Nutrition 5: ate less food than wanted	... ate less than you thought you should because of a lack of money or other resources?
Nutrition 6: run out of food	... ran out of food because of a lack of money or other resources?
Nutrition 7: hungry	... were hungry but did not eat because there was not enough money or other resources for food?
Nutrition 8: didn't eat for a whole day	... went without eating for a whole day because of a lack of money or other resources?
Fixed Effects	
Province	Categorical for the three provinces: Guadalcanal, Malaita, Makira/Ulawa.
Ward	Categorical for the 24 wards (see Table 12 for ward list).
Village	Categorical for the 84 villages (see Table 13 for village list).

Table 2: Summary statistics

Dependent Variable	Mean	Std. Dev.	Min.	Max.	N
Present SWB	5	1.6	0	10	1274
Subjective Climate Measure					
Climate Shock	50%	0.5	0	1	1274
Objective Climate Measure					
Dry Spells Decades	12.9	5.2	0	21	1228
Household Characteristics					
Household Size	5.4	2.2	1	14	1274
Female Headed	10%	0.3	0	1	1274
Married	80%	0.4	0	1	1274
Age	46.5	12.8	17	90	1274
Education Years =0	20%	0.4	0	1	1274
Education Years =6	50%	0.5	0	1	1274
Education Years =13	20%	0.4	0	1	1274
Education Years 13	10%	0.3	0	1	1274
Agricultural Association Member	30%	0.5	0	1	1274
Agriculture and Welfare					
Gross Income (K)	23.8	67.2	0	1332.9	1274
Area of parcel (HA)	7.1	102.4	0	2500	1274
No Toilet	60%	0.5	0	1	1274
Thatch Roof	40%	0.5	0	1	1274
Non-Climate Shock	50%	0.5	0	1	1274
Durable assets index	20%	0.2	0	1	1274
Nutrition 1: worried about food	40%	0.5	0	1	1274
Nutrition 2: healthy	50%	0.5	0	1	1274
Nutrition 3: few food	50%	0.5	0	1	1274
Nutrition 4: skipped meals	20%	0.4	0	1	1274
Nutrition 5: ate less food than wanted	20%	0.4	0	1	1274
Nutrition 6: run out of food	10%	0.3	0	1	1274
Nutrition 7: hungry	10%	0.3	0	1	1274
Nutrition 8: didn't eat for a whole day	10%	0.3	0	1	1274

Table 3: The effects of subjective measure of climate shocks on current subjective well-being (OLS)

	(1)	(2)	(3)
	Present SWB	Present SWB	Present SWB
Subjective Measure			
Climate Shock	-0.227***	-0.250***	-0.234**
	(0.082)	(0.080)	(0.082)
Household Characteristics			
Household Size	-0.010	-0.024	-0.035*
	(0.020)	(0.020)	(0.020)
Female Headed	-0.332**	-0.177	-0.224
	(0.143)	(0.133)	(0.146)
Married	0.228*	0.351***	0.243*
	(0.129)	(0.125)	(0.133)
Age	0.007	0.013	0.019
	(0.017)	(0.017)	(0.017)
Age^2	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Education Years =0	-0.188	-0.190	-0.285
	(0.175)	(0.169)	(0.177)
Education Years =6	-0.158	-0.161	-0.172
	(0.144)	(0.143)	(0.147)
Education Years =13	-0.121	-0.137	-0.090
	(0.155)	(0.156)	(0.161)
Agricultural Association Member	0.219**	0.199**	0.306***
	(0.086)	(0.083)	(0.084)
Agriculture and Welfare			
Gross Income (K)	0.003***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)
Area (HA)	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
No Toilet	-0.49	-0.153*	-0.155*
	(0.086)	(0.092)	(0.092)
Thatch Roof	-0.336***	-0.415***	-0.428***
	(0.084)	(0.085)	(0.089)
Nutrition Problem	-0.425***	-0.320***	-0.402***
	(0.086)	(0.091)	(0.092)
Non-Climate Shock	-0.267***	-0.391***	-0.486***
	(0.083)	(0.079)	(0.081)
Fixed Effects			
Province	YES	NO	NO
Ward	NO	YES	NO
Village	NO	NO	YES
Constant	5.364***	4.719***	5.692***
	(0.429)	(0.450)	(0.602)
Observations	1274	1274	1274
R^2	0.216	0.294	0.352

