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Breaking up the Collective Farm

Welfare Outcomes of Vietnam's Massive Land Privatization

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In the decollectivization of agriculture in Vietnam, local allocation of land use rights reduced overall inequality—thanks to initial conditions at the time of reform and actions by the center to curtail the power of local elites.

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Summary findings

The decollectivization of agriculture in Vietnam was a crucial step in the country's transition to a market economy. But the assignment of land use rights had to be decentralized, and local cadres ostensibly had the power to corrupt this process.

Ravallion and van de Walle assess the realized land allocation against explicit counterfactuals, including the simulated allocation implied by a competitive market-based privatization. The authors find that 95–99 percent of maximum aggregate consumption (depending on the region) was realized by a land allocation that reduced overall inequality, with the poorest absolutely better off. They attribute this outcome to initial conditions at the time of reform and actions by the center to curtail the power of local elites.

This paper—a product of the Poverty Team and the Public Services for Human Development Team, Development Research Group—is part of a larger effort in the group to undertake ex-post assessments of the efficiency and equity implications of policy reforms. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Catalina Cunanan, room MC3-542, telephone 202-473-2301, fax 202-522-1151, email address ccunanan@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at mravallion@worldbank.org or dvandewalle@worldbank.org. November 2001. (41 pages)

Breaking up the Collective Farm:
Welfare Outcomes of Vietnam's Massive Land Privatization

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1. Introduction

Vietnam's land reform of 1988 abandoned the collective farming system that had been introduced in the 1960s. The 1988 Land Law and its key implementation directive—"Resolution 10"—gave individual households long-term use rights over the collectives' land and other resources.[2] Four million hectares of land were thus scheduled for effective privatization. The economic significance of this new land law is obvious, given that (around 1990) three-quarters of the country's workforce depended directly on farming. Clearly, this land privatization was hugely important to living standards and their distribution in Vietnam.

Implementation of Resolution 10 was decentralized to commune level; there was little choice, since the center could not control the local authorities, who were (naturally) much better informed about local conditions. So the center faced an accountability problem in this decentralized reform.[3] Malarney (1997, p.900) describes the problem faced by the reformers:

> "..given the institutional dominance of the Communist Party, local politicians with party backgrounds, which is to say all, are compelled by the party to be impartial and committed to official policies; yet, as politicians drawn from local kin and community, they are also pressured to nurture interpersonal relations, selectively avoid official dictates, and use their positions to bring advantages to kin and/or co-residents."

This echoes concerns in recent literature and policy discussion about decentralized development programs (Bardhan and Mookherjee, 2000; Galasso and Ravallion, 2001). In developing country settings, the center often faces high costs of acquiring the information needed to control outcomes locally, and local agents may well have little sympathy with the center's aims. So there is a real risk that a decentralized program will be captured by a local elite that sees the intervention as an opportunity to enhance its own position.

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[2] What is widely known as the 1988 Land Law, was in actual fact enacted December 29 1987. We will follow the convention of calling it the 1988 Land Law. Resolution 10 followed in April 1988.

[3] Local accountability problems were apparently also common in the 1960s' collectivization program (Fforde, 1989)

This paper assesses the assignment of land-use rights achieved by Vietnam's de-collectivization. We use two counter-factuals for assessing impact. One is an equal allocation of (quality-adjusted) land and the other is the allocation that would have maximized aggregate consumption, as would have been achieved by a competitive market-based privatization under ideal conditions. Comparing this with the actual allocation allows us to estimate the implicit value that was placed on efficiency versus distributional goals in the allocation of land. We also characterize the specific distributional outcomes of the realized land allocation; possibly efficiency was sacrificed, but the poor would have been better off if it had not been.

The following section describes Vietnam's de-collectivization, and the factors leading up to it. Section 3 outlines our approach in theory, while section 4 describes our empirical specification. Section 5 discusses our survey data, collected 2-3 years after the reform was completed. Section 6 presents the regressions and section 7 discusses their welfare implications. Section 8 concludes.

2. Privatizing the collective's land

With the aim of raising agricultural productivity, Vietnam's 1988 Land Law and Resolution 10 abandoned collective farming and granted households long-term use rights over land and the freedom to cultivate it as they wished.[4] Land remained the property of the State, reverting back to the authorities when a household moved or stopped farming.[5] The de-collectivization was virtually complete by 1990 (Ngo 1993).

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[4] Use rights for crop land were granted for 10 to 15 years; longer periods applied to tree crops. Some flexibility was allowed in that 10-15% of the cooperative's land could be kept aside for new households and demobilized soldiers, and available for hire by households in the meantime (Tran 1997).

[5] Although Resolution 10 affirms the right to transfer land use and legate it to one's offspring, such rights were not fully guaranteed legally (Bloch and Oesterberg 1989). It did not recognize the right to exchange, lease, or mortgage land. These rights were only extended in the 1993 Land Law. Land policies have evolved since, but it is the impact of the 1988 Land Laws that is our main interest in this paper.

The new Land Law made recommendations on how the land was to be allocated across households. It recommended that allocations take account of the availability of land resources, on households' labor force and the land that households had been cultivating. It also placed certain limits on how much land could go to any one household.[6] Resolution 10 acknowledges claims to the land farmed prior to collectivization. It also entreats the cooperatives to provide appropriate jobs and good arable land to the families of war heroes and martyrs, to those who significantly contributed to the revolution, to the injured and unable-bodied and to others facing considerable difficulties. But it then dilutes this request by adding that the well-being of these groups is really the responsibility of the local Peoples' Committees and that the Ministry of Labor, War Invalids and Social Affairs and the Ministry of Finance will devise policies on social assistance to them (Vietnam Communist Party 1988).

While the new land law extended some guidelines, it left local cadres with considerable power over land allocation and the conditions of contracts. The center's directives were disseminated by Provincial Peoples' Committees, who in turn relied on the local authorities, apparently allowing them wide berth in adapting the guidelines to local conditions, priorities and customs. One can expect foot dragging on their part, and the pursuance of quite different objectives in implementing the central directives. Those who were making the decisions locally were essentially the same cadres who had positions of relative privilege as the managers of the cooperatives, and relatively high living standards under the collective mode of agricultural production (Selden, 1993). The reform threatened to undermine their power and privilege.

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[6] Article 27 of the 1988 Land Law stipulates that the land allocation to each household should not exceed ten percent of the total farm land area of each concerned village. It further decrees regional per capita land ceilings for those contracting land for long term use from state operated farms. It has been claimed that ceilings were officially set at two hectares in the fertile but densely populated Red River Delta and three hectares in the South (ANZDEC 2000), though we find no mention of this in Resolution 10 or the 1988 Land Law.

So there was a real risk here that the benefits of reform would be captured by self-interested local cadres, potentially undermining the center's aims. There is anecdotal evidence of abuse of local power, against the center's interests. Kolko (1997, p. 92) argues that:

> "From its inception, the land redistribution was marred by conflict, ambiguity and corruption. Cadres in many villages immediately began to distribute the best land to their families and relatives, and abuse was rife."

There were numerous public disputes at the time, stemming from (amongst other things) conflicting historical claims over land, disputes over village and commune boundaries and complaints about corrupt party cadres (Nguyen 1992; Pingali and Xuan 1992; Kolko 1997). It has also been argued that those with the weakest prior claims on plots did poorly in the land allocation. For example, Ngo (1993) argues that war veterans, demobilized soldiers and their families were short-changed in the land allocations and were over-represented as protagonists in disputes.

It is unimaginable that such an enormous land reform was free from corruption. However, the interpretation of the existing qualitative evidence on this issue is unclear. Cases of extreme abuse of power by local elites were visible when they boiled up in local protests—Vietnam's "hot spots" (Kolko 1997, cites many examples). However, the fact that local protests were possible can also be interpreted as evidence that there were constraints on local abuse of power.

The possibility for bias in the historical-qualitative account is clear; the cases of abuse may well have been uncommon but far more visible. Objective village-level assessments were rare; in the only village study we know of to address this issue, Tanaka (2001) describes the elaborate efforts of the "land allocation committee" in a North Vietnamese village to equalize land allocation. Such efforts are unlikely to have attracted much publicity at the time. While one would not want to generalize from one village study, it is no less hazardous to infer from the available evidence that capture by local elites was the norm.

There clearly were constraints on the power of the cadres, in part due to actions by the center. Formally, Article 54 of the Land Law extends the threat of punishment for officials found to have abused their power in the allocation process. Enforcement is, of course, another matter. However, it is important to note that Vietnam's peasants had sacrificed heavily through long periods of war, in the hope of a better life after reunification. The outcomes for their living standards had been disappointing. Peasant resistance to the collective system was common in the 1980s, and has been identified as a factor motivating the center's de-collectivization reforms (Beresford 1985, 1993; Selden, 1993; Kerkvliet 1995). With the center's support, the Vietnam Peasant Union (VPU) was created in 1988 with the explicit aim of giving peasants a stronger voice in reform policies and—implicitly at least—promoting the center's reforms locally. As with past peasant unions, it seems that the VPU was eventually captured by local elites; Wurfel (1993, p.32) argues that by 1990 the VPU had been "tamed by local party cadre, who had interests to protect." But for a critical period the VPU appears to have acted as a counter-weight to the cadres (Wurfel, 1993). During the reform period, the center also gave greater freedom to the press; the press subsequently carried much criticism of the bureaucracy, again helping the reform process (Wurfel 1993).

