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Do Local Elites Capture Natural Disaster Reconstruction Funds?

by

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Abstract

This paper examines the allocation of natural disaster reconstruction funds among cyclone victims in rural Fiji. During post-emergency periods, when good information about cyclone damage is available, do local elites, a powerful minority, capture housing construction materials? With effective targeting in both receipt and the amount received, local elites do not capture larger benefits. More severely affected victims are not early recipients, though, because the supply of reconstruction funds is limited during early periods. This invites early capture: Traditional kin elites receive benefits earlier than others in recipient villages.

I. Introduction

Vulnerability to natural disaster is a major barrier to development, and augmenting the capacity for effective disaster management is critically important. Frequent reports point to an inefficient distribution of disaster relief by uncoordinated relief agents who lack pertinent information about the damage. This is not surprising, because relief agents give a higher priority to the speed of response than to evidence-based decision making (de Ville de Goyet, 2008). Only recently has empirical research started to shed light on the performance of relief targeting. Morris and Wodon (2003) find that among Honduran victims of Hurricane Mitch, the receipt of emergency aid is targeted on pre-shock assets, asset loss, and incidence of housing damage, but the amount received is not. In Fiji, Takasaki (forthcoming) demonstrates that the allocation of

cyclone relief within villages is linked with informal risk sharing (in Ethiopia, Dercon and Krishnan, 2005 also find evidence that food aid is shared within the village).

As time passes, the main actions of disaster management shift from relief to recovery and reconstruction, and the allocation of relief, recovery, and reconstruction funds becomes more efficient as damage information accumulates and agents' coordination becomes more effective.[1] Probably because of this perception, as well as a lack of data, empirical research on targeting reconstruction funds during post-emergency periods is lacking. This paper examines the allocation of housing reconstruction funds among cyclone victims in rural Fiji. Understanding the performance of targeting reconstruction funds is important, but is not a main focus of the paper. My main goal is to address a question that has not yet been explored by researchers, but has potential to be critically important: Do local elites capture reconstruction funds?

Elite capture of a particular program occurs when a powerful minority alters the nature of the program in their favor. As the participatory or decentralized approach to development has become mainstream (World Bank, 2002; Mansuri and Rao, 2004), elite capture as its potential drawback has been receiving considerable attention from researchers. Bardhan and Mookherjee (2000) theoretically examine the factors that might affect whether elite capture is more likely to occur at the local or national levels, showing that higher income inequality results in more local capture. Consistent empirical findings have been obtained in community-based programs in Asia and Latin America, such as India's employment generation program (Bardhan and Mookherjee, 2006), Bangladesh's Food-for-Education Program (Galasso and Ravallion, 2005), and Ecuador's Social Fund investment projects (Araujo et al., 2008).[2]

Platteau and Abraham (2002) argue that capture problems are also significant in more egalitarian countries in Sub-Saharan Africa because of community imperfections entailed in the personalized character of human interactions in small groups:

> In lineage-based societies, local chiefs and elders from dominant lineages are ideally positioned to … "capture" the benefits of decentralized development programmes or projects. In fact, they may easily respond to new prospects of windfall gains by transforming themselves into all-powerful patrons. Instead of "father figures" clinging to their traditional duties of redistributing wealth and settling conflicts in such a way as to maintain the existing social order, the erstwhile elite become greedy individuals who show all the less restraint in enriching themselves at the expense of their community as they are actually legitimated by outside actors. By virtue of their dominant position, they can thus manipulate participatory methods by subtly representing their own interests as community concerns expressed in the light of project deliverables. (p. 122)

In Fiji and many other Pacific Island states, kin-based hierarchies play a central role in local governance:

> Hierarchy is defined here as the ranking of the elements of a whole (society) in relation to the whole. In this sense, the elements that are ranked are social categories or positions defined in terms of age, seniority of descent, and gender, and the whole in relation to which they are ranked is a social system grounded in ritual. Elder is superior to junior, chief to commoner, and male to female. But while age, rank, and gender differences entail relations of superiority/inferiority among persons, they also create interdependence. . . . These relations of inequality and interdependence (which do not preclude conflict) are expressed and reproduced in the practice of everyday life. (Turner, 1992, p.291)

Kin elites may become capturers of reconstruction funds even when such funds are strongly targeted toward victims. If elite capture deteriorates the equitability of disaster management, policymakers need to pay serious attention to recipient communities. As a related study in a different context, Leeson and Sobel (2008) find that disaster relief is associated with an increase in public corruption across the United States.

To empirically examine elite capture, most extant studies on community-based development programs rely on measures of consumption, income, or asset inequality with

the assumption that power is correlated with wealth. A straightforward alternative is to use direct measures of elite status as determinants of benefit allocation. In standard household surveys, however, elite status is often unobservable to researchers, and even if it is observable, there are too few elites to make a statistical analysis possible. A unique feature of the Fijian data is that in each village, households are stratified by their kin group (clan) and elite status, and thus rich, direct measures of local elites are available.

The paper is based on original survey data gathered in 2005 in the same area as Takasaki's (forthcoming) study, but from many more villages and households than his original sample collected in 2003. Distinct from this earlier work on the relief allocation within the village in the six months after the cyclone, this paper investigates the allocation of housing reconstruction funds at three different levels – village, clan, and household – over three years. Comparing reconstruction with relief in response to the same cyclone allows me to better understand capture problems in disaster management.[3]

The paper examines in which form – receipt, the amount received, or the timing of these two – local elites capture reconstruction funds. Examining receipt and the amount received separately is important because their determinants can be distinct, as shown by Morris and Wodon (2003) for emergency relief (see also Jayne et al., 2002; Dercon and Krishnan, 2005 for similar empirical findings on targeting food aid in Africa). Strong targeting in receipt and the amount received does not necessarily mean *targeting in timing*: The larger the damage, the earlier the receipt or the greater the amount received in early periods. Targeting in timing can be weak or even nonexistent, because reconstruction usually takes time and the distribution of scarce funds is often delayed. Thus the limited supply of funds during early periods may lead to *early capture* of receipt

or the amount received: Local elites receive benefits earlier or receive greater benefits during early periods. Lanjouw and Ravallion (1999) find early capture of benefits from schooling and antipoverty programs by the nonpoor in India.

Main findings of the paper are summarized as follows. Allocations of housing reconstruction funds – both receipt and the amount received – across villages, clans, and households are strongly targeted on damage, and accordingly, local elites do not capture larger benefits at any level (in any period). A limited supply of funds during early periods, however, precludes targeting in timing, resulting in early capture of receipt by local elites within the recipient village.

The rest of the paper is organized as follows. Section II describes elite status in Fijian society, the sampling design, and the data. Section III provides a description of cyclone damage and reconstruction. Descriptive evidence of targeting and elite capture of housing reconstruction funds is offered in Sections IV and V, respectively. Section VI discusses the econometric specification, which is followed by estimation results in Section VII and discussions in Section VIII. The last section concludes.