Notes: The dependent is a categorical variable (0-10) answering to the question: *"Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. Suppose we say that the top of the ladder represents the best possible life for you and your household, and the bottom of the ladder represents the worst possible life for you and your household. On which step of the ladder would you say your household stands now?"*. See Table 1 for regressors legend.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Difference between subjective and objective measures of climate shocks on current subjective wellbeing (OLS)

	(1)	(2)	(3)
	Present SWB	Present SWB	Present SWB
Objective measure			
Dry Spells	-0.024***	-0.024**	-0.034**
	(0.009)	(0.010)	(0.014)
Subjective measure			
Climate Shock	-0.242***	-0.239***	-0.241***
	(0.084)	(0.082)	(0.084)
Household Characteristics			
Household Size	-0.014	-0.027	-0.035*
	(0.021)	(0.020)	(0.021)
Female Headed	-0.371***	-0.218	-0.246*
	(0.142)	(0.133)	(0.148)
Married	0.259*	0.379***	0.275**
	(0.133)	(0.129)	(0.138)
Age	0.009	0.017	0.021
	(0.018)	(0.017)	(0.018)
Age^2	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Education Years =0	-0.108	-0.109	-0.226
	(0.178)	(0.174)	(0.181)
Education Years =6	-0.062	-0.085	-0.107
	(0.149)	(0.148)	(0.151)
Education Years =13	-0.048	-0.068	-0.029
	(0.158)	(0.159)	(0.164)
Agricultural Association Member	0.227**	0.192**	0.300***
	(0.089)	(0.085)	(0.087)
Agriculture and Welfare			
Gross Income (K)	0.003***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)
Area (HA)	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
No Toilet	-0.041	-0.162*	-0.178*
	(0.088)	(0.096)	(0.096)
Thatch Roof	-0.320***	-0.403***	-0.420***
	(0.086)	(0.086)	(0.091)
Nutrition Problem	-0.428***	-0.312***	-0.400***
	(0.088)	(0.094)	(0.096)
Non-Climate Shock	-0.270***	-0.385***	-0.476***
	(0.085)	(0.080)	(0.083)
Fixed Effects			
Province	YES	NO	NO
Ward	NO	YES	NO
Village	NO	NO	YES
Constant	5.769***	5.121***	6.248***
	(0.437)	(0.468)	(0.621)
Observations	1228	1228	1228
R^2	0.217	0.295	0.353

Notes: The dependent is a categorical variable (0-10) answering to the question: *"Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. Suppose we say that the top of the ladder represents the best possible life for you and your household, and the bottom of the ladder represents the worst possible life for you and your household. On which step of the ladder would you say your household stands now?"*. See Table 1 for regressors legend.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Subjective measure of climate shocks and subjective wellbeing: interaction effects