The reform movement was clearly driven by more than the center's concerns about the welfare of peasants. The same inefficiencies of the collective farming system constrained the resources available to the center for its industrialization plans, and created food shortages in urban areas (Beresford 1993; Kerkvliet 1995). Arguably then, the reforms were only possible through an implicit coalition between the peasants and reformers at the center—a coalition that clearly aimed to constrain the power of local cadres to capture the process.

Recent history provided a reference point in deciding how the land should be allocated.

Collectivization came soon after the completion of land reform programs that had gone a long way toward redressing the high inequality of land ownership under French Colonial rule (Beresford 1985; Pingali and Xuan 1992). The pre-collectivization allocation may have influenced land allocation at de-collectivization. There are reports that some households simply went back to farming the land they had originally handed over to the cooperative or collective, or land they had some historical claim to.[7] While there was no legal commitment to restore the pre-collectivization land allocation, that was an option for the local authorities.

There were important differences between the North and the South at the time of the reform. In the South's Mekong Delta, farmers had resisted collectivization, and by the time Resolution 10 was introduced less than 10 percent of all the region's farmers had been organized into collectives. In contrast, virtually all of the crop land in the North and in the South's Central Coastal provinces—where joining the collectives was seen as a means of rebuilding after the war—was collectivized by the time of the reform (Pingali and Xuan 1992; Ngo 1993). Southern Vietnamese farm households who participated did so for a much shorter period, while many never participated in the collectives, notably in the Mekong Delta. However, the land allocation in the South was still administratively determined and periodically re-allocated (Pingali and Xuan 1992); the difference with the more collectivized North is that in the South (especially the Mekong Delta) farmers continued to farm individually rather than collectively. Prior to reunification, agricultural land in the South had also undergone a series of land reforms.[8] Resolution 10 allowed farmers in the South to recover land owned prior to 1975, though former

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[7] Smith and Binh (1994) quote a number of Son La households in the North as professing, in 1994, to be farming the same land they had at the time of the departure of the French. Tran (1997) claims that land was redistributed according to household original contributions to the cooperatives in some areas.

[8] The South's land reform programs prior to reunification had initially consisted of lease price control and ownership ceilings, but were followed in 1970 by substantial land redistribution and titling under a "land-to-the tiller" program (Callison 1983; Pingali and Xuan 1992).

"landlords" were explicitly barred from doing so (Pingali and Xuan 1992). There are reports that in the Mekong Delta the implementation of Resolution 10 often entailed restoring the land allocation that prevailed prior to reunification (Hayami, 1993; ANZDEC, 2000).

The collectives had also owned and controlled the farm capital stock (tools, machinery, draft animals) that also had to be allocated among farm households. It is sometimes claimed that this process more easily allowed cooperative officials to favor themselves, their families and friends than the more visible land allocation process. Because of data limitations we can only focus on land allocation, though we will look for signs of differing returns to land associated with political connections.

3. Theoretical model of the actual and counter-factual land allocations

Motivated by the above observations we shall test whether the local implementation of decollectivization served distributional goals—possibly reflecting capture by local elites—at some loss to aggregate consumption. We construct a model that allows us to estimate that loss, and to compare the observed allocation against explicit counter-factuals. One of those will be an equal allocation of land per capita. This is easily calculated. The other is the allocation that maximizes aggregate consumption of the commune; this requires a model of consumption.

The actual decision-making process might be anything from administrative fiat (according to the cadre's personal preferences) to a complex bargaining game. We only assume that the outcome (however it is reached) is Pareto optimal, in that no commune member's utility can be increased without someone else being worse off. To characterize all possible solutions, we represent the problem as maximizing a weighted sum of welfare levels across all farm-households. The Pareto weight attached to the utility of household i is $w_i = w(X_i)$ where X is a vector of exogenous household characteristics. Naturally, different weighting functions imply

different distributions of land and utility. If the weights tend to be negatively (positively) correlated with welfare (to be defined) then one can say that the outcome will tend to be "pro-poor" ("pro-rich").

The utility of the i'th farm-household is assumed to depend solely on its consumption of a composite commodity. The household receives L_i of land, which yields an output of $F(L_i, X_i)$. (For now we treat land as homogeneous; in the empirical work we allow for observable heterogeneity, and we consider the consequences of latent heterogeneity in the next section.) The household also has (positive or negative) non-farm income, $Y(X_i)$.[9] (At the time of the reform, and since, agricultural labor markets were virtually non-existent in Vietnam, so to simplify the exposition we close off this market in our model.) The household's consumption is then:

$$C_i = C(L_i, X_i) = F(L_i, X_i) + Y(X_i) \tag{1}$$

We assume that the function F is increasing and strictly concave in L. Utility is in turn an increasing concave function of consumption, $U_i = U(C_i)$.

The commune selects an allocation of the total available land $n\bar{L}$ across n households, with mean $\bar{L}$. The observed land allocation is:

$$(L_1,..,L_n) = \arg\max[\sum_{i=1}^{n} w(X_i)U[F(L_i, X_i) + Y(X_i)] \Big| \sum_{i=1}^{n} L_i = n\bar{L}] \tag{2}$$

which solves:

$$w(X_i)U'(C_i)F_L(L_i, X_i) = \mu \text{ for } i = 1,..,n \tag{3}$$

where $F_L(L_i, X_i)$ is the marginal product of land and μ is the shadow price of land in the

[9] The functions F and Y may vary between households in different communes. We will deal with this possibility in the empirical work by including a complete set of commune effects in the regressions.

commune (the Lagrange multiplier on the aggregate land constraint in equation 2). It is readily verified that the land allocation is strictly increasing (decreasing) in X_{ij} (the j'th element of the vector X_i) if the sum of the elasticities of $w(X_i)$ and $U'(C_i)F_L(L_i, X_i)$ to X_{ij} is positive (negative).

Compare this to the allocation that maximizes the commune's aggregate consumption:

$$(L_1^*,..,L_n^*) = \arg\max[\sum_{i=1}^{n} C(L_i, X_i) \Big| \sum_{i=1}^{n} L_i = n\bar{L}] \tag{4}$$

We call this the "consumption-efficient allocation." This equates $C_L(L_i^*, X_i) = F_L(L_i^*, X_i)$ with the multiplier λ on aggregate land in (4), giving

$$L_i^* = L(X_i, \lambda) \text{ for } i=1,..,n \tag{5}$$

Mean consumption is then:

$$\bar{C}^* = \sum_{i=1}^{n} C(L_i^*, X_i)/n \tag{6}$$

The consumption loss from the actual allocation is then $\bar{C}^* - \bar{C}$ where $\bar{C}$ is the actual mean.

The consumption-efficient allocation is also the competitive equilibrium given $(X_1,..,X_n)$. In a market-based land allocation, each household's consumption will be $F(L_i, X_i) + Y(X_i) - \lambda L_i$ where λ is the market price of land. Demands equate $F_L(L_i, X_i) = \lambda$ over all i, which is the allocation that maximizes aggregate consumption under the non-market allocation. Naturally the market solution will also vary with the joint distribution of the Xs.

There are some caveats to this interpretation of the consumption efficient allocation. A competitive market is unlikely to have been a feasible option at the time in Vietnam. For one thing, agricultural land markets were virtually non-existent. And other markets (notably for credit) and institutions (for property rights enforcement) were probably not functioning well

enough to assure an efficient market-based privatization of land. However, against these observations, it should also be noted that under communism very little mobility had been allowed between communes. People may well have been sufficiently well informed within each village to know if one family attached an appreciably higher value to extra land than another, even though a market did not exist.

It should also be noted that if holding land gives utility independently of consumption then the competitive market allocation of land will differ from the consumption-maximizing one. For example, if land provides insurance against risk then it will have value independently of current consumption. Then our interpretation of the consumption-maximizing allocation as the market solution would also require that risk markets worked perfectly.[10] Since we have no basis for assigning a value to land independently of the current consumption it generates we cannot calculate a "conditional" market solution (conditional on other market failures). Nonetheless, the consumption-maximizing allocation remains a natural benchmark for assessing the realized allocation. It will be of interest to see how close the non-market allocation is to this benchmark.

4. Empirical model

In our empirical implementation of the above model we make the following assumptions:

Assumption 1: Utility is given by log consumption:

$$U(C_i) = \ln C(L_i, X_i) \tag{7}$$

Assumption 2: Log consumption is given by:

$$\ln C_i = \alpha + \beta \ln L_i + X_i\gamma + \varepsilon_i \tag{8}$$

where $0 < \beta < 1$ and ε_i is a zero-mean i.i.d. error term uncorrelated with $\ln L_i$ and X_i.

[10] To give another example, Burgess (2000) argues that food market failures exist in rural China such that holding more land reduces the shadow price of food.

Assumption 3: The welfare weights take the form:

$$\ln w_i = X_i b + \upsilon_i \tag{9}$$

where υ_i is a zero-mean error term uncorrelated with X_i.