II. Elite status and data

The hierarchical Fijian kin structure is well known among anthropologists: The bottom is *tokatoka*, followed by *mataqali*, *yavusa*, and *vanua*, and all native Fijians belong to one tokatoka, which belongs to one mataqali, and so forth (Ravuvu, 1983). Vanua ranges over several villages, roughly matching districts, and there is one or a few yavusa in a village; mataqali and tokatoka are village sub-groups.

I define kin-based elite status at the household, mataqali (henceforth called *clan*), and village levels as follows. First, in the village, individuals who hold a traditionally

assigned, permanent leadership position in their kin group – yavusa, mataqali, or tokatoka – play a major role in the group's decision making and negotiations among groups (*clan leaders*). Second, a small number of clan leaders are yavusa or mataqali chiefs with special social status who assume various traditional duties in the village (no tokatoka chiefs exist; village chiefs are shared by some clan leaders and are not necessarily yavusa or mataqali chiefs). These chiefs come from only specific mataqali (*chief's clans*). Third, vanua chiefs who are highly ranked and assume traditional duties across villages are available in or originated from selected villages (*chief's villages*). Since many vanua chiefs live in a city, the data contain a small number of vanua chiefs who share yavusa chiefs (i.e., clan leaders). Local elite status is also held by leaders of groups other than kin groups in the village, such as church, women's, and school groups (*non-clan leaders*). Non-clan leadership is neither permanent nor directly related to kinship.[4]

In July-September 2005, I conducted a survey among native Fijian households in Cakaudrove Province in the northern region of the country.[5] The province has 134 villages in 16 districts. Households were sampled as follows. First, in each district, villages were stratified by chief's village status; *all* 15 chief's villages were sampled, and other villages with distinct environmental and economic conditions were intentionally chosen. Next, in each village, *all* tokatoka were sampled. Lastly, in each tokatoka, households were stratified by a combination of clan and non-clan leadership status and major asset holdings (like shops), and households were randomly sampled in each stratum. Overall, the survey covered 906 households, 234 tokatoka, and 146 mataqali in 43 villages (with no overlap of tokatoka or mataqali across villages). While the data

represent neither the province nor the nation, the sample villages well capture various types of villages in Fiji's underdeveloped islands.

In the sample, 19% of households, 17% of clans, and 35% of villages are clan leaders, chief's clans, and chief's villages, respectively; 10% of households are non-clan leaders, and there are non-clan leaders in 55% of clans and in all villages (see Table 1). Hence, the present data contain sufficient frequencies of local elites for statistical analysis.

At the time of interviews, households in the sample earned F$10,972 annual income, or F$2,515 per adult equivalent (F$1 = US$.60), on average; cropping, fishing, and permanent wage labor accounted for 65%, 11%, and 10% of income, respectively.[6]

III. Cyclone damage and reconstruction

On 13 January 2003, Cyclone Ami swept over the northern and eastern regions of the Fiji Islands.[7] According to respondents' subjective assessments, Ami damaged 62% of residents' dwellings in the sample (panel A of Table 1): 19% and 34% of main houses were completely destroyed and partially damaged, respectively; and 54% of households experienced damage of independent dwelling units other than the main house, such as the kitchen, shower, and toilet (not all households have such units, as such facilities are often located inside the main house). The mean value of total dwelling damage, including independent units, in the whole sample was F$1,074.[8]

The Red Cross, other nongovernmental organizations (NGOs), and governments provisioned emergency relief. While almost all households received generous food aid (30% of their food consumption over six months, on average), as well as seeds for crop rehabilitation, primitive tarpaulins – to be used as emergency shelters and for temporary dwelling repair – were given to a small proportion of victims (Takasaki, forthcoming).

Housing reconstruction programs followed. Construction materials were provisioned, and if needed, carpenters were sent to villages to help build new houses (villagers helped each other with rebuilding and repairing). In the survey, each household was asked whether it received construction materials, and the recipient was asked about the year and month of receipt and the monetary value of construction materials received (measurement errors in these retrospective data are discussed in Section VI). A quarter of households were recipients, and the mean amount in the whole sample was F$685. The mean amount among recipients was F$2,821, which is almost the same as the mean value of total dwelling damage in the same sub-sample: That is, housing reconstruction funds and dwelling damages were balanced among recipients, on average.[9]

IV. Targeting

Household-level targeting

Housing reconstruction funds were strongly targeted toward victims. Panel A of Table 2 compares the receipt of construction materials (of any amount) with the incidence of dwelling damage (of any magnitude) among households. While 2% *of recipients* were households that experienced no dwelling damage, 60% *of victims* with a damaged dwelling were not recipients. That is, while the error of inclusion (leakage) is very small, the error of exclusion (under-coverage) is very large. While households with a completely destroyed main house were targeted (48% of recipients), under-coverage was still common among them (35% of such victims were non-recipients) (panel B). Thus, the supply of full construction materials for new house building was limited, and small provisions were targeted toward victims with a partially damaged main house and damaged independent units (42% and 8% of recipients, respectively).

Panel A of Table 3 shows the correlations of construction materials – receipt and amount received – with cyclone damage in the whole sample. The allocation is strongly positively correlated with all damage measures, except for a negative correlation between the amount of construction materials received and partial main house damage, the reason for which is given below. Panel A of Table 1 shows comparable patterns of recipients and non-recipients.

Targeting in timing

Provisions of construction materials took time. Figure 1 depicts the numbers of households that received construction materials and the mean amounts among recipients by quarter (the record is incomplete in the last quarter, 2005-3, when interviews were conducted). The numbers of recipients and the amounts received were small during early quarters and increased later, since 2004-1 and 2004-4, respectively. That is, housing reconstruction programs augmented in scale one year after the disaster, and provisions of full construction materials for new house building were further delayed (in 2003-3, only one recipient received them). A comparison across years reveals that 58% of recipients received construction materials in 2004, and the mean amount received among recipients in 2005 is more than two times that in 2003 and 2004.

Panel B of Table 3 shows correlations of cyclone damage with the receipt of construction materials in each year and the amount received in three years and in each year, among *recipients* in the corresponding year(s). Receipt is negatively correlated with dwelling damage value and complete main house destruction and positively correlated with partial main house damage in 2004; in 2005, opposite correlation patterns hold in a statistically significant manner (the results in 2003 are statistically nonsignificant). At the

same time, the amounts received are always positively correlated with dwelling damage value and complete main house destruction and negatively correlated with partial main house damage (the last relationship significantly appeared also in the whole sample discussed above). These patterns indicate that households with severer damage received construction materials later, not earlier, simply because their supply was limited during early periods, while benefit amounts were always strongly targeted on damage.[10]

Clan- and village-level targeting

Cyclone damage and construction materials at the clan (mataqali) level are reported in panel B of Table 1 (all mataqali-level analyses in the paper were repeated at the level of tokatoka, a sub-group of mataqali, yielding very similar results). Comparable village-level figures appear in panel C. While 88% of clans and all villages experienced dwelling damage (i.e., at least one victimized household was located there), 54% of clans and 88% of villages, respectively, were recipients (i.e., at least one recipient household was located there). Not surprisingly, clan and village means of all damage and construction material measures are comparable to the original household-level figures reported in panel A.