Household Characteristics	(1) Present SWB	(2) Present SWB	(3) Present SWB	(4) Present SWB	(5) Present SWB
Household Size	-0.035*	-0.034*	-0.036*	-0.038*	-0.035*
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Female Headed	-0.221	-0.240	-0.213	-0.209	-0.223
	(0.146)	(0.148)	(0.145)	(0.145)	(0.145)
Married	0.244*	0.235*	0.243*	0.241*	0.244*
	(0.133)	(0.135)	(0.133)	(0.132)	(0.133)
Age	0.020	0.019	0.021	0.019	0.019
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Age^2	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education Years =0	-0.282	-0.290	-0.289	-0.235	-0.286
	(0.177)	(0.177)	(0.176)	(0.177)	(0.177)
Education Years =6	-0.168	-0.167	-0.171	-0.143	-0.171
	(0.147)	(0.147)	(0.145)	(0.145)	(0.147)
Education Years =13	-0.089	-0.093	-0.082	-0.076	-0.089
	(0.161)	(0.160)	(0.159)	(0.159)	(0.161)
Agricultural Association Member		0.314***	0.305***	0.280***	0.307***
		(0.084)	(0.085)	(0.084)	(0.085)
Agriculture and Welfare					
Gross Income (K)	0.002***	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Area (HA)	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
No Toilet	-0.159*	-0.172*	-0.162*	-0.131	-0.155*
	(0.092)	(0.093)	(0.093)	(0.092)	(0.092)
Thatch Roof	-0.430***	-0.414***	-0.411***	-0.383***	
	(0.089)	(0.088)	(0.089)	(0.089)	
Nutrition Problem	-0.398***	-0.403***	-0.409***	-0.405***	-0.400***
	(0.092)	(0.091)	(0.093)	(0.092)	(0.092)
Non-Climate Shock	-0.489***	-0.479***	-0.501***	-0.477***	-0.485***
	(0.081)	(0.081)	(0.081)	(0.080)	(0.081)
Subjective Climate Shock Interaction Effects					
Climate Shock =0 × Association NO	o.b.				
	(.)				
Climate Shock =0 × Association YES	0.241**				
	(0.112)				
Climate Shock =1 × Association NO	-0.278***				
	(0.098)				
Climate Shock =1 × Association YES	0.107				
	(0.124)				
Climate Shock =0 × High Altitude =0		o.b.			
		(.)			
Climate Shock =0 × High Altitude =1		-0.130			
		(0.108)			
Climate Shock =1 × High Altitude =0		-0.186*			
		(0.108)			
Climate Shock =1 × High Altitude =1		-0.409***			
		(0.120)			
Climate Shock =0 × Low Crop Income =0			o.b.		
			(.)		
Climate Shock =0 × Low Crop Income =1			0.019		
			(0.113)		
Climate Shock =1 × Low Crop Income =0			-0.094		
			(0.117)		
Climate Shock =1 × Low Crop Income =1			-0.366***		
			(0.122)		
Climate Shock =0 × Below Median Asset =0				o.b.	
				(.)	
Climate Shock =0 × Below Median Asset =1				-0.265**	
				(0.103)	
Climate Shock =1 × Below Median Asset =0				-0.231*	
				(0.127)	
Climate Shock =1 × Below Median Asset =1				-0.509***	
				(0.118)	
Climate Shock =0 × Thatch Roof =0					0.b.
					(.)
Climate Shock =0 × Thatch Roof =1					-0.386***
					(0.111)
Climate Shock =1 × Thatch Roof =0					-0.196*
					(0.103)
Climate Shock =1 × Thatch Roof =1					-0.667***
					(0.120)
Village FE	YES	YES	YES	YES	YES
Constant	5.979***	5.993***	5.884***	6.017***	5.957***
	(0.589)	(0.593)	(0.595)	(0.587)	(0.587)
Observations	1274	1274	1274	1274	1274
R^2	0.352	0.354	0.355	0.358	0.352

Notes: The dependent is a categorical variable (0-10) answering to the question: *"Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. Suppose we say that the top of the ladder represents the best possible life for you and your household, and the bottom of the ladder represents the worst possible life for you and your household. On which step of the ladder would you say your household stands now?". o.b. omitted benchmark* See Table 1 for regressors legend.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Objective measures of climate shocks and subjective wellbeing: interaction effects