Assumptions 1-3 imply that the land allocation satisfying equation (4) can be written in explicit form as the regression model:[11]

$$\ln L_i = \ln(\beta/\mu) + X_i b + \upsilon_i \tag{10}$$

This identifies directly the parameters of the implicit welfare weights of the local land-allocation authority. Substituting (10) into (8) generates the reduced form equation for consumption:

$$\ln C_i = \alpha + \beta \ln(\beta/\mu) + X_i(\beta b + \gamma) + \varepsilon_i + \beta\upsilon_i \tag{11}$$

The consumption-maximizing allocation by contrast is given by:[12]

$$\ln L_i^* = \frac{\alpha + \ln(\beta/\lambda)}{1-\beta} + \frac{X_i\gamma}{1-\beta} + \frac{\varepsilon_i}{1-\beta} \tag{12}$$

Comparing (10) and (12), it can be seen that if $\gamma/(1-\beta) = b$ then the actual allocation responds to changes in X the same way as the consumption-efficient allocation. So if the two allocations are essentially the same then we should be able to accept the restriction that $b = \beta b + \gamma$ when imposed on the reduced form equations, (10) and (11). If we cannot accept this restriction then it is of interest to calculate the consumption-efficient land allocation, $(L_1^*, L_2^*, ..., L_n^*)$, from which we can then measure the distribution of consumption losses implied by the actual allocation, using the fact that the proportionate consumption loss for household i is $(L_i^*/L_i)^\beta - 1$.

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[11] To verify the following equation, take logs through (3) and note that note that (7) and (8) imply that $U'(.)F_L = \beta/L_i$. Equation (10) then follows using (9).

[12] Given (8), the consumption-efficient allocation to household i solves $\ln L_i^* = \ln(\beta/\lambda) + \ln C_i^*$ where $\ln C_i^* = \alpha + \beta \ln L_i^* + X_i\gamma + \varepsilon_i$.

While allocated land is endogenous in this model, it is taken to be exogenous to consumption (i.e., Cov(υ, ε)=0). This is a standard assumption in past empirical work for Vietnam and in other settings in which land allocation is done administratively rather than through markets.[13] The assumption can also be defended on the grounds that the land allocation preceded the survey-based consumption measure by 3-4 years.

Our estimates of the parameters of equation (8) will be biased if there are omitted variables that jointly influence the welfare weights and consumption levels. The most serious concern in this respect is heterogeneity in land quality. Higher land quality will probably result in higher consumption at given land quantity. Assuming that the quality differences are public knowledge within the commune, the administrative land allocation will take them into account, with more land being used to compensate for lower quality. We will include available controls for differences in the average quality of land holdings. However, latent heterogeneity will create a negative correlation between the error terms in the estimated consumption equation and the land allocation equation (Cov(υ, ε)<0).

Notice that our test for systematic differences between the efficient and actual land allocations is robust to heterogeneity in land quality. Our test is based on the reduced form coefficients in (10) and (11); it does not require the (potentially biased) parameters of (8). Nonetheless, our estimates of the parameters of the implicit equation for the efficient allocation (equation 12) do require the parameters of the structural model in (8). So bias due to latent heterogeneity in land quality will contaminate our estimates of the efficient allocation.

In principle this could be dealt with by introducing an instrumental variable that

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[13] See for example Wiens (1998) and van de Walle (1998). The assumption is also a standard one in empirical work for China, where a large share of crop land is also allocated administratively; see for example, Burgess (2000) and Jalan and Ravallion (2001).

influences land allocation but not consumption conditional on land, i.e., at least one element of the parameter vector b in (9) would have to be set to zero, while leaving the corresponding element of γ unrestricted. However, there is no theoretical basis for such an exclusion restriction; anything that can be included from our data set could presumably have been observed or anticipated by the local authorities.

It should also be noted that while there is likely to be heterogeneity in land quality across plots within communes, the scope for land fragmentation — combining land from different plots when forming a package for each household — means that the variance across households in the average quality of their allocations can be considerably less than the underlying inter-plot variance. In the only evidence on this point that we know of, Tanaka (2001) finds that plot fragmentation in North Vietnamese villages was used to produce land parcels of relatively even quality. Then heterogeneity in land quality would not be a problem for our analysis.

5. Data

Our data are from the Vietnam Living Standards Survey (VNLSS) of 1992/93. This is one of the national, multi-purpose, surveys sponsored by the World Bank under the Living Standards Measurement Study (LSMS).[14] The VNLSS follows established LSMS practices (World Bank 1995). Our sample is the 2810 rural farming households in the VNLSS with complete data. Some 400 households had to be dropped due to missing data on key variables. There are also 419 households in the rural farming sample without any allocated irrigated or non-irrigated agricultural land identified in the survey. Our reading of the literature and casual observations suggest that it is unlikely that there is genuine censoring, such that some farming

[14] The VLNS is public access, subject to standard conditions. For further information on the LSMS see http://www.worldbank.org/lsms/.

households were deliberately left out of the land privatization. Under that assumption, we focus solely on the sample of farming households with complete data.

Table 1 gives summary statistics on the variables we will use from the data set, by region. Household consumption includes the value of consumption from own production, imputed expenditures on housing and the depreciated value of consumer durables. It is deflated by a monthly price index to allow for temporal variation in household interviews and by a spatial price index to take account of regional price variation (World Bank, 1995).

Geographic heterogeneity across communes is to be expected, if only because of differences in the shadow price of land (μ in equation 10). While the sample size does not permit estimation of a separate model for each commune, all regressions included a complete set of commune dummy variables. And all parameters are allowed to vary regionally. Vietnam is routinely divided into seven regions reflecting geographical and historical similarities. We conduct the analysis both nationally and separately for the Northern Uplands (NU), Red River (RR), North Coast (NC), Central Coast (CC) and Mekong Delta (MD) regions.[15]

Within annual crop-land, the survey identifies five land types: (i) Allocated land: This is the land allocated to households by the cooperative or productive group under Resolution 10; this accounts for the bulk of the North's crop land; (ii) Long term use land: Predominant in the South, this differs from allocated land only in that the farmer owes no contracted output (in addition to obligatory taxes for all allocated land) to the cooperative or productive group that allocated the land; (iii) Auctioned land: This refers to a part of the cooperatives' land reserved for bidding by households, with a three to five year tenure depending on the region; (iv) Private land: This

[15] In the Central Highlands region, land is mostly perennial. In the South East there were too few observations in the sample; after excluding non-farming households and those with missing data we are left with a sample of only 99 observations in the South East.

consists of land inherited and used by households as a garden area, as well as an area equal to 5% of the commune's agricultural land that has been handed to households for their private use. This land requires no payment; and (v) Sharecropped or rented land.

What we refer to here as "allocated land" is annual crop land, either irrigated or unirrigated, which is defined as either "allocated land" by the survey respondents or "long-term use land." This includes all allocated land, including any that is not actually cultivated by the household. There is also an allocation mechanism for perennial, forest and water surface land. However, these other land types followed a much slower and haphazard allocation process so that we limit our analysis here to allocated annual irrigated and non-irrigated cropland.

We aggregate irrigated and non-irrigated land using region-specific weights to obtain irrigated land equivalents. To calculate the weights, we estimated region-specific regressions of farm profit on total irrigated and non-irrigated annual crop land, perennial, forest and other land amounts (including swidden, bald hill and newly cleared land), and commune effects.[16] Controls were also included for household characteristics (the head's religion, ethnicity, age and age squared and whether born locally; household size, the share of male adults in the household, the years of primary schooling of the head and of other adults and a dummy for whether the household is a social subsidy beneficiary). The ratio of the coefficients on non-irrigated to that on irrigated land was then used as the weight on non-irrigated land to recalculate an allocated irrigated land equivalent quantity for each household. The weights seemed plausible.[17]

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[16] We exclude water surface land from the farm profits regressions because we are unable to adequately calculate net profits from water surface land. The questionnaire does not allow a separation of expenses incurred in raising water products from that of raising livestock, and assumptions must also be made about consumption from own production.

[17] Our estimated weights for non-irrigated land are 0.739 for the national sample, 0.241 for the Northern Uplands, 0.407 for the Red River, 0.495 for the North Coast, 0.838 for the Central Coast and 0.906 for the Mekong Delta. On the measure of farm profit see van de Walle (1998).

The survey asked respondents to assign their total annual crop land into the categories "good," "medium" and "poor" quality. Unfortunately, the questionnaire design does not allow us to separately identify quality for allocated land versus other land types. So we cannot use these quality assessments in calculating our measure of allocated irrigated land equivalents. These quality assessments are problematic from other points of view. The categories are probably quite well-defined within communes, but are unlikely to be comparable between communes. Nor can it be assumed that they would account fully for omitted heterogeneity in land quality in our main results. The exogeneity of these land quality variables is also questionable. Against these considerations, excluding these variables adds to the aforementioned concerns about omitted heterogeneity in land quality. So we chose to include each household's proportions of good irrigated and non-irrigated land in the consumption and land allocation regressions, as controls for quality.[18] We also tested robustness to dropping these variables.

We treat private land in a special way. As can be seen in Table 1, land classified as private is not negligible and falls under all usages. The category is clearly broader than residential or garden area. This type of land has typically been with the household for a long time and the amounts of this land were clearly known at land allocation time. So it is reasonable to treat the amounts of this type of land as exogenous explanatory variables. We treat all other land as endogenous, so that it does not appear in the model.