Using these clan- and village-level measures, I examine targeting performance at the clan and village levels in the same manner as the household-level analysis. Corresponding to panel B of Table 3, I consider the years of the *earliest receipt* – this dummy for each year takes one if a first-recipient household in the clan/village appears in that year – and the amount received among recipient clans/villages – with at least one recipient household – in each year. While by definition the former dummies for the earliest receipt are mutually exclusive across years, dummies for receipt corresponding to

the latter recipient clans/villages are not, because different households in the same clan/village can be recipients in different years. Qualitatively the same results as those reported in Tables 2 and 3 are obtained (results not shown); as an exception, clans and villages with severer damage did not necessarily receive construction materials later (the results are statistically nonsignificant).

Synthesis

To sum up, while targeting in receipt and the amount received was strong at the village, clan, and household levels, limited supply of reconstruction funds resulted in nonsignificant under-coverage and precluded targeting in timing. This indicates considerable room for early capture by local elites.

V. Elite capture

Descriptive evidence of elite capture is limited to the following. First, as shown in panel B of Table 1, chief's clans and clans with non-clan leaders are more likely to be recipients (comparable results are obtained from correlation analyses at the clan level and by comparing the proportion of recipients in these leaders' clans with that of other clans). Second, as suggested from panel B of Table 3, the amounts received in 2003 and 2004 (and in 2003-2005) among recipients are significantly larger for clan leaders than non-leaders (comparable results are obtained by comparing the means of the amounts conditional on recipient between these two). There is no statistically significant difference in receipt, however, between clan leaders and others in any year, and neither receipt nor the amount received significantly differs between non-clan leaders and others. Clans' elite status does not significantly differentiate the years of the earliest receipt and the amount received among recipient clans in each year, and qualitatively the same

results hold at the village level (results not shown). To sum up, it appears that chief's clans and non-clan leaders' clans are capturers, but not early ones, in the allocation of recipients, and clan leaders are early capturers of larger benefits, but not receipt of benefits.

These patterns could be spurious, however. Let me consider the clan-level capturing to illustrate why. First, chiefs' clans and non-clan leaders' clans are positively correlated with each other (the correlation is .27 with a 1% statistical significance). Only one of them may be a real capturer. Second, these two leaders' clans can be correlated with other factors that determine receipt of benefits. An obvious example is clan size: Larger clans with more victims are more likely to be recipient clans, and these leaders' clans tend to be larger than other clans. Systematically controlling for other determinants, which is a task in the remaining sections, is thus crucial to identify elite capture.

VI. Econometric specification

Empirical models

I conjecture that allocation of construction materials y is determined not only by cyclone damage X (targeting) but also by social status Z (elite capture). I employ the following reduced-form models at the village (v), clan (g), and household (i) levels:

$$y_v = \alpha_1 + \beta_1 X_v + \gamma_1 Z_v + \delta_1 W_v + e_v , \quad (1)$$

$$y_g = \alpha_2 + \beta_2 X_g + \gamma_2 Z_g + \delta_2 W_g + V + e_g , \quad (2)$$

$$y_i = \alpha_3 + \beta_3 X_i + \gamma_3 Z_i + \delta_3 W_i + V + e_i , \quad (3)$$

where W_v, W_g, and W_i, respectively, are other village, clan, and household characteristics that affect the allocation; V is village dummies; and e_v, e_g, and e_i are error terms. Whether victims reconstruct or repair their dwellings without receiving construction materials

certainly affects the allocations of reconstruction funds (see note 9), but this endogenous decision does not appear as an explanatory variable in the reduced-form equations (1)-(3) (examining self-reconstruction is not a focus of the paper). As village dummies fully control for village-level factors, including total construction materials allocated to the village, equations (2) and (3), respectively, focus on the allocations across clans and households within the village. I also estimate equation (3), replacing village dummies V with clan dummies G, which fully control for clan-level factors. If household-level factors are a driving force, then significant findings in the original equation (3), which does not control for clan-level factors – both observable and unobservable ones – must be robust to this alternative specification focusing on allocations within the clan.

I conduct two analyses, one ignoring the timing of receipt and the other highlighting it. The first analysis estimates the determinants of receipt in the three-year period, 2003-2005, using probit for the whole sample and those of log of the amount received *among recipients* using Ordinary Least-Squares (OLS) (the village and clan means of the amount received is used in equations 1 and 2, respectively). This hurdle model is commonly used in previous studies (Jayne et al., 2002; Dercon and Krishnan, 2005).[11] Targeting performance and elite capture, respectively, are measured by positive β_j and γ_j (or their positive elements if they are a vector);[12] if the allocation corresponds to only damage, then γ_j and δ_j should be zero.

The second analysis employs the same hurdle model in the first year, 2003, and in the first two years, 2003-2004. At the village and clan levels, the year of the earliest receipt and the recipients in the corresponding year(s) defined above are considered. For example, the dummy dependent variable for 2003-2004 takes one if at least one recipient

household in a clan appears in the first two years, and the corresponding amount equation is estimated for clans with at least one recipient household in the same period. Targeting in timing and early capture, respectively, are measured by positive β_j and γ_j with greater magnitudes than those for the three-year period.

I also estimate the determinants of the year of receipt – 2003, 2004, or 2005 – *among recipients* using ordered probit (the year of the earliest receipt in the village- and clan-level analyses). As the greater the dependent variable, the later the receipt, *negative* β_j and γ_j, respectively, indicate targeting in timing and early capture of receipt. While the probit model shows whether elites are more likely to be recipients during early periods, the ordered-probit model examines the order of receipts among recipients.[13]

While retrospective errors in the receipt of construction materials should be minimal and those in the year of receipt should be also small (those in the month of receipt could be significant), those in the amount received could be considerable. A key question is whether errors are correlated with covariates. In particular, households with more damage may have felt that the amount received was too small, causing a *downward* bias in estimated impacts of the damage. This means that estimated positive β_j in the amount equation (suggesting good targeting) should be qualitatively robust.

Covariates

Three groups of covariates – cyclone damage X, social status Z, and other characteristics W – are measured as follows. At the household level, X_i is captured by the log value of total dwelling damage or two dummies for a completely destroyed and partially damaged main house. The former damage measure is comprehensive, as it covers total damage of all dwelling units, but its measurement errors could be

considerable and systematic. Although the latter damage measure does not capture independent units owned by some households, retrospective errors in the damage status of each main house reported by individual households are minimal, because relief officers used the same three categories for their damage assessments, and thus the damage status of each house was common knowledge among villagers. As such, qualitatively similar results of these two damage measures give me confidence about the findings' robustness. X_v is measured by the village mean of total damage value or two variables for the proportions of households with completely destroyed and partially damaged main houses in the village; X_g is measured analogously. When main house damage measures are used, β_j (which is a vector) should indicate a greater marginal effect for complete damage than partial damage.

Social status Z_v, Z_g, and Z_i, respectively, are measured by a dummy for chief's villages, two dummies for chief's clans and non-clan leaders' clans, and two dummies for clan leaders and non-clan leaders defined above.