Subjective measure	(1) Present SWB	(2) Present SWB	(3) Present SWB	(4) Present SWB
Climate Shock	-0.239***	-0.238***	-0.242***	-0.242***
	(0.082)	(0.082)	(0.081)	(0.081)
Household Characteristics				
Household Size	-0.036*	-0.035*	-0.037*	-0.039*
	(0.020)	(0.020)	(0.020)	(0.020)
Female Headed	-0.242*	-0.255*	-0.236	-0.230
	(0.147)	(0.148)	(0.146)	(0.146)
Married	0.253*	0.249*	0.251*	0.251*
	(0.134)	(0.134)	(0.134)	(0.132)
Age	0.019	0.018	0.020	0.019
	(0.017)	(0.017)	(0.017)	(0.017)
Age^2	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Education Years =0	-0.284	-0.287	-0.291*	-0.232
	(0.178)	(0.177)	(0.177)	(0.178)
Education Years =6	-0.165	-0.160	-0.165	-0.135
	(0.147)	(0.147)	(0.147)	(0.146)
Education Years >13	o.b.	o.b.	o.b.	o.b.
	(.)	(.)	(.)	(.)
Agricultural Association Member		0.305***	0.306***	0.271***
		(0.085)	(0.085)	(0.084)
Agriculture and Welfare				
Gross Income (K)	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Area (HA)	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
No Toilet	-0.165*	-0.182*	-0.167*	-0.142
	(0.092)	(0.093)	(0.092)	(0.092)
Thatch Roof	-0.428***	-0.418***	-0.425***	-0.382***
	(0.088)	(0.088)	(0.088)	(0.089)
Nutrition Problem	-0.421***	-0.418***	-0.412***	-0.424***
	(0.092)	(0.092)	(0.093)	(0.092)
Non-Climate Shock	-0.481***	-0.474***	-0.491***	-0.471***
	(0.081)	(0.081)	(0.081)	(0.080)
Objective Climate Shock Interaction Effects				
Dry above median =0 × Association NO	o.b.			
	(.)			
Dry above median =0 × Association YES	0.292**			
	(0.119)			
Dry above median =1 × Association NO	-0.443**			
	(0.180)			
Dry above median =1 × Association YES	-0.139			
	(0.193)			
Dry above median =0 × High Altitude =0		o.b.		
		(.)		
Dry above median =0 × High Altitude =1		-0.134		
		(0.121)		
Dry above median =1 × High Altitude =0		-0.376**		
		(0.190)		
Dry above median =1 × High Altitude =1		-0.568***		
		(0.182)		
Dry above median =0 × Low Crop Income =0			o.b.	
			(.)	
Dry above median =0 × Low Crop Income =1			-0.093	
			(0.120)	
Dry above median =1 × Low Crop Income =0			-0.401**	
			(0.188)	
Dry above median =1 × Low Crop Income =1			-0.556***	
			(0.184)	
Dry above median =0 × Below Median Asset =0				o.b.
				(.)
Dry above median =0 × Below Median Asset =1				-0.296**
				(0.131)
Dry above median =1 × Below Median Asset =0				-0.476**
				(0.189)
Dry above median =1 × Below Median Asset =1				-0.733***
				(0.194)
Village FE	YES	YES	YES	YES
Constant	5.991***	6.027***	5.993***	6.046***
	(0.586)	(0.588)	(0.587)	(0.585)
Observations	1274	1274	1274	1274
R^2	0.354	0.356	0.355	0.360

Notes: The dependent is a categorical variable (0-10) answering to the question: *"Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. Suppose we say that the top of the ladder represents the best possible life for you and your household, and the bottom of the ladder represents the worst possible life for you and your household. On which step of the ladder would you say your household stands now?"*. See Table 1 for regressors legend.
Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 7: Nutrition problem difference between groups experiencing or not climate shocks

	No Climate Shock Group		Climate Shock Group				
Nutrition Variables	Percent	N. of obs.	Percent	N. of obs.	Diff. (T-C)	S.E.	T-stat
Nutrition 1: worried	41%	680	41.9%	620	-0.009	0.027	-0.3310
Nutrition 2: unhealthy food	48.7%	68%	0.45	620	0.037	0.028	1.3265
Nutrition 3: few food	50.3%	680	53%	620	-0.028	0.027	-0.9980
Nutrition 4: skipped meals	17.6%	680	22.9%	620	-0.052**	0.022	-2.3629
Nutrition 5: ate less food than wanted	16%	680	23.1%	620	-0.070***	0.022	-3.2151
Nutrition 6: run out of food	9.1%	680	12.7%	620	-0.036**	0.017	-2.1009
Nutrition 7: hungry	5.9%	680	12.6%	620	-0.067***	0.016	-4.2244
Nutrition 8: didn't eat for a whole day	5.7%	680	7.7%	620	-0.020	0.013	-1.4462

Notes: Results from t-test between the means of the two groups: those experiencing climate shocks and those not. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Compensating Surplus