Our data were collected five years after the 1988 Land Law (though prior to the 1993 Land Law). In trying to explain the allocations we want to use variables that reflect the situation around 1988. We have no explicit information on the methods for allocating land use rights in

[18] Very few households reported that they had "bad quality" irrigated land or "good quality" non-irrigated land. So we aggregated the categories into two; by "good quality non-irrigated land" we mean "good" or "medium" quality.

the communes. As we have noted, Resolution 10 left this quite vague. Some observers mention that household size was taken into account (Ngo, 1993; Hayami, 1993), while in other cases it seems that an effort was made to take into account available labor.[19] Our demographic variables include household size and the dependency ratio. Household size is that reported in the 1992/93 survey minus all members younger than six years of age. The dependency ratio is one minus the ratio of labor age members (between 20 and 65 for men and 20 and 60 for women) to all household members minus those aged less than six years.

We include dummies for the gender of the head, whether he/she was born locally, whether he/she reports practicing the Christian or Buddhist religions as opposed to no religion, animism or other and for whether the head of household belongs to an ethnic group other than the majority Kinh or the relatively well-off Chinese ethnic groups. We include a dummy variable for whether the household reports cultivating swidden land. This aims to capture a ethno-cultural particularity of those who practice shifting cultivation. Since at least the sixties, the government has pursued policies to sedentarize such groups by apportioning land to them (Bloch and Oesterberg 1989). Resolution 10 also states that practical measures should be adopted to promote permanent agriculture and settlement. One might therefore expect these households to get more allocated land as a result.

We also include a dummy variable for whether a household contains a handicapped adult of labor age.[20] The latter could influence the land allocation decision negatively, through effects

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[19] For example, Tran (1997) describes one local allocation rule as giving a full share to members of working age (defined as 16 to 60 for men and 16 to 55 for women), half a share to those above working age and in the 13 to 15 age range, and one third share to the youngest. Also see Hayami (1993).

[20] We create this variable from those individuals 21-65 for men and 21-60 for women who said they did not work during the last 12 months, or look for work in the last 7 days, and gave being handicapped as the main reason. This variable may not be measured well as it may exclude those who have been cured since the land allocation time and it may well include more recently disabled adults.

on productivity. Against that, the Vietnamese government has had a number of policies bestowing preferential treatment to the disabled and those individuals and their families who suffered in the wars. A handicapped adult might thus be favored. However, this variable will not fully capture the possibility that soldiers and their families were treated differently to others as decreed by Resolution 10 (Vietnam Communist Party 1988) and alleged by Ngo (1993). We test for this by also adding a dummy variable for whether the household or one of its members is a recipient of social subsidy transfers from the government. These transfers are targeted to the disabled, war wounded and the families of war heroes and martyrs. Receipt of this transfer appears to be the best way to identify such households in our data. There are, however, possible concerns about the endogeneity of this variable (notably if the nonpoor select out of the program). So we did our analysis with and without this variable.

The survey did not identify members of the Communist Party. However, we do know if a household member worked for the cooperative, a social organization, a State Owned Enterprise (SOE) or the government for five years or more, either in their primary or secondary jobs. On *a priori* grounds it is unclear how these variables would influence land allocation. On the one hand, other sources of employment may entail a substitution effect, with the commune allocating less land to such households. On the other hand, it may well come with a "power effect," whereby households with such employment also have more power over local decisions (interpretable as an effect on the welfare weights in equation 3).

As also noted in section 2, it is possible that the most egregious abuse and corruption occurred in the distribution of collectively owned farming implements and draft animals rather than that of land. If so, we would expect to find positive impacts on consumption through the returns to land for favored households. We will test this by including in the consumption

equation an interaction effect between land and whether a household member worked for a cooperative at or prior to de-collectivization. This is an imperfect test as it allows only for favoritism through household member ties, but this is the best we can do with the data.

6. Regressions for consumption and allocated land

For the sample as a whole and each region, we can convincingly reject the null hypothesis (with probability less than 0.00005) that the observed land allocation responded the same way to household characteristics as the consumption-efficient allocation that one would have expected from a competitive market-based privatization, under our assumptions. The reduced form regressions for consumption and test statistics for the hypothesis that the two allocations are the same can be found in the Appendix. So we proceeded to estimate the efficient allocation.

Table 2 gives the structural model of consumption (equation 8). The results are generally unsurprising. Household consumption is a rising function of household size, with an elasticity less than unity. In most regions consumption is higher for households with a government or SOE job. It is increased by higher household education. And consumption rises with the amount of allocated land in all regions.

Table 3 gives the reduced form equation for the actual land allocation (equation 10) and the estimated parameters of the implied equation for the consumption-efficient allocation (equation 12). There is diversity between regions in how much the two allocations differ, notably between the North (the Northern Uplands, the Red River and North Coast) and South (the Central Coast and Mekong Delta). For example, in the North, the actual allocation is more responsive to household size than the efficient allocation would have been. This reverses in the South. The dependency ratio significantly negatively affects the actual allocations in the North but not in the South (the CC and MD). The negative coefficient on the dependency ratio

indicates that the administrative allocation in the North put higher weight on household members who were of prime working age than the consumption-efficient allocation would have required.

In the North (except the Uplands), being in a minority group significantly increases the administrative allocation, but decreases the efficient allocation (though only significantly so in the RR). In the other two regions there is less difference in how ethnicity affected the two allocations. The positive and significant effect of being a minority household in the northern regions probably captures the fact that the minorities were given more land as a result of having contributed more to the collectives originally, as allowed by Resolution 10.

Having a household member with a government job or in a SOE tended to reduce the administrative allocation, though the effect is generally not significant. But these characteristics would have resulted in a higher efficient allocation — suggestive of greater access to credit and/or productive inputs by these households. Again there are some regional differences in these effects. For example, there is no significant effect of SOE on the efficient allocation in the South; the significant national effect stems from the NU and RR.

Administrative allocations responded positively to male household headship, and much more so than the efficient allocation. Generally, education of the household head had no significant effect on the actual allocation (the sole exception is in the CC, where higher education reduced the allocation.) The education of others in the household was also insignificant in the actual allocation. However, the consumption maximizing allocation would have favored households with higher education, presumably reflecting complementarities between education and land productivity. The MD is the one exception.

Receipt of a social subsidy is found to have reduced the actual land allocation nationally, though this effect was confined solely to the Mekong Delta. This provides some support for the

claims that war veterans and their families were unequally treated in the land allocation process in the South. In contrast, we found this variable to be insignificant in the consumption equation for all regions (suggesting that the social transfer compensated fully for the income loss due to war disability). The efficient allocation would have ignored whether or not the household received social subsidies. All other results were robust to including this variable.

The practice of cultivating swidden land increased the administrative allocation in the RR and the MD, but not elsewhere. The positive effect in these regions can be interpreted as a policy effort to discourage this form of land usage (on the assumption that lack of access to regular crop land encouraged swidden farming.) The efficient allocation in the MD would also have given weight to this characteristic, but considerably less so than the actual allocation.

When we tested an interaction term between allocated irrigated land equivalents and a dummy for whether a household member worked for a cooperative, we found no sign of any effect on consumption in the national or individual regional samples. However, in testing the interaction with private land amounts, we find a significant positive effect of water surface land on consumption in the national sample and in the Red River and Northern Uplands. There was also a significant negative interaction effect with private perennial land in the North Coast, and a significant negative interaction effect with non-irrigated private land in the Central Coast, though at the same time there was a positive interaction with private irrigated land in that region. On balance, our results suggest that having a cooperative job provided no advantage in deriving benefits from a given land allocation, though there are signs of limited impact on the productivity of other land types, notably water surface land in some regions.

In the aggregate sample, the proportion of good quality land (irrigated or not) had no significant effect on either the actual or efficient allocation. This holds in all regions except NU

and RR, where there is an indication that households with higher quality non-irrigated land tended to get lower total land allocations. Other coefficients in both equations were little affected by dropping these land quality variables (given possible endogeneity concerns).

7. Welfare comparisons

The first panel of Table 4 gives various summary statistics on welfare outcomes for the actual allocation, namely mean consumption and measures of inequality and poverty. The inequality measure is the Theil index (E(0)), given by the difference between log mean consumption per capita and the mean of log consumption per capita. The poverty measures are the headcount index (% below the poverty line) and the squared poverty gap index (Foster et al., 1984) which penalizes inequality among the poor. The poverty line is from Glewwe et al. (2000) and aims to measure the cost of a set of basic food and non-food consumption needs. The poverty line was developed on the same survey and agreed to by the government. The second panel in Table 4 gives the same statistics for the consumption-efficient allocation, for which we give mean consumption and inequality. The third panel is for an equal allocation, in which the irrigated land equivalent is equalized on a per capita basis across all households within the commune.

Recall that the socialist mode of agricultural production had been in place for a shorter time in the South and that the Mekong Delta, in particular, had been far less collectivized than the North and the Central Coast (though still subject to other controls under socialist agriculture).[21] So the land allocation in the MD at the time of de-collectivization was undoubtedly more influenced by the pre-Communist allocation, as determined by historical land

[21] Recall that the Central Coast was probably a somewhat special case given that it had been a war zone and so collectivization was more easily adopted (Pingali and Xuan 1992; Ngo 1993).

rights and prior land reforms (section 2). So it is notable that, relative to the consumption-efficient allocation, we find that the actual allocation in the MD entailed a greater loss of aggregate consumption, with a four percent consumption loss (Table 4). A seemingly plausible explanation is that the historical (pre-unification) land allocation had become less efficient over time but was nonetheless the more natural fall-back position in the MD. Ironically then, it can be argued that the fact that socialist agriculture had been more short-lived in the South meant that the region could not achieve the potential efficiency gains available to the North from land re-allocation under de-collectivization. The history of Vietnam meant that the North was in a somewhat better position to achieve a relatively efficient land allocation.