Village characteristics W_v include village size and access, measured by the total number of households in the village (in population) and travel time to a market (log), respectively; only clan size, measured by the total number of households in the clan (in population), is considered for clan characteristics W_g. While clan size should positively affect the allocation in the village, as discussed above, how village size matters is ambiguous: Larger villages may be prioritized or they instead may be given a lower priority with a limited supply of funds. While geographical location certainly determines the delivery of emergency relief, whether this is also the case for reconstruction funds during post-emergency periods is an empirical question. In equations (2) and (3), all

geographical factors are captured by village dummies. Household characteristics W_i are captured by asset holdings and demographic factors in a standard manner.[14] If the allocation is determined by targeting on housing damage and social status potentially causing elite capture, as conjectured here, household characteristics should not matter.

VII. Estimation results

Estimation results of the models with dwelling damage value and main house damage are reported in Tables 4 and 5, respectively. In each table, results of the allocations across villages, clans, and households are shown in panels A, B, and C, respectively. In each table, columns (1)-(3), respectively, show probit results for receipts in 2003, 2003-2004, and 2003-2005 (marginal effects at means are reported); columns (4) and (5), respectively, show OLS results for the amounts received among recipients in 2003-2004 and 2003-2005 (the analysis in 2003 is infeasible because of the small number of observations); and column (6) gives ordered probit results for the year of receipt among recipients.[15] I first discuss targeting and then elite capture and other factors.

Targeting

Targeting performance is very consistent with earlier descriptive findings. When the timing of receipt is ignored (columns 3 and 5), the receipt and the amount received are strongly targeted toward more severely affected victims, according to both dwelling damage value and main house damage, at the village, clan, and household levels. Almost all results are statistically significant at least at a 5% significance level.[16] Allocations strongly respond to complete main house destruction. At the household level, for example, the probability of being a recipient is higher by .72 and the amount received (conditional

on receipt) is 261% larger among households with a completely destroyed main house than others.[17]

There is no strong evidence of targeting in timing (columns 1, 2, 4, and 6). Overall fitness of the models of the receipt in 2003 and of the year of receipt is weak at the village and clan levels. Only in receipt at the village level do the marginal effects of damage decrease over time, and correspondingly, the estimated coefficients of the damage in the year-of-receipt equation are negative, but not statistically significant. According to both the receipt and year-of-receipt equations, clans with more severely affected victims are rather late recipients.[18]

Elite capture

Consistent with the earlier descriptive finding at the clan level, when clan size is *not* controlled for, the probability of receipt is significantly higher among the chief's clans than other clans (results not shown); once clan size is controlled for, however, this result loses statistical significance and the estimated marginal effect decreases (column 3 in panel B of Table 4). The former result is thus biased upward for the reason discussed above. A new finding is that the chief's clans strongly affect the receipt in 2003-2004 – about .40 marginal effects with a near 10% statistical significance (column 2). At the same time, chief's villages do not significantly influence across-villages allocations.

Two new findings at the household level are obtained: (1) the probability of receipt in 2003-2004 is higher by .10-.12 among clan leaders than others, and this pattern is not statistically significant in 2003 or 2003-2005 (panel C of Table 4); and (2) according to the year-of-receipt equation among recipients, the probability of receipt in 2003 and 2005 is higher and lower by about .14-.15 and .12-.13, respectively, among clan

leaders than non-leaders (column 6 in panel C of Table 6). There are no other significant results indicating capturing in receipt or the timing of receipt, and when I estimate equation (3) with clan dummies, these two significant results hold, confirming that household-level elite status is a driving force. Hence, individual clan leadership matters in across-households allocations within villages and clans.

Consistent with the earlier descriptive finding, the clan leader dummy exhibits a positive impact on the amount received in 2003-2004; however, this is statistically significant only in models with dwelling damage value and the result loses statistical significance in equation (3) with clan dummies, indicating that household-level elite status is not a strong determinant. According to the regression results, traditional local elites do not capture larger amounts at any level of allocation in any period. Nor is there evidence of capturing by non-traditional elites in any form of allocation – at the clan or household level – over time.

To sum up, elite capture exists in two forms: (1) chief's clans, but not non-clan leaders' clans, are early capturers of receipt in the village; and (2) clan leaders are early capturers of receipt of benefits, but not larger benefits, in the village and the clan. Note that as there are clan leaders in most clans, the latter household-level capturing is not necessarily a primary cause of the former clan-level capturing. These patterns differ from earlier descriptive findings: The descriptive evidence of capturing by non-clan leaders' clans is an artifact caused by their positive correlation with chief's clans; chief's clans are early capturers, as clan leaders are; and clan leaders are capturers of receipt of benefits, as chief's clans are.

Other factors

Findings about village, clan, and household characteristics are as follows (results not shown). While village access does not influence the allocation, smaller villages are more likely to be recipients in 2003-2004, but not in 2003-2005 (with .07-.13 marginal effects in magnitude). As expected, larger clans are more likely to be recipients in 2003-2004 and 2003-2005 (with .28-.40 marginal effects); the results are statistically significant, however, only in the models with main house damage. Lastly, almost no household characteristics are strong determinants in any form of allocations.[19]

VIII. Discussions

To better interpret the findings on elite capture in the last section, this section compares the findings with those regarding emergency relief. Recall that with a large supply of food aid, almost all households are recipients. Takasaki (forthcoming) shows that neither clan leaders nor chief's clans capture food aid, even though crop damage is not very observable to other households and everyone demands food aid, and thus there exist significant room and demand for capture. This is because in a closely knit kin society, capturing relief allocated as part of risk sharing can greatly deteriorate the capturer's reputation.

In contrast to emergency food aid, the following relationships hold for construction materials. First, as only households with a damaged dwelling demand construction materials, capturing by non-victims is limited. Indeed, leakage was minimal (Takasaki, forthcoming shows a similar pattern in the receipt of tarpaulins). Second, information problems in housing damage among villagers and relief officers are very small. This precludes local elites from capturing larger benefits in any period, because the amount provisioned can be well determined based on the damage. Third, a limited supply

of construction materials gives rise to significant under-coverage, especially during early periods, making considerable room for the early capture of the receipt of benefits.

Whether local elites actually capture benefits earlier depends on their benefit-cost calculation of doing so. Benefits are much higher for receiving construction materials than for receiving food aid (the mean value of construction materials received per adult equivalent among recipients is 6.5 times the mean value of food aid received per capita, as reported by Takasaki, forthcoming). Benefits peak in 2004 when the amount provisioned – especially provisions for new house building – started to augment. The social costs of capturing can be also high, but those of manipulating the timing of receipt by one year or so are much smaller than manipulating the recipients themselves. Traditional local elites can exercise their power most within the village, while non-traditional elites have no such power.[20] As a result, early capture of the receipt of benefits by traditional elites emerges in the recipient village.