	(1) Present SWB	(2) Present SWB	(3) Present SWB
Table 3			
Subjective Climate Shock	75.7	125	117
Table 4			
Subjective Climate Shock	80.7	119.5	120.5
Objective CLimate Shock (Dry Spells)	7.3	12.5	17.5
Table 5			
Subjective Climate Shocks			
Climate Shock =1 × Association NO			139
Climate Shock =1 × High Altitude =0			93
Climate Shock =1 × High Altitude =1			177
Climate Shock =1 × Low Crop Income =1			183
Climate Shock =1 × Below Median Asset =1			254.5
Table 6			
Objective Climate Shocks			
Dry above median =1 × Association NO			221.5
Dry above median =1 × High Altitude =0			188
Dry above median =1 × High Altitude =1			285
Dry above median =1 × Low Crop Income =0			200.5
Dry above median =1 × Low Crop Income =1			278
Dry above median =1 × Below Median Asset =0			238
Dry above median =1 × Below Median Asset =1			366.5
Province FE	YES	NO	NO
Ward FE	NO	YES	NO
Village FE	NO	NO	YES

Notes: Compensating surplus calculation identifying gross income months required to compensate the fall in life satisfaction produced by exposure to climate shocks.

Table 9: Alternative specifications estimates from Table 3

Subjective Climate Shock on Present SWB	(1)	(2)	(3)
Ordered probit regression with linear income			
Climate Shock	-0.202***	-0.225***	-0.223***
	(0.060)	(0.061)	(0.063)
Thatch Roof=0 × Climate Shock=1	-0.133*	-0.149*	-0.184**
	(0.075)	(0.078)	(0.080)
Thatch Roof=1 × Climate Shock=0	-0.190**	-0.255***	-0.317***
	(0.079)	(0.082)	(0.088)
Thatch Roof=1 × Climate Shock=0	-0.482***	-0.575***	-0.586***
	(0.089)	(0.091)	(0.095)
Linear regression with self consumption			
Climate Shock	-0.259***	-0.274***	-0.260***
	(0.082)	(0.080)	(0.082)
Thatch Roof=0 × Climate Shock=1	-0.172*	-0.179*	-0.214**
	(0.104)	(0.103)	(0.103)
Thatch Roof=1 × Climate Shock=0	-0.247**	-0.321***	-0.393***
	(0.106)	(0.106)	(0.112)
Thatch Roof=1 × Climate Shock=1	-0.621***	-0.714***	-0.707***
	(0.118)	(0.118)	(0.121)
Ordered probit regression with self consumption			
Climate Shock	-0.203***	-0.224***	-0.221***
	(0.060)	(0.061)	(0.063)
Thatch Roof=0 × Climate Shock=1	-0.131*	-0.145*	-0.178**
	(0.076)	(0.078)	(0.080)
Thatch Roof=1 × Climate Shock=0	-0.187**	-0.254***	-0.317***
	(0.079)	(0.083)	(0.088)
Thatch Roof=1 × Climate Shock=1	-0.483***	-0.578***	-0.590***
	(0.089)	(0.091)	(0.095)
Linear regression with log income			
Climate Shock	-0.284***	-0.288***	-0.265***
	(0.083)	(0.080)	(0.083)
Thatch Roof=0 × Climate Shock=1	-0.190*	-0.190*	-0.215**
	(0.105)	(0.102)	(0.103)
Thatch Roof=1 × Climate Shock=0	-0.166	-0.244**	-0.320***
	(0.106)	(0.107)	(0.113)
Thatch Roof=1 × Climate Shock=1	-0.572***	-0.655***	-0.645***
	(0.119)	(0.117)	(0.120)
Ordered probit regression with log income			
Climate Shock	-0.245***	-0.256***	-0.250***
	(0.061)	(0.061)	(0.064)
Thatch Roof=0 × Climate Shock=1	-0.167**	-0.173**	-0.201**
	(0.076)	(0.078)	(0.081)
Thatch Roof=1 × Climate Shock=0	-0.132*	-0.196**	-0.262***
	(0.079)	(0.084)	(0.090)
Thatch Roof=1 × Climate Shock=1	-0.480***	-0.558***	-0.571***
	(0.089)	(0.091)	(0.096)
Province FE	YES	NO	NO
Ward FE	NO	YES	NO
Village FE	NO	NO	YES