Both the efficient and "equal-land" allocations would have resulted in a lower poverty rate than the actual allocation, though the differences are small (two percentage points overall). This is somewhat deceptive since we found that the poverty line turns out to be close to the intersection of the cumulative distribution functions. However, the poverty lines used here are higher (in real terms) than the poverty lines used in Vietnam at the time of the 1988 allocations (Dollar and Glewwe, 1998). So it can be argued that poverty incidence would have been higher under the efficient allocation when assessed by the local standards of poverty at the time.

These observations are reinforced by Figure 1 which gives scatter plots of the percentage losses from the actual relative to the consumption-maximizing allocation against actual consumption, and a non-parametric regression function (using Cleveland's, 1979, local regression method as programmed in STATA). It can be seen that the losses from the actual allocation tend to rise with consumption, both nationally and within each region. Nationally, mean consumption gains are about 15% for the poorest, with losses of about 20% for the richest (comparing end points on the regression function in Figure 1(a)). The mean proportionate gains

are roughly linear in log consumption. The point where the mean gain is zero is fairly close to the poverty line (indicated by the vertical line). The gains to the poorest are also reflected in the squared poverty gap measures in Table 4, which are higher for the consumption-efficient allocation.

It is evident from Figure 1 that there are large differences between regions in the conditional variance of the proportionate losses. In particular, the relationship between welfare losses and consumption levels is less precise (though still positive) for the MD, where there are clearly other factors at play in determining the incidence of the losses relative to the consumption-efficient allocation. Again, historical (pre-unification) allocations are likely to have had greater influence in this region.

An equal allocation of land (in terms of its irrigated equivalent) across all households would have achieved a close approximation to the levels of mean consumption and inequality observed in the data. There were of course deviations from equal land in practice, but the overall outcomes for the distribution of consumption were similar. However, under the equal-land allocation the poorest are generally better-off relative to the actual allocations as evidenced by lower squared poverty gap indices. It is notable again that the region where the equal allocation differed most from the actual is the Mekong Delta.

It might be conjectured that the market-based allocation would have achieved substantially higher average consumption if only land could have been redistributed between communes. To address this question, Table 5 repeats the simulations reported in Table 4 except that we ignore commune boundaries when making the calculations. Thus the calculation entails maximizing aggregate consumption over the entire region subject only to the aggregate amount of (irrigation-equivalent) land in the region. In practice this would of course require moving

households between communes, which was rare in Vietnam. However, this simulation gives an idea of how much immobility constrains the problem.

The maximum levels of consumption would of course have been higher allowing households to be moved between communes, so that only aggregate land endowments at the regional level matter. The difference is not large however (comparing Tables 4 and 5). The actual allocation within communes, without redistribution between them, entailed losses in mean consumption between one and nine percent as compared to a consumption maximizing land allocation with redistribution allowed. Impacts on poverty also look similar. The headcount index of poverty is lower everywhere but the Red River region, while the very poorest households would have a worsening under the efficient allocation with mobility across communes. When we compare the outcomes under the actual allocation with those resulting from the equalization of land at the regional level, we find the losses in consumption to be slightly lower— ranging from one to eight percent. This scenario shows the largest impact on poverty. Both the rate and the severity of poverty would be lower under a region-wide equal-land allocation relative to the actual land allocation.

Again the Mekong Delta stands out as having high unrealized consumption gains from land re-allocation. If mobility were possible within the region, the actual land allocation entails a nine percent loss of aggregate consumption relative to the consumption maximizing allocation, and eight percent relative to an equal allocation; in both cases this is about twice the overall mean consumption loss (Table 5). Lack of mobility under Communism appears to have come at an unusually large cost in the MD. This is consistent with our casual observations that household plot sizes vary greatly within the region.

8. Conclusions

The heavy reliance on decentralized implementation of policy reforms in developing countries has raised concerns about capture by local elites whose interests are not well served by the center's aims. We have tried to see if such concerns are borne out by evidence on how land-use rights were allocated in practice under the massive reform to land laws introduced by Vietnam in 1988. This reform was arguably the most important step in the country's transition to a market-based agricultural economy after abandoning collective farming. We have used a model of household consumption to assess the distribution of consumption impacts relative to counter-factual allocations, including the one that would have maximized aggregate consumption, which would have been the competitive market allocation under our assumptions.

Our results are not consistent with the picture that many commentators have painted (based on anecdotal evidence) of an inegalitarian land allocation stemming from the power of relatively well-off local cadres to capture the process. In terms of the impact on average consumption and consumption inequality, the observed allocation of land in our data was roughly equivalent to giving every household in the commune the same irrigated-land equivalent.

The observed allocation was significantly different to what one would have expected from an efficient (consumption-maximizing) allocation, as would be achieved by a competitive privatization at market-clearing prices. The consumption-efficient allocation would have put greater weight on education (which raised the marginal utility of land), and given less weight to household size, labor force, minority-groups and male heads of household. We find no evidence that land allocation unduly favored households with government or semi-government jobs; indeed, the market allocation would have given higher weight to these attributes, because such

households would have put a higher value on land, presumably because of better access to other farm inputs.

This decentralized reform achieved a more equitable assignment of land-use rights than one would have expected from free markets, or some other arrangement for achieving a consumption-efficient allocation. Our results are suggestive of an effort to protect the poorest and reduce overall inequality, at the expense of aggregate consumption. The solution that was arrived at entailed an equity-efficiency trade-off, indicating that both objectives were valued positively by decision makers.

Combined with our reading of the history of Vietnam around this time, we can identify two main reasons for the welfare outcomes implied by our results. The first factor was the formation of a pro-reform coalition between peasants and reformers in the center. The latter were fully aware of the risks of local capture that were intrinsic to a decentralized administrative allocation of land and other farm inputs at the time of decollectivization. This is not to deny the importance of the fact that the desire for reform was not just coming from the top, but reflected more deeply-rooted concerns about the inefficiency of collective agriculture among those who were losing most, namely the peasants. The reforms followed many years of peasant resistance. Nonetheless, the center was an active player. To help shift the balance of local power at the time of reform, the center (for a limited time) actively promoted peasant organizations and used the press to channel complaints and expose corruption.

The second reason is that initial conditions at the time of the reform appear to have been favorable to achieving an equitable assignment of land-use rights at modest cost to total consumption. Vietnam's low inequality in the initial distribution of education — stemming from social policies under communism — meant a smaller trade-off than would have been faced

otherwise (assuming that it would have been the poor who had relatively less education without those policies). The history of past, but not too far past, redistributive land reforms prior to the introduction of socialist agriculture probably also helped in providing a relatively equitable fallback position in deciding how land should be allocated at the time of de-collectivization.

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Table 1: Variable definitions and descriptive statistics

Variable definitions	Northern Uplands		Red River		North Coast		Central Coast		Mekong Delta		Full sample	
	mean	st.dev.	mean	st.dev	mean	st.dev	mean	st. dev.	mean	st. dev.	mean	st. dev.
Log h'hold real consumption expenditure (dongs)	15.236	0.52	15.205	0.54	15.113	0.53	15.391	0.62	15.667	0.53	15.311	0.58
Real consumption expenditure per capita ('000 dongs)	947.665	474.91	1114.444	506.65	899.983	391.30	1146.167	556.84	1422.439	847.95	1117.792	628.68
Religion: 1 if h'hold head is Buddhist or Christian (0 if other, animist or none)	0.333	0.47	0.264	0.44	0.180	0.38	0.116	0.32	0.564	0.50	0.313	0.46
Ethnic: 1 if h'hold head is of ethnicity other than majority Kinh or Chinese	0.345	0.48	0.075	0.26	0.032	0.18	0.083	0.28	0.079	0.27	0.116	0.32
Local born: 1 if head is born locally	0.798	0.40	0.947	0.22	0.893	0.31	0.849	0.36	0.831	0.38	0.859	0.35
Age of household head	40.376	13.59	43.507	14.53	45.437	15.31	47.895	15.26	46.648	14.26	44.463	14.75
Gender of household head (male=1)	0.814	0.39	0.758	0.43	0.798	0.40	0.757	0.43	0.786	0.41	0.782	0.41
Log h'hold size excluding those < 6 yrs old	1.346	0.48	1.173	0.49	1.272	0.50	1.381	0.47	1.466	0.48	1.304	0.50
Dependency ratio: 1- (ratio of labor age members to all members > 6 yrs old).	0.459	0.25	0.422	0.28	0.454	0.28	0.469	0.25	0.485	0.24	0.452	0.26
Labor age adult member is handicapped	0.008	0.09	0.007	0.09	0.006	0.08	0.018	0.13	0	0	0.007	0.08
SOE: h'hold member has primary or secondary occupation in State owned enterprise and had it 5 years ago	0.006	0.08	0.032	0.19	0.012	0.11	0.007	0.08	0.011	0.11	0.019	0.14
Gov't job: member has worked for gov't in primary/secondary occupation for 5+ yrs, or did so 5 yrs ago or retired from gov't*	0.068	0.25	0.040	0.21	0.069	0.28	0.047	0.23	0.084	0.30	0.058	0.25
Social subsidy: h'hold is recipient of gov't tranfers to war heroes, martyrs, disabled etc	0.103	0.30	0.118	0.32	0.134	0.34	0.091	0.29	0.050	0.22	0.101	0.30
Household head's years of education	6.252	3.71	7.226	3.70	7.051	3.80	4.562	3.79	4.312	3.13	6.162	3.83
Other h'hold adults' years of education	9.808	9.25	10.681	8.56	11.174	9.54	10.203	9.93	9.765	9.55	10.441	9.24
Log allocated irrigated land equivalent (m^2)	7.197	0.73	7.447	0.62	7.400	0.79	7.603	0.73	8.416	1.29	7.587	0.93
Allocated irrigated land equivalent (m^2)	1679.569	1117.37	2007.701	997.03	2084.141	1312.36	2621.580	2403.59	7296.937	6514.12	3003.256	3646.40
H'hold's private irrigated land (m^2)	159.616	238.56	157.051	167.05	86.213	157.35	136.424	545.33	279.165	1505.35	155.887	648.13
H'hold's private non-irrigated land (m^2)	242.92	401.20	113.382	521.38	250.951	389.62	310.033	598.75	209.016	1561.83	218.544	921.38
H'hold's private perennial land (m^2)	278.719	507.38	120.698	353.67	90.713	204.60	188.533	463.52	903.740	1672.80	343.747	1453.46
H'hold's private water surface land (m^2)	58.320	163.23	60.732	176.88	30.012	116.36	0	0	116.259	1102.29	55.738	459.87
H'hold cultivates swidden land=1	0.289	0.45	0.037	0.19	0.043	0.20	0.225	0.42	0.020	0.14	0.104	0.31
Share of good irrigated land	0.281	0.391	0.563	0.371	0.439	0.344	0.319	0.405	0.246	0.413	0.428	0.400
Share of good non-irrigated land	0.376	0.422	0.729	0.404	0.815	0.327	0.369	0.414	0.942	0.213	0.663	0.429
H'holds in regression sample	484		956		506		276		443		2810	