IX. Conclusion

This paper examined the allocation of natural disaster reconstruction funds among cyclone victims in rural Fiji. Using original survey data with rich, direct measures of traditional, kin-based elite status, the paper investigated whether and how local elites capture housing construction materials during post-emergency periods when good information about the damage is available. With effective targeting in both receipt and the amount received at the village, clan, and household levels, local elites do not capture larger benefits at any level. More severely affected victims are not early recipients, however, because the supply of reconstruction funds is limited during early periods. This invites early capture within the recipient village: Clan leaders and elite clans receive

benefits earlier. At the same time, there is no evidence of capturing by non-traditional elites of village organizations other than kin groups. Descriptive results of targeting well match regression results, except in the instance of elite capture.

Policy implications for disaster management are the following. First, good data and information management for effective targeting (Amin and Goldstein, 2008) greatly help preclude elite capture. Second, timely provision of sufficient reconstruction funds is crucial not only to better support disaster victims, but also to reduce early capture by local elites. Third, in kin-based societies like Fiji, traditional elite status is likely to be a source of power fuelling elite capture, and not only individual elites but also elite kin groups can be capturers in the recipient community. Fourth, identifying elite capture is more difficult than evaluating targeting performance, and thus it is likely to require careful econometric analysis of direct measures of elite status. Capture problems in disaster management may be also prevalent in other kin-based societies, such as those in Sub-Saharan Africa, and need to receive more attention from researchers and practitioners.

Notes

[1] Post-disaster management consists of three phases – relief, early recovery, and recovery and reconstruction (de Ville de Goyet, 2008). Relief emphasizes the urgent but temporary nature of the assistance, such as search and rescue, evacuation, food and water distribution, temporary sanitation and health care, temporary shelter, and restoration of the access to transport. Relief is mostly a humanitarian response by nongovernmental organizations and the United Nations (UN) Office for the Coordination of Humanitarian Affairs. Development agents, such as bilateral donors, the UN Development Programme,

and the World Bank, are primarily concerned about recovery and reconstruction, aiming at restoring heavy infrastructure and the normal life of business with a long-term vision. Early recovery consists of continuing basic needs support, providing mental health care, restoring education, and restoring livelihoods:

> It is often assumed that early recovery implies emergency or temporary measures. However, early recovery is gradually coming to include permanent solutions such as *the construction of housing* or water systems and the establishment of primary health care centers or schools staffed by local people, thereby blurring the distinction between delayed relief and reconstruction. Emergency activities undertaken by relief agencies following hurricanes or earthquakes, which used to be run for only a few weeks or months, are now spanning years. (de Ville de Goyet, 2008, pp.31-32, emphasis added)

[2] To the contrary, Yamauchi (forthcoming) finds no evidence of elite capture in Indonesia's anti-poverty program, nor does elite capture appear in India's credit and agricultural minikit programs (Bardhan and Mookherjee, 2006).

[3] Better understanding the effectiveness of disaster management is of great importance in small island states (Bertram, 1986), as researchers criticize their increasing dependency on emergency aid from donors and the associated deterioration of indigenous mechanisms (e.g., Campbell, 1984). In contrast to extensive anthropological studies, economic studies of the Pacific region based on household survey data are greatly scarce.

[4] Non-clan leaders also include *gatekeepers* (*turaga ni koro*), who handle most matters in connection with the local government. Gatekeepers receive information and materials from the government and NGOs, distribute them to villagers, and coordinate village meetings. While gatekeepers are deliverers of disaster relief, whether and how they affect allocation decisions are unknown.

[5] The province is mainly located on Vanua Levu Island and Taveuni Island, the second- and third-largest islands in the country, which significantly lag behind the largest island, Viti Levu, where the state capital, two international airports, and most tourism businesses are situated. While Fiji is divided almost evenly between native Fijians and Indo-Fijians, this study focuses on the former.

[6] Almost all households employ traditional farming practices, using no mechanized equipment or animal traction and limited purchased inputs to produce taro, cassava, coconut, and kava plant (locally known as *yaqona*, a pepper plant used to make a local beverage kava which is a dominant symbol in Fijian culture, Turner, 1986). Land is communally owned by mataqali, is privately used, and by law cannot be sold (about 83% of the country's total land is communal). Most households engage in subsistence fishing using lines and hooks, simple spear guns, or rudimentary nets, and more commercially oriented fishermen use boats with engines, along with more valuable nets. Some households engage in permanent wage labor, especially in the public and tourism sectors.

[7] The northern region is much less prone to being hit by cyclones than other regions of the country, and Ami was the only cyclone in the northern region from 1991 through 2005 (McKenzie et al., 2005).

[8] The total cyclone damage across the country is estimated at F$104 million, of which dwelling damage is F$22 million and crop damage is F$40 million (National Disaster Management Office, 2003). Fourteen people were killed. In the sample villages, no casualties and very limited injuries and illnesses caused by the cyclone were reported.

[9] The provisions of construction materials greatly helped reconstruction as follows (a systematic analysis of impacts of housing reconstruction programs is beyond the scope of the paper). I focus on new main house building, for which information is available (information of repairing is lacking). In the whole sample, 9% of households built a new house and almost all of them had experienced dwelling damage, especially complete destruction of their main house; among households with a completely destroyed main house, more than half of recipients built a new house and 20% of non-recipients did so (results not shown). Thus, the provisions of construction materials for new house building were insufficient and constructing a new house without receiving them (i.e., self-reconstruction) was relatively common.

[10] Correspondingly, among recipients, new main house building is positively correlated with the amount of construction materials received, but not receipt itself, in each year; in the whole sample, new main house building is positively correlated with cyclone damage and both receipt and the amount received (Table 3).

[11] An alternative sample selection model is infeasible with these data, which lack the identifying instruments required to credibly estimate the selection equation.

[12] If the allocation of construction materials is part of informal risk sharing among villagers and clan members, β_3 is generally unsigned, because the opposite allocation rule is possible when households that suffered more receive greater net private transfers, as Takasaki (forthcoming) finds for emergency food aid. It is most unlikely, however, that private transfers outweigh provisions of construction materials.

[13] At the household and clan levels, respectively, I repeated all these analyses for households with a damaged dwelling and clans containing at least one such victimized household. In this way, I can examine capture problems as well as targeting performance among *eligible* potential recipients. All results of this sub-sample analysis are almost the same as what are presented below based on the whole sample. Of course, because of the minimal error of inclusion found above, recipients in the victim sub-sample are almost the same as those in the whole sample analysis.

[14] Household characteristics include land holdings (log), fishing capital (log), a dummy for secondary education among adults (capturing human capital), household adult equivalent size (log), proportions of children and elderly (capturing labor resources), the age of household head (log), and a dummy for female head. All of these are measured at the time of interviews. It is better to use measures before the cyclone or right after the cyclone, but such data are lacking. In particular, land holding and fishing capital can be endogenous, because the receipt of construction materials can alter household investment decisions. To address this problem, I estimate models excluding these two assets, finding very similar results on all remaining variables. For the same reason, income is not controlled for, though household characteristics still control for permanent income. Note also that village dummies control for income inequality (also in equation 2).