Notes: The dependent is a categorical variable (0-10) answering to the question: *"Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. Suppose we say that the top of the ladder represents the best possible life for you and your household, and the bottom of the ladder represents the worst possible life for you and your household. On which step of the ladder would you say your household stands now?"*. See Table 1 for regressors legend.
For the interactions Thatch Roof=0 × Climate Shock=0 is the omitted benchmark.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Alternative specifications estimates from Table 4

Objective and Subjective Climate Shock on Present SWB	(1)	(2)	(3)
Ordered probit regression with linear income			
Dry spells	-0.016***	-0.019**	-0.029**
	(0.006)	(0.007)	(0.012)
Climate Shock	-0.210***	-0.214***	-0.226***
	(0.061)	(0.062)	(0.064)
Thatch Roof=0 × Climate Shock=1	-0.142*	-0.137*	-0.192**
	(0.077)	(0.079)	(0.081)
Thatch Roof=1 × Climate Shock=0	-0.175**	-0.242***	-0.312***
	(0.081)	(0.084)	(0.090)
Thatch Roof=1 × Climate Shock=1	-0.475***	-0.553***	-0.580***
	(0.090)	(0.092)	(0.096)
Linear regression with self consumption			
Dry Spells	-0.025***	-0.025**	-0.034**
	(0.009)	(0.010)	(0.014)
Climate Shock	-0.245***	-0.238***	-0.239***
	(0.084)	(0.082)	(0.084)
Thatch Roof=0 × Climate Shock=1	-0.157	-0.140	-0.198*
	(0.107)	(0.105)	(0.105)
Thatch Roof=1 × Climate Shock=0	-0.221**	-0.298***	-0.382***
	(0.109)	(0.109)	(0.115)
Thatch Roof=1 × Climate Shock=1	-0.580***	-0.659***	-0.668***
	(0.121)	(0.119)	(0.123)
Ordered probit regression with self consumption			
Dry spells	-0.017***	-0.020***	-0.029**
	(0.006)	(0.008)	(0.012)
Climate Shock	-0.212***	-0.214***	-0.224***
	(0.061)	(0.062)	(0.064)
Thatch Roof=0 × Climate Shock=1	-0.141*	-0.132*	-0.186**
	(0.077)	(0.079)	(0.082)
Thatch Roof=1 × Climate Shock=0	-0.171**	-0.240***	-0.313***
	(0.081)	(0.084)	(0.090)
Thatch Roof=1 × Climate Shock=1	-0.477***	-0.556***	-0.583***
	(0.090)	(0.092)	(0.096)
Linear regression with log income			
Dry spells	-0.024***	-0.024**	-0.031**
	(0.009)	(0.010)	(0.014)
Climate Shock	-0.303***	-0.283***	-0.275***
	(0.085)	(0.083)	(0.086)
Thatch Roof=0 × Climate Shock=1	-0.205*	-0.178*	-0.225**
	(0.107)	(0.105)	(0.106)
Thatch Roof=1 × Climate Shock=0	-0.142	-0.219**	-0.309***
	(0.110)	(0.110)	(0.116)
Thatch Roof=1 × Climate Shock=1	-0.574***	-0.632***	-0.643***
	(0.121)	(0.119)	(0.123)
Ordered probit regression with log income			
Dry spells	-0.016***	-0.019***	-0.026**
	(0.006)	(0.007)	(0.011)
Climate Shock	-0.257***	-0.251***	-0.256***
	(0.062)	(0.063)	(0.066)
Thatch Roof=0 × Climate Shock=1	-0.178**	-0.165**	-0.211**
	(0.077)	(0.079)	(0.082)
Thatch Roof=1 × Climate Shock=0	-0.115	-0.178**	-0.254***
	(0.081)	(0.085)	(0.092)
Thatch Roof=1 × Climate Shock=1	-0.475***	-0.537***	-0.565***
	(0.090)	(0.092)	(0.097)
Province FE	YES	NO	NO
Ward FE	NO	YES	NO
Village FE	NO	NO	YES