Source: 1992/93 Viet Nam Living Standards Survey. Note: * We identify government work through professional codes 20 and 21.

Table 2: Determinants of consumption

	Northern Uplands	Red River	North Coast	Central Coast	Mekong Delta	Full sample
religion	-0.086	-0.007	-0.041	0.124	-0.059	-0.022
	(2.07)	(0.14)	(0.54)	(1.18)	(1.00)	(0.82)
ethnic	-0.062	-0.193	-0.117	-0.649	0.141	-0.070
	(0.86)	(2.34)	(1.23)	(2.90)	(1.90)	(1.65)
local born	-0.077	0.027	0.101	-0.138	-0.062	-0.035
	(1.57)	(0.78)	(1.53)	(3.65)	(0.86)	(1.29)
age of head	-0.0002	0.016	-0.003	0.002	0.005	0.007
	(0.02)	(2.32)	(0.32)	(0.21)	(0.47)	(1.83)
age^2 of head x 10^3	0.038	-0.158	0.025	0.012	-0.046	-0.059
	(0.42)	(2.19)	(0.33)	(0.15)	(0.45)	(1.46)
Log household size	0.451	0.462	0.534	0.532	0.452	0.482
	(6.90)	(7.62)	(10.24)	(6.24)	(6.92)	(15.73)
dependency ratio	-0.066	-0.026	-0.120	-0.186	-0.110	-0.071
	(0.65)	(0.41)	(1.71)	(1.73)	(1.19)	(2.00)
gender of head	0.074	0.030	0.014	0.025	-0.078	0.008
	(1.65)	(0.75)	(0.37)	(0.61)	(1.34)	(0.34)
disabled adult	-0.348	0.003	-0.432	-0.067	--	-0.162
	(3.81)	(0.01)	(1.37)	(0.61)		(1.68)
government job	0.103	0.149	0.103	0.296	0.181	0.140
	(2.13)	(3.10)	(1.70)	(4.15)	(3.72)	(4.83)
SOE job	0.540	0.109	-0.044	0.498	0.046	0.130
	(4.16)	(2.26)	(0.58)	(1.45)	(0.40)	(2.74)
education of head	0.021	0.027	0.024	0.033	0.009	0.025
	(3.87)	(5.45)	(4.48)	(4.93)	(1.46)	(9.48)
education of other adults	0.010	0.011	0.013	0.005	0.010	0.011
	(4.72)	(7.74)	(4.89)	(1.89)	(4.21)	(11.32)
social subsidy recipient	0.007	0.044	0.041	-0.034	-0.025	0.031
	(0.17)	(1.10)	(0.56)	(0.52)	(0.30)	(1.15)
Log allocated irrigated land equivalent	0.097	0.084	0.052	0.214	0.188	0.131
	(2.82)	(2.30)	(2.39)	(3.81)	(6.89)	(7.45)
private irrigated x 10^3	0.137	0.239	0.236	0.049	0.017	0.028
	(3.34)	(2.32)	(3.01)	(1.04)	(1.56)	(2.54)
private non-irrigated x 10^3	0.015	-0.002	0.089	0.047	0.022	0.012
	(0.31)	(0.05)	(2.50)	(0.77)	(1.24)	(0.98)
private perennial x 10^3	0.064	0.109	0.038	0.033	0.042	0.019
	(3.47)	(1.73)	(0.40)	(0.51)	(3.59)	(1.76)
private water x 10^3	0.189	0.175	0.313	--	0.016	0.040
	(2.15)	(3.40)	(4.16)		(0.72)	(1.50)
cultivates swidden land	0.070	-0.082	-0.092	-0.018	0.112	-0.009
	(1.15)	(0.86)	(0.70)	(0.26)	(3.83)	(0.24)
share good irrigated land	0.017	0.032	0.084	-0.055	0.111	0.042
	(0.25)	(0.57)	(1.21)	(0.63)	(1.55)	(1.47)
share good non-irrigated land	-0.004	0.004	-0.008	-0.037	0.016	0.020
	(0.06)	(0.10)	(0.27)	(0.54)	(0.20)	(0.81)
Constant	13.320	13.415	13.377	12.712	13.300	13.474
	(41.53)	(49.55)	(50.75)	(28.17)	(37.69)	(68.80)
R^2	0.679	0.671	0.703	0.666	0.570	0.673
RMSE	0.305	0.318	0.300	0.383	0.367	0.340
F stat	53.10	971.45	456.46	71.89	438.67	92.43
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n	484	956	506	276	443	2810

Note: The dependent variable is log household consumption expenditures. Commune fixed effects included. T-ratios in parentheses are based on standard errors corrected for heteroskedasticity and clustering.