[15] Equation (2) can be applied only to villages in which there exist across-clans variations in the receipt in the period of interest in the probit and the years of receipt among recipient clans in the ordered probit; without such variations, village dummies perfectly predict them. Analogously, equation (3) can be applied only to villages with sufficient

across-households variations. Accordingly, the numbers of observations for these analyses greatly decrease. The numbers of observations for the analyses conditional on receipt – OLS and ordered probit – further decline, and this is especially so in 2003.

[16] The result of receipt at the village level is weak, because non-recipient villages are uncommon (only 5 out of 43 villages). Indeed, the result is stronger in 2003-2004, when non-recipient villages are more common.

[17] At the clan level, a .1 increase in the proportion of households with completely destroyed main houses in the clan augments the probability of receipt by .31 and the amount received by 27%; and the comparable marginal effect on the amount received at the village level is 71%. In both the receipt and the amount received at any level of allocation, partial main house damage exhibits much smaller impacts than complete destruction. While marginal effects of dwelling damage value on receipt are small, those on the amount received are large – its 10% increase augments the amount received by 18%, 7.8%, and 4.8% at the village, clan, and household levels, respectively.

[18] This result is not strong. A 10% increase in dwelling damage value reduces the probability of receipt in 2003 by .015 and increases that in 2004 and 2005 by .010 and .004, respectively, and the result is not statistically significant in the model with main house damage. Consistent with the earlier descriptive finding, a similar pattern is found at the household level, but in equation (3) with clan dummies, the estimated coefficient for dwelling damage value in the year-of-receipt equation loses statistical significance, indicating that household-level damage is not a driving force.

[19] The only exception is that households with more children (in proportion) tend to receive larger amounts of construction materials in 2003-2004 and 2003-2005. Because household size, as well as other demographic factors, is separately controlled for, this result suggests that the allocations favor children.

[20] Non-clan leaders' clans, not non-clan leaders themselves, capture emergency food aid provisioned to their groups (Takasaki, forthcoming). Because construction materials were not provisioned to village organizations, non-clan leaders could not use the traditional kin structure for capturing, as they did for food aid.

References

Amin, S. and Goldstein, M. (2008) *Data Against Natural Disasters: Establishing Effective Systems for Relief, Recovery, and Reconstruction*. (Washington, D.C.: World Bank).

Araujo, M. C., Ferreira, F. H. G., Lanjouw, P. and Ozler, B. (2008) Local Inequality and Project Choice: Theory and Evidence from Ecuador. *Journal of Public Economics*, 92(5-6), pp.1022-46.

Bardhan, P. and Mookherjee, D. (2000) Capture and Governance at Local and National Levels. *American Economic Review*, 90(2), pp.135-39.

Bardhan, P. and Mookherjee, D. (2006) Pro-poor Targeting and Accountability of Local Governments in West Bengal. *Journal of Development Economics*, 79(2), pp.303-27.

Bertram, G. (1986) Sustainable development in Pacific microeconomies. *World Development*, 14(7), pp.809-822.

Campbell, J. R. (1984) *Dealing With Disaster: Hurricane Response in Fiji*. (Honolulu: Pacific Islands Development Program, East-West Centre).

de Ville de Goyet, C. (2008) Information gaps in relief, recovery, and reconstruction in the aftermath of natural disasters, in: S. Amin, M. Goldstein (eds.) *Data Against Natural Disasters: Establishing Effective Systems for Relief, Recovery, and Reconstruction*, (Washington, D.C.: World Bank), pp. 23-58.

Dercon, S. and Krishnan, P. (2005) Food Aid and Informal Insurance, in: S. Dercon (ed.) *Insurance Against Poverty*, (Oxford and New York: Oxford University Press), pp. 305-329.

Galasso, E. and Ravallion, M. (2005) Decentralized Targeting of an Antipoverty Program. *Journal of Public Economics*, 89(4), pp.705-27.

Jayne, T. S., Strauss, J., Yamano, T. and Molla, D. (2002) Targeting of Food Aid in Rural Ethiopia: Chronic Need or Inertia? *Journal of Development Economics*, 68(2), pp.247-88.

Lanjouw, P. and Ravallion, M. (1999) Benefit Incidence and the Timing of Program Capture. Policy Research Working Paper Series 1956, World Bank.

Leeson, P. T. and Sobel, R. S. (2008) Weathering Corruption. *Journal of Law and Economics*, 51(4), pp.667-81.

Mansuri, G. and Rao, V. (2004) Community-Based and -Driven Development: A Critical Review. *World Bank Research Observer*, 19(1), pp.1-39.

McKenzie, E., Prasad, B. and Kaloumaira, A. (2005) Economic impact of natural disasters on development in the Pacific: Volume 1 Research report. The University of the South Pacific.

Morris, S. S. and Wodon, Q. (2003) The Allocation of Natural Disaster Relief Funds: Hurricane Mitch in Honduras. *World Development*, 31(7), pp.1279-89.

National Disaster Management Office (2003) Report on Tropical Cyclone Ami. Ministry of Regional Development, Fiji.

Platteau, J.-P. and Abraham, A. (2002) Participatory Development in the Presence of Endogenous Community Imperfections. *Journal of Development Studies*, 39(2), pp.104-36.

Ravuvu, A. (1983) *Vaka I Taukei: The Fijian Way of Life*. (Suva: Institute of Pacific Studies).

Takasaki, Y. (forthcoming) Targeting cyclone relief within the village: kinship, sharing, and capture. *Economic Development and Cultural Change*.

Turner, J. W. (1986) "The water of life": kava ritual and the logic of sacrifice. *Ethnology*, 25(3), pp.203-214.

Turner, J. W. (1992) Ritual, habitus, and hierarchy in Fiji. *Ethnology*, 31(4), pp.291-302.

World Bank (2002) *Reaching the poor: a renewed strategy for rural development*. (Washington, D.C.: World Bank).

Yamauchi, C. (forthcoming) Community-based Targeting and Initial Local Conditions: Evidence from Indonesia's IDT Program. *Economic Development and Cultural Change*.

Table 1. Means of elite status, housing damage, construction materials, and reconstruction by receipt.