Notes: The dependent is a categorical variable (0-10) answering to the question: *"Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. Suppose we say that the top of the ladder represents the best possible life for you and your household, and the bottom of the ladder represents the worst possible life for you and your household. On which step of the ladder would you say your household stands now?"*. See Table 1 for regressors legend.
For the interactions Thatch Roof=0 × Climate Shock=0 is the omitted benchmark.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Durable Index Robustness (estimates from Table 3 and 4)

Subjective Climate Shock on Present SWB	(1)	(2)	(3)
Linear regression			
Climate Shock	-0.241***	-0.256***	-0.236***
	(0.081)	(0.080)	(0.081)
Durable assets index	1.434***	1.325***	1.007***
	(0.281)	(0.283)	(0.281)
Thatch Roof=0 × Climate Shock=1	-0.169	-0.180*	-0.203**
	(0.104)	(0.102)	(0.103)
Thatch Roof=1 × Climate Shock=0	-0.176*	-0.261**	-0.337***
	(0.106)	(0.106)	(0.110)
Thatch Roof=1 × Climate Shock=1	-0.511***	-0.612***	-0.613***
	(0.117)	(0.116)	(0.119)
Ordered probit regression			
Climate Shock	-0.215***	-0.232***	-0.226***
	(0.060)	(0.061)	(0.063)
Durable assets index	1.106***	1.111***	0.904***
	(0.205)	(0.214)	(0.220)
Thatch Roof=0 × Climate Shock=1	-0.152**	-0.165**	-0.191**
	(0.076)	(0.078)	(0.080)
Thatch Roof=1 × Climate Shock=0	-0.138*	-0.209**	-0.275***
	(0.079)	(0.083)	(0.088)
Thatch Roof=1 × Climate Shock=1	-0.436***	-0.525***	-0.543***
	(0.089)	(0.091)	(0.094)
Objective and Subjective Climate Shock on Present SWB			
Linear regression			
Dry Spells	-0.022**	-0.024**	-0.035**
	(0.009)	(0.010)	(0.014)
Climate Shock	-0.253***	-0.242***	-0.241***
	(0.083)	(0.082)	(0.084)
Durable assets index	1.446***	1.382***	1.050***
	(0.287)	(0.286)	(0.288)
Thatch Roof=0 × Climate Shock=1	-0.178*	-0.160	-0.210**
	(0.105)	(0.105)	(0.105)
Thatch Roof=1 × Climate Shock=0	-0.157	-0.238**	-0.327***
	(0.109)	(0.109)	(0.114)
Thatch Roof=1 × Climate Shock=1	-0.506***	-0.581***	-0.605***
	(0.119)	(0.118)	(0.122)
Ordered probit regression			
Dry Spells	-0.015**	-0.020***	-0.030***
	(0.006)	(0.007)	(0.011)
Climate Shock	-0.221***	-0.219***	-0.228***
	(0.061)	(0.063)	(0.065)
Durable assets index	1.110***	1.151***	0.934***
	(0.209)	(0.217)	(0.224)
Thatch Roof=0 × Climate Shock=1	-0.158**	-0.150*	-0.197**
	(0.077)	(0.080)	(0.082)
Thatch Roof=1 × Climate Shock=0	-0.124	-0.193**	-0.268***
	(0.082)	(0.085)	(0.090)
Thatch Roof=1 × Climate Shock=1	-0.426***	-0.498***	-0.532***
	(0.090)	(0.092)	(0.096)
Province FE	YES	NO	NO
Ward FE	NO	YES	NO
Village FE	NO	NO	YES

Notes: The dependent is a categorical variable (0-10) answering to the question: *"Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. Suppose we say that the top of the ladder represents the best possible life for you and your household, and the bottom of the ladder represents the worst possible life for you and your household. On which step of the ladder would you say your household stands now?"*. See Table 1 for regressors legend.
For the interactions Thatch Roof=0 × Climate Shock=0 is the omitted benchmark.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 12: Province and Ward list