Table 3: Actual land allocations compared to consumption-efficient allocations

	Northern Uplands		Red River		North Coast		Central Coast		Mekong Delta		Full Sample	
	actual	efficient	actual	efficient	actual	efficient	actual	efficient	actual	efficient	actual	efficient
religion	-0.123	-0.095	0.047	-0.007	0.130	-0.043	0.035	0.157	0.162	-0.073	0.078	-0.025
	(1.48)	(2.03)	(0.66)	(0.14)	(0.93)	(0.54)	(0.47)	(1.16)	(1.86)	(1.00)	(1.24)	(0.81)
ethnic	0.023	-0.068	0.309	-0.210	0.462	-0.124	-0.116	-0.826	0.364	0.174	0.013	-0.080
	(0.39)	(0.85)	(2.56)	(2.29)	(2.78)	(1.22)	(0.47)	(2.73)	(1.51)	(1.91)	(0.11)	(1.65)
local born	0.032	-0.086	-0.029	0.030	-0.086	0.107	0.024	-0.176	0.146	-0.077	0.045	-0.040
	(0.72)	(1.59)	(0.54)	(0.78)	(0.51)	(1.51)	(0.38)	(3.69)	(1.73)	(0.87)	(1.07)	(1.29)
age of head	-0.008	-0.0002	-0.0003	0.017	-0.012	-0.003	0.045	0.002	0.028	0.006	0.003	0.008
	(0.49)	(0.00)	(0.81)	(2.29)	(0.88)	(0.32)	(2.23)	(0.22)	(1.75)	(0.47)	(0.46)	(1.82)
age^2 of head x 10^3	0.081	0.042	-0.065	-0.173	0.041	0.026	-0.486	0.016	-0.213	-0.057	-0.056	-0.068
	(0.44)	(0.42)	(0.81)	(2.17)	(0.27)	(0.33)	(2.32)	(0.14)	(1.39)	(0.45)	(0.75)	(1.45)
log h'hold size	0.724	0.499	0.794	0.504	0.696	0.563	0.661	0.676	0.243	0.557	0.695	0.555
	(6.63)	(8.01)	(14.38)	(9.41)	(5.18)	(10.79)	(4.39)	(7.50)	(2.21)	(8.08)	(11.93)	(18.70)
dependency ratio	-0.498	-0.073	-0.478	-0.029	-0.386	-0.127	-0.292	-0.237	0.092	-0.135	-0.420	-0.082
	(2.59)	(0.66)	(6.91)	(0.41)	(2.52)	(1.71)	(1.34)	(1.68)	(0.50)	(1.21)	(6.07)	(2.02)
gender of head	0.070	0.082	0.070	0.032	0.147	0.015	0.103	0.032	0.155	-0.096	0.094	0.009
	(0.77)	(1.69)	(1.90)	(0.75)	(2.43)	(0.37)	(1.19)	(1.68)	(1.21)	(1.34)	(2.82)	(0.35)
disabled adult	-0.125	-0.385	-0.086	0.003	-0.094	-0.456	0.118	-0.085	--	--	-0.053	-0.186
	(1.19)	(3.81)	(0.70)	(0.00)	(0.45)	(1.36)	(0.57)	(0.61)			(0.64)	(1.68)
gov't job	-0.221	0.114	-0.122	0.162	-0.200	0.109	-0.049	0.377	0.095	0.223	-0.160	0.161
	(1.28)	(2.17)	(1.90)	(2.93)	(1.63)	(1.71)	(0.29)	(3.48)	(0.92)	(3.74)	(2.75)	(4.77)
SOE	-0.767	0.598	-0.232	0.119	0.134	-0.046	-0.049	0.634	0.342	0.056	-0.174	0.150
	(2.26)	(3.90)	(4.09)	(2.22)	(0.43)	(0.57)	(0.13)	(1.35)	(0.88)	(0.40)	(2.32)	(2.69)
education of head	-0.012	0.024	-0.006	0.029	-0.009	0.026	-0.018	0.042	0.018	0.011	-0.001	0.028
	(1.06)	(3.81)	(1.10)	(5.26)	(1.10)	(4.38)	(2.53)	(4.35)	(1.46)	(1.45)	(0.30)	(9.12)
education of other adults	-0.005	0.011	0.002	0.012	0.005	0.014	0.004	0.007	0.010	0.012	0.003	0.013
	(1.31)	(4.81)	(0.74)	(6.95)	(0.86)	(5.04)	(0.84)	(1.87)	(1.45)	(4.09)	(1.29)	(11.04)
social subsidy	0.005	0.008	-0.079	0.048	0.035	0.044	-0.192	-0.044	-0.371	-0.030	-0.088	0.036
recipient	(0.07)	(0.17)	(1.61)	(1.09)	(0.37)	(0.57)	(1.58)	(0.52)	(3.50)	(0.30)	(2.26)	(1.15)
private irrigated	0.471	0.152	0.399	0.261	0.084	0.249	0.144	0.063	0.028	0.021	0.151	0.033
x 10^3	(2.79)	(3.41)	(3.28)	(2.28)	(0.71)	(2.95)	(5.79)	(1.07)	(2.05)	(1.55)	(3.14)	(2.54)
private non irrigated	-0.033	0.017	-0.013	-0.003	0.174	0.093	-0.086	0.059	-0.004	0.027	-0.012	0.014
x 10^3	(0.66)	(0.30)	(0.21)	(0.00)	(1.62)	(2.49)	(1.85)	(0.78)	(0.16)	(1.24)	(0.69)	(0.97)
private perennial	0.015	0.071	0.028	0.119	0.054	0.040	-0.084	0.042	0.022	0.052	0.005	0.022
x 10^3	(0.27)	(3.59)	(0.62)	(1.68)	(0.38)	(0.40)	(2.32)	(0.50)	(0.62)	(3.63)	(0.57)	(1.76)
private water x 10^3	-0.017	0.209	0.041	0.192	0.346	0.330	--	--	0.058	0.020	0.063	0.046
	(0.11)	(2.17)	(0.77)	(3.51)	(2.62)	(4.42)			(6.50)	(0.71)	(5.00)	(1.50)

cultivates swidden	0.121	0.077	0.230	-0.089	0.050	-0.097	0.046	-0.023	0.465	0.138	0.078	-0.010
land	(1.10)	(1.26)	(2.32)	(0.87)	(0.40)	(0.69)	(0.40)	(0.26)	(7.90)	(4.08)	(0.93)	(0.24)
share of good	0.302	-0.005	-0.032	0.035	-0.100	0.089	0.050	-0.070	0.051	0.136	0.013	0.048
irrigated land	(1.20)	(0.00)	(0.74)	(0.57)	(0.78)	(1.20)	(0.52)	(0.62)	(0.48)	(1.57)	(0.18)	(1.48)
share of good non-	-0.434	0.019	-0.201	0.004	0.029	-0.008	0.221	-0.047	-0.019	0.020	-0.035	0.023
irrigated land	(2.89)	(0.24)	(3.46)	(0.10)	(0.44)	(0.26)	(3.30)	(0.53)	(0.38)	(0.04)	(0.89)	(0.81)
Constant	5.729	--	6.881	--	4.778	--	6.614	--	7.003	--	5.876	--
	(18.39)		(38.40)		(12.97)		(15.73)		(17.44)		(13.74)	
R^2	0.543		0.630		0.627		0.610		0.771		0.675	
RMSE	0.512		0.389		0.503		0.482		0.648		0.545	
F stat	(14, 15)=		(20,31)=		(16,17)=		(10,11)=		(18,22)=		(21,109)	
	135.92		2020.27		2120.20		230.57		1066.59		=874.10	
Prob>F	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	
obs	484	484	956	956	506	506	276	276	443	443	2810	2810

Note: Commune fixed effects included. T-ratios in parentheses are based on standard errors corrected for heteroskedasticity and clustering.

Table 4: Mean consumption, inequality and poverty under alternative land allocations

	Northern Uplands	Red River	North Coast	Central Coast	Mekong Delta	Full Sample
			Actual allocation			
Mean consumption ('000 dongs)/ h'hold	4725.083	4594.556	4183.381	5725.078	7300.921	5258.276
Inequality in per capita expenditures	0.101	0.085	0.079	0.124	0.130	0.115
Headcount index of poverty (%)	81.322	67.523	85.143	61.975	49.919	68.455
Squared poverty gap index (x100)	13.014	7.386	13.464	9.719	5.639	9.271
			Consumption-efficient counter factual			
Maximum consumption ('000 dongs)/ h'hold	4821.796	4656.408	4227.616	6000.305	7688.655	5448.437
(%) loss (1-actual/efficient)	2.006	1.328	1.046	4.587	5.043	3.490
Inequality of consumption under the efficient land allocation	0.120	0.101	0.087	0.185	0.176	0.150
Headcount index of poverty under the efficient land allocation (%)	78.393	66.691	83.959	59.664	50.526	66.331
Squared poverty gap index under the efficient land allocation (x100)	13.564	8.083	13.712	11.976	6.724	10.330
			Equal land counter factual			
Mean consumption at equal land per household	4773.223	4620.384	4205.749	5829.239	7546.890	5345.507
(%) loss	1.009	0.559	0.532	1.787	3.259	1.632
Inequality of consumption at equal land allocation	0.101	0.087	0.080	0.122	0.117	0.116
Headcount index of poverty at equal land allocation (%)	79.620	66.985	84.653	61.134	46.440	66.505
Squared poverty gap index at equal land allocation (x100)	12.700	7.411	13.331	9.167	4.548	8.928

Note: Inequality is given by the difference between log mean consumption per capita and the mean of log consumption per capita.

Table 5: *Mean consumption, inequality and poverty with mobility between communes*

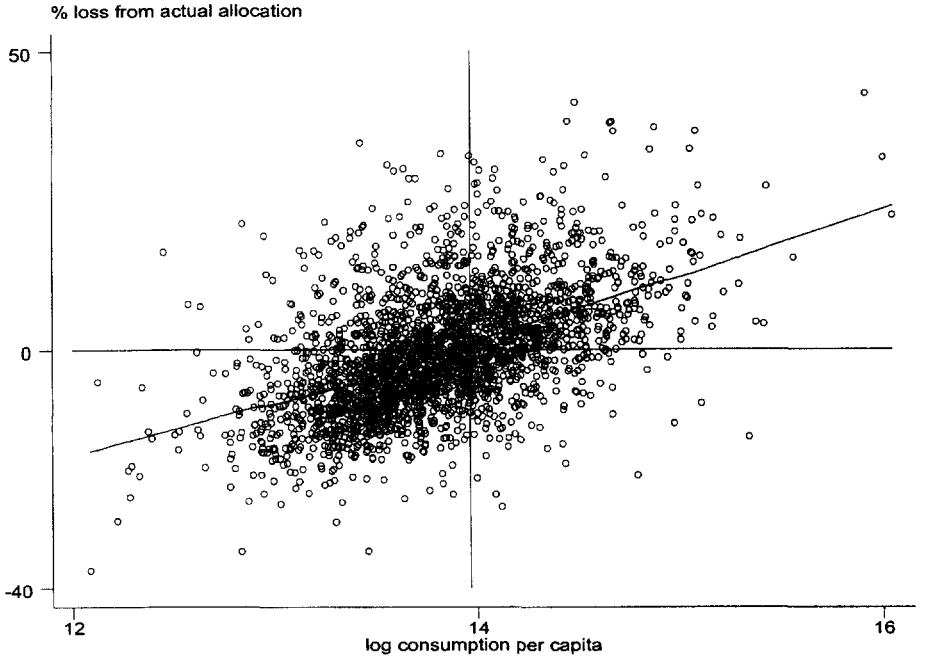
	Northern Uplands	Red River	North Coast	Central Coast	Mekong Delta	Full sample
			Consumption-efficient counter factual			
Maximum consumption ('000 dongs)/ h'hold	4836.772	4674.562	4245.877	6111.004	8386.244	5580.237
(%) loss	2.309	1.712	1.472	6.315	12.942	5.770
Inequality under the efficient allocation	0.117	0.101	0.088	0.186	0.223	0.146
Headcount index of poverty under the efficient allocation (%)	78.195	66.422	82.898	59.174	49.555	64.562
Squared poverty gap index under the efficient allocation (x100)	13.271	8.029	13.605	11.551	6.526	9.457
			Equal land counter factual			
Mean consumption at equal land per household	4792.570	4639.757	4226.545	5938.658	8105.723	5488.358
(%) loss	1.408	0.974	1.021	3.596	9.929	4.192
Inequality at equal land	0. 098	0.087	0.080	0.122	0.149	0.113
Headcount index of poverty at equal land allocation (%)	79.185	67.107	83.755	60.294	46.804	65.004
Squared poverty gap index at equal land allocation (x100)	12.419	7.345	13.218	8.724	4.282	8.076

Appendix: Reduced form regressions for consumption

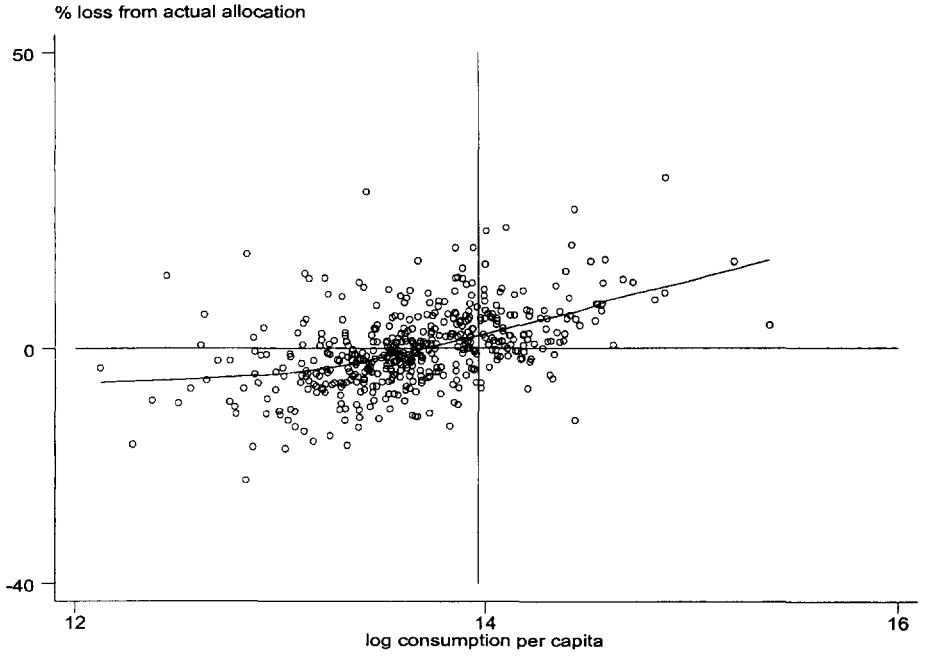
	Northern Uplands	Red River	North Coast	Central Coast	Mekong Delta	Full Sample
religion	-0.098	-0.003	-0.034	0.131	-0.02	-0.005
	(1.96)	(0.06)	(0.56)	(1.60)	(0.62)	(0.25)
ethnic	-0.059	-0.167	-0.093	-0.674	0.210	-0.086
	(1.14)	(1.84)	(0.71)	(2.40)	(2.15)	(2.39)
local born	-0.074	0.025	0.097	-0.133	-0.035	-0.024
	(1.55)	(0.49)	(1.47)	(1.64)	(0.62)	(1.02)
age of head	-0.001	0.016	-0.003	0.012	0.010	0.008
	(0.11)	(2.56)	(0.40)	(1.03)	(1.02)	(2.15)
age² of head x 10^3	0.046	-0.163	0.027	-0.092	-0.086	-0.065
	(0.45)	(2.46)	(0.34)	(0.82)	(0.88)	(1.77)
log h'hold size	0.521	0.529	0.570	0.673	0.498	0.573
	(8.58)	(12.56)	(10.92)	(7.93)	(8.02)	(23.64)
dependency ratio	-0.114	-0.067	-0.140	-0.249	-0.092	-0.128
	(1.31)	(1.22)	(1.94)	(1.89)	(0.91)	(3.61)
gender of head	0.081	0.036	0.022	0.047	-0.049	0.018
	(1.86)	(1.19)	(0.54)	(0.67)	(0.90)	(0.94)
disabled adult	-0.360	-0.005	-0.437	-0.042	--	-0.17
	(2.20)	(0.04)	(2.43)	(0.22)		(2.08)
gov't job	0.081	0.138	0.093	0.286	0.199	0.118
	(1.34)	(2.66)	(1.83)	(2.58)	(3.03)	(4.25)
SOE job	0.466	0.090	-0.037	0.488	0.110	0.107
	(2.43)	(1.60)	(0.28)	(1.66)	(0.61)	(2.23)
education of head	0.020	0.026	0.024	0.029	0.013	0.025
	(3.77)	(6.50)	(5.04)	(3.28)	(1.69)	(10.25)
education of other adults	0.010	0.011	0.013	0.006	0.012	0.011
	(4.32)	(6.35)	(6.21)	(1.64)	(4.16)	(10.87)
social subsidy recipient	0.008	0.037	0.043	-0.075	-0.095	0.018
	(0.15)	(0.98)	(0.90)	(0.84)	(1.00)	(0.71)
private irrigated x 10^3	0.183	0.272	0.241	0.080	0.022	0.067
	(2.46)	(3.00)	(2.22)	(1.48)	(1.33)	(5.83)
private non irrigated x 10^3	0.012	-0.004	0.098	0.028	0.021	0.011
	(0.27)	(0.13)	(2.02)	(0.56)	(1.32)	(1.25)
private perennial x 10^3	0.066	0.112	0.041	0.015	0.046	0.020
	(1.75)	(2.59)	(0.53)	(0.24)	(3.77)	(3.66)
private water x 10^3	0.187	0.179	0.331	--	0.027	0.048
	(2.01)	(2.79)	(2.54)		(1.53)	(3.26)
cultivates swidden land	0.082	-0.063	-0.089	-0.008	0.199	-0.010
	(1.77)	(0.88)	(0.83)	(0.09)	(1.23)	(0.31)
Share of good irrigated land	0.025	0.015	0.079	-0.044	0.120	0.054
	(0.38)	(0.32)	(1.47)	(0.59)	(1.38)	(2.02)
Share of good non-irrigated land	-0.025	0.001	-0.006	0.011	0.012	0.016
	(0.47)	(0.04)	(0.17)	(0.14)	(0.20)	(0.78)
constant	13.874	--	--	14.128	14.619	13.879
	(71.90)			(46.60)	(47.99)	(137.88)
R^2	0.670	0.668	0.700	0.641	0.522	0.657
RMSE	0.309	0.320	0.301	0.397	0.387	0.349
F stat	25.220	40785.07	32665.58	14.003	10.360	39.568
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	484	956	506	276	443	2810
test of $\gamma/(1-\beta) = b$	F(36,894) =8.68	F(53,1804) =179.15	F(39,932) = 151.65	F(31,486) =6.66	F(42,796) =31.45	F(129,5340) =28.37
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: The dependent variable is log household consumption expenditure. Commune fixed effects were also included.

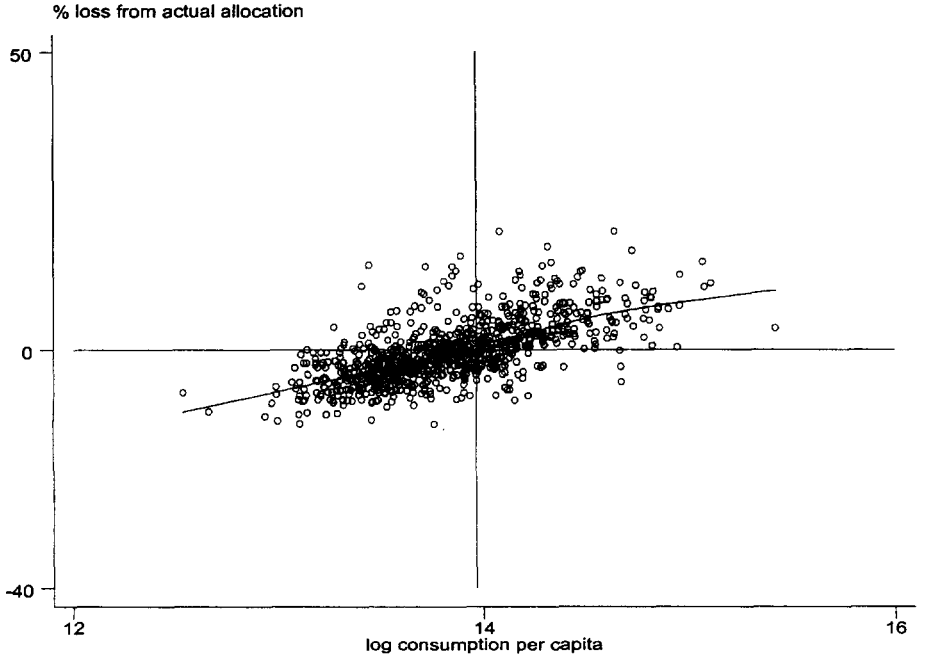
Figure 1: Distribution of consumption losses relative to the efficient allocation
(ii) National