	All	Non-recipients	Recipients	Mean. test (p-value)
A. Household				
Clan leader dummy	0.19 (0.40)	0.20 (0.40)	0.18 (0.38)	0.412
Non-clan leader dummy	0.10 (0.30)	0.09 (0.29)	0.14 (0.34)	0.055
Damaged dwelling dummy	0.62 (0.49)	0.50 (0.50)	0.98 (0.15)	**0.000**
Completely destroyed main house dummy	0.19 (0.39)	0.09 (0.28)	0.48 (0.50)	**0.000**
Partially damaged main house dummy	0.34 (0.47)	0.32 (0.46)	0.42 (0.50)	**0.003**
Damaged independent units dummy	0.53 (0.50)	0.41 (0.49)	0.86 (0.35)	**0.000**
Total dwelling damage (F$)	1074 (2138)	466 (1160)	2881 (3134)	**0.000**
Construction materials receipt dummy	0.25 (0.43)	0.00 (0.00)	1.00 (0.00)	n.a.
Construction materials received (F$)	685 (1983)	0 (0)	2821 (3191)	**0.000**
New main house building dummy	0.09 (0.3)	0.03 (0.2)	0.28 (0.5)	**0.000**
No. observations	903	676	227	
B. Clan				
Chief's clan dummy	0.17 (0.38)	0.10 (0.31)	0.23 (0.42)	**0.049**
Non-clan leaders dummy	0.55 (0.50)	0.40 (0.49)	0.67 (0.47)	**0.001**
Damaged dwelling dummy	0.88 (0.32)	0.75 (0.44)	1.00 (0.00)	**0.000**
Proportion of damaged dwelling	0.59 (0.32)	0.41 (0.34)	0.73 (0.21)	**0.000**
Proportion of completely destroyed main houses	0.18 (0.23)	0.06 (0.12)	0.27 (0.26)	**0.000**
Proportion of partially damaged main houses	0.32 (0.28)	0.28 (0.30)	0.34 (0.26)	0.189
Proportion of damaged independent units	0.49 (0.31)	0.34 (0.32)	0.62 (0.25)	**0.000**
Clan mean of total dwelling damage (F$)	994 (1165)	352 (539)	1538 (1274)	**0.000**
Construction materials receipt dummy	0.54 (0.50)	0.00 (0.00)	1.00 (0.00)	n.a.
Clan mean of construction materials received (F$)	680 (1366)	0 (0)	1257 (1654)	**0.000**
Proportion of new main house building	0.08 (0.2)	0.01 (0.1)	0.15 (0.2)	**0.000**
No. observations	146	67	79	
C. Village				
Chief's village dummy	0.35 (0.48)	0.40 (0.55)	0.34 (0.48)	0.804
Non-clan leaders dummy	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	n.a.
Damaged dwelling dummy	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	n.a.
Proportion of damaged dwelling	0.64 (0.21)	0.37 (0.24)	0.68 (0.18)	**0.001**
Proportion of completely destroyed main houses	0.21 (0.16)	0.07 (0.08)	0.23 (0.16)	**0.031**
Proportion of partially damaged main houses	0.34 (0.15)	0.26 (0.15)	0.35 (0.14)	0.162
Proportion of damaged independent units	0.55 (0.21)	0.33 (0.22)	0.58 (0.19)	**0.009**
Village mean of total dwelling damage (F$)	1160 (771)	287 (203)	1275 (744)	**0.006**
Construction materials receipt dummy	0.88 (0.32)	0.00 (0.00)	1.00 (0.00)	n.a.
Village mean of construction materials received (F$)	775 (849)	0 (0)	877 (852)	**0.006**
Proportion of new main house building	0.10 (0.1)	0.02 (0.0)	0.12 (0.1)	**0.028**
No. observations	43	5	38	

Note - Standard deviations are shown in parentheses. Mean test results with a 5% significance level are bolded.

Table 2. Targeting of construction materials among households.

A. Targeting on dwelling damage.

	Receipt of construction materials		
	Non-receipt	Receipt	Total
Undamaged	338	5	343
	99%	1%	100%
	50%	2%	38%
Damaged	338	222	560
	60%	40%	100%
	50%	98%	62%
Total	676	227	903
	75%	25%	100%
	100%	100%	100%

B. Targeting on main house damage.

	Receipt of construction materials		
	Non-receipt	Receipt	Total
Undamaged	404	22	426
	95%	5%	100%
	60%	10%	47%
Partially damaged	213	96	309
	69%	31%	100%
	32%	42%	34%
Completely destroyed	59	109	168
	35%	65%	100%
	9%	48%	19%
Total	676	227	903
	75%	25%	100%
	100%	100%	100%

Note - In each cell of panels A and B, the frequency, the proportion of recipient status (in rows), and the proportion of damage category (in columns), respectively, are shown at the top, in the middle, and at the bottom.

Table 3. Correlations of housing damage, construction materials, reconstruction, and elite status among households.

	Dwelling damage value (F$)	Completely destroyed main house dummy	Partially damaged main house dummy	Construction materials receipt dummy	Amount of construction materials (F$)	New main house building dummy	Clan leader dummy	Non-clan leader dummy
A. Whole sample								
Dwelling damage value (F$)	1.000							
Completely destroyed main house dummy	0.661	1.000						
	(0.000)							
Partially damaged main house dummy	-0.079	-0.345	1.000					
	(0.018)	**(0.00)**						
Construction materials receipt dummy	0.491	0.438	0.099	1.000				
	(0.000)	**(0.000)**	**(0.003)**					
Amount of construction materials (F$)	0.616	0.612	-0.164	0.611	1.000			
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**				
New main house building dummy	0.473	0.518	-0.149	0.381	0.536	1.000		
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**			
Clan leader dummy	0.014	-0.027	-0.066	-0.027	0.043	-0.021	1.000	
	(0.687)	(0.420)	**(0.047)**	(0.412)	(0.198)	(0.531)		
Non-clan leader dummy	0.048	0.035	-0.014	0.064	0.049	-0.007	0.017	1.000
	(0.149)	(0.299)	(0.674)	(0.055)	(0.147)	(0.838)	(0.601)	
B. Recipient sample								
2003 construction materials receipt dummy among recipients	-0.061	-0.102	0.106			-0.025	-0.040	-0.027
	(0.361)	(0.130)	(0.114)			(0.706)	(0.556)	(0.689)
2004 construction materials receipt dummy among recipients	-0.199	-0.177	0.140			-0.029	0.100	0.023
	(0.003)	**(0.008)**	**(0.036)**			(0.670)	(0.135)	(0.734)
2005 construction materials receipt dummy among recipients	0.290	0.302	-0.263			0.057	-0.081	-0.002
	(0.000)	**(0.000)**	**(0.000)**			(0.394)	(0.228)	(0.979)
Construction materials received among recipients (F$)	0.545	0.690	-0.552			0.504	0.142	0.019
	(0.000)	**(0.000)**	**(0.000)**			**(0.000)**	**(0.036)**	(0.778)
Construction materials received among 2003 recipients (F$)	0.677	0.579	-0.426			0.501	0.345	-0.044
	(0.000)	**(0.000)**	**(0.007)**			**(0.001)**	**(0.032)**	(0.790)
Construction materials received among 2004 recipients (F$)	0.528	0.693	-0.555			0.561	0.169	0.030
	(0.000)	**(0.000)**	**(0.000)**			**(0.000)**	(0.059)	(0.737)
Construction materials received among 2005 recipients (F$)	0.390	0.619	-0.455			0.409	0.081	0.025
	(0.006)	**(0.000)**	**(0.001)**			**(0.004)**	(0.581)	(0.865)

Note - p-values are shown in parentheses. Results with a 5% significance level are bolded.

Table 4. Allocation of construction materials - dwelling damage value.

	Whole sample			Recipients		
	Receipt			Amount received		Year of receipt
	2003	2003-2004	2003-2005	2003-2004	2003-2005	2003/2004/2005
	(1)	(2)	(3)	(4)	(5)	(6)
			A. Village.			
Village mean of log dwelling damage value (F$)	0.230 **	0.046 **	0.025 **	1.279 ***	1.784 ***	-0.391
	(0.100)	(0.081)	(0.051)	(0.283)	(0.181)	(0.278)
Chief's village dummy	0.015	-0.009	-0.020	0.025	0.242	0.178
	(0.170)	(0.027)	(0.042)	(0.495)	(0.312)	(0.502)
Log likelihood	-26.4	-9.5	-7.2			-32.5
Chi sq./F (p-value)	0.176	0.000	0.002	0.001	0.000	0.573
Pseudo-R sq./R sq.	0.107	0.542	0.533	0.358	0.702	0.061
No. observations	43	43	43	35	38	38
			B. Clan.			
Clan mean of log dwelling damage value (F$)	0.071	0.168 ***	0.380 ***	0.908 ***	0.781 ***	0.394 *
	(0.049)	(0.055)	(0.259)	(0.257)	(0.130)	(0.217)
Chief's clan dummy	0.132	0.406	0.315	-0.803	-0.165	-1.048
	(0.257)	(0.236)	(0.274)	(0.679)	(0.536)	(0.737)
Non-clan leaders' clan dummy	0.100	-0.209	0.016	0.823	0.370	-0.709
	(0.160)	(0.224)	(0.253)	(0.485)	(0.356)	(0.456)
Log likelihood	-32.1	-27.0	-22.5			-37.9
Chi sq./F (p-value)	0.799	0.001	0.000	0.000	0.000	0.131
Pseudo-R sq./R sq.	0.167	0.450	0.573	0.762	0.813	0.255
No. observations	58	71	76	49	61	51
			C. Household.			
Log dwelling damage value (F$)	0.021 ***	0.062 ***	0.082 ***	0.485 ***	0.479 ***	0.095 *
	(0.004)	(0.006)	(0.006)	(0.104)	(0.075)	(0.057)
Clan leader dummy	0.007	0.102 **	0.030	0.516	0.230	-0.514 *
	(0.031)	(0.054)	(0.046)	(0.320)	(0.267)	(0.267)
Non-clan leader dummy	0.014	0.026	0.051	0.127	-0.060	0.003
	(0.035)	(0.048)	(0.054)	(0.345)	(0.290)	(0.282)
Log likelihood	-111.7	-267.5	-270.3			-150.8
Chi sq./F (p-value)	0.006	0.000	0.000	0.000	0.000	0.000
Pseudo-R sq./R sq.	0.187	0.311	0.421	0.525	0.532	0.200
No. observations	428	689	773	153	207	186

*10% significance, **5% significance, ***1% significance. Columns (1)-(3) are marginal effects at means in probit estimates with standard errors in parentheses. Columns (4)-(5) are OLS estimates conditional on receipt with robust standard errors in parentheses. Column (6) is ordered probit estimates conditional on receipt with standard errors in parenthesis. Other controls which are not shown here are village characteristics in panel A, clan characteristics in panel B, household characteristics in panel C, village dummies in panels B and C, and constant in columns (4)-(6).

Table 5. Allocation of construction materials - main house damage.

	Whole sample			Recipients		
	Receipt			Amount received		Year of receipt
	2003	2003-2004	2003-2005	2003-2004	2003-2005	2003/2004/2005
	(1)	(2)	(3)	(4)	(5)	(6)
A. Village.						
Proportion of completely damaged main houses	1.182 **	0.498 **	0.169	6.297 ***	7.258 ***	-1.731
	(0.587)	(0.448)	(0.302)	(1.474)	(1.152)	(1.432)
Proportion of partially damaged main houses	0.969 *	0.248	0.075	0.305	-2.380	-1.652
	(0.566)	(0.319)	(0.161)	(2.111)	(1.954)	(1.494)
Chief's village dummy	-0.002	-0.036	-0.027	0.013	0.256	0.283
	(0.170)	(0.059)	(0.048)	(0.474)	(0.411)	(0.496)
Log likelihood	-26.1	-12.0	-9.1			-32.3
Chi sq./F (p-value)	0.240	0.004	0.026	0.000	0.000	0.653
Pseudo-R sq./R sq.	0.114	0.420	0.413	0.358	0.564	0.067
No. observations	43	43	43	35	38	38
B. Clan.						
Proportion of completely damaged main houses	0.082	2.040 ***	3.133 ***	2.664 *	2.706 ***	1.288
	(0.413)	(0.765)	(1.020)	(1.453)	(0.980)	(1.212)
Proportion of partially damaged main houses	0.989 **	0.440	0.668	0.434	0.191	-1.532
	(0.429)	(0.351)	(0.408)	(1.475)	(0.967)	(1.056)
Chief's clan dummy	0.414	0.393	0.348	-0.450	-0.164	-1.525 *
	(0.253)	(0.218)	(0.201)	(0.819)	(0.642)	(0.817)
Non-clan leaders' clan dummy	0.010	-0.319	-0.197	0.725	0.365	-0.779
	(0.173)	(0.211)	(0.216)	(0.561)	(0.429)	(0.497)
Log likelihood	-29.9	-27.4	-27.8			-36.5
Chi sq./F (p-value)	0.575	0.003	0.001	0.000	0.000	0.093
Pseudo-R sq./R sq.	0.224	0.441	0.471	0.711	0.752	0.283
No. observations	58	71	76	49	61	51
C. Household.						
Completely damaged main house dummy	0.199 ***	0.507 ***	0.715 ***	2.686 ***	2.610 ***	0.510
	(0.068)	(0.058)	(0.043)	(0.338)	(0.271)	(0.350)
Partially damaged main house dummy	0.134 ***	0.344 ***	0.384 ***	0.834 ***	0.728 ***	-0.139
	(0.042)	(0.046)	(0.045)	(0.301)	(0.257)	(0.359)
Clan leader dummy	0.016	0.119 **	0.056	0.570 *	0.306	-0.558 **
	(0.039)	(0.056)	(0.053)	(0.309)	(0.276)	(0.271)
Non-clan leader dummy	0.024	0.056	0.081	0.359	0.165	0.050
	(0.044)	(0.053)	(0.059)	(0.322)	(0.247)	(0.283)
Log likelihood	-116.4	-288.2	-299.2			-147.4
Chi sq./F (p-value)	0.074	0.000	0.000	0.000	0.000	0.000
Pseudo-R sq./R sq.	0.152	0.258	0.360	0.634	0.633	0.218
No. observations	428	690	774	153	207	186

*10% significance, **5% significance, ***1% significance. Columns (1)-(3) are marginal effects at means in probit estimates with standard errors in parentheses. Columns (4)-(5) are OLS estimates conditional on receipt with robust standard errors in parentheses. Column (6) is ordered probit estimates conditional on receipt with standard errors in parenthesis. Other controls which are not shown here are village characteristics in panel A, clan characteristics in panel B, household characteristics in panel C, village dummies in panels B and C, and constant in columns (4)-(6).

Figure 1. Evolution of provisions of construction materials