Provinces	(1) Freq.	(2) Percent	(3) Cum.
Guadalcanal	557	42.85	42.85
Malaita	388	29.85	72.69
Makira/Ulawa	355	27.31	100.00
Wards			
Tandai	16	1.23	1.23
Saghalu	109	8.38	9.62
Tangarare	90	6.92	16.54
Aola	17	1.31	17.85
East Tasimboko	87	6.69	24.54
Malango	122	9.38	33.92
East Ghaobata	116	8.92	42.85
Aimela	70	5.38	48.23
Fauabu	18	1.38	49.62
West Baegu/Fataleka	7	0.54	50.15
Mandalua/Folotana	76	5.85	56.00
Takwa	81	6.23	62.23
East Baegu	21	1.62	63.85
Sububenu/Burianiasi	24	1.85	65.69
Kwarekwareo	16	1.23	66.92
Waneagu Silana Sina	16	1.23	68.15
Keaimela/Radefasu	59	4.54	72.69
East Arosi	45	3.46	76.15
Bauro West	32	2.46	78.62
Bauro Central	33	2.54	81.15
811	17	1.31	82.46
812	30	2.31	84.77
Rawo	82	6.31	91.08
Weather Coast	116	8.92	100.00

Table 13: Village list

Villages	(1) Freq.	(2) Percent	(3) Cum.
Aifa	7	0.65	0.65
Ailali	18	1.68	2.34
Akwe	8	0.75	3.08
Apurahe	28	2.62	5.70
Arabala	16	1.50	7.20
Arao	4	0.37	7.57
Arohane	18	1.68	9.25
Balehodove	13	1.21	10.47
Baunani	12	1.12	11.59
Between Isunavara and Manga	8	0.75	12.34
Between Rosavolo and Turimate	15	1.40	13.74
Between Sali2 and Dereni, adjacent	10	0.93	14.67
Boroni	13	1.21	15.89
Busungarerede-Taeloa	7	0.65	16.54
Bwaumarau	16	1.50	18.04
Close to Mbelaha	16	1.50	19.53
Fa'alau	22	2.06	21.59
Ferabora	7	0.65	22.24
Folotana	11	1.03	23.27
Fulikafo	6	0.56	23.83
Gagalu	11	1.03	24.86
Gwasusuru	10	0.93	25.79
Isunavatu	12	1.12	26.92
Kafomara	9	0.84	27.76
Kakalano	13	1.21	28.97
Koai	16	1.50	30.47
Kochimiu	14	1.31	31.78
Kokurau	16	1.50	33.27
Komuvoghi	16	1.50	34.77
Kowavaolu	17	1.59	36.36
Kwaea	21	1.96	38.32
Langanaku	15	1.40	39.72
Lololo	8	0.75	40.47
Madalua	13	1.21	41.68
Mage	18	1.68	43.36
Mangakiki 2	15	1.40	44.77
Manitaraibia	1	0.09	44.86
Manitawaniuhi	16	1.50	46.36
Maoro	37	3.46	49.81
Marapui	13	1.21	51.03
Marokafo	18	1.68	52.71
Marunga	39	3.64	56.36
Mataruka 2	16	1.50	57.85
Namobaula	51	4.77	62.62
Namohoai	23	2.15	64.77
Namona'ako	12	1.12	65.89
Ngalitavethi	12	1.12	67.01
Nggilo	16	1.50	68.50
Komibo	4	0.37	68.88
Onefolo	5	0.47	69.35
Parego	33	3.08	72.43
Piruma	16	1.50	73.93
Poiloki 1	13	1.21	75.14
Poiloki 2	7	0.65	75.79
Raupono	16	1.50	77.29
Sali2	18	1.68	78.97
Savaolu	16	1.50	80.47
Simba	15	1.40	81.87
Sohati	4	0.37	82.24
Sungina	14	1.31	83.55
Tawani	15	1.40	84.95
Tenavutu 1	17	1.59	86.54
Topas	18	1.68	88.22
Tughu	12	1.12	89.35
Tupathushuruni	15	1.40	90.75
Uni	12	1.12	91.87
Vaovao	4	0.37	92.24
Vura1	16	1.50	93.74
Waihaga	25	2.34	96.07
Whitestone	13	1.21	97.29
Wouah	23	2.15	99.44
Kikiri	6	0.56	100.00

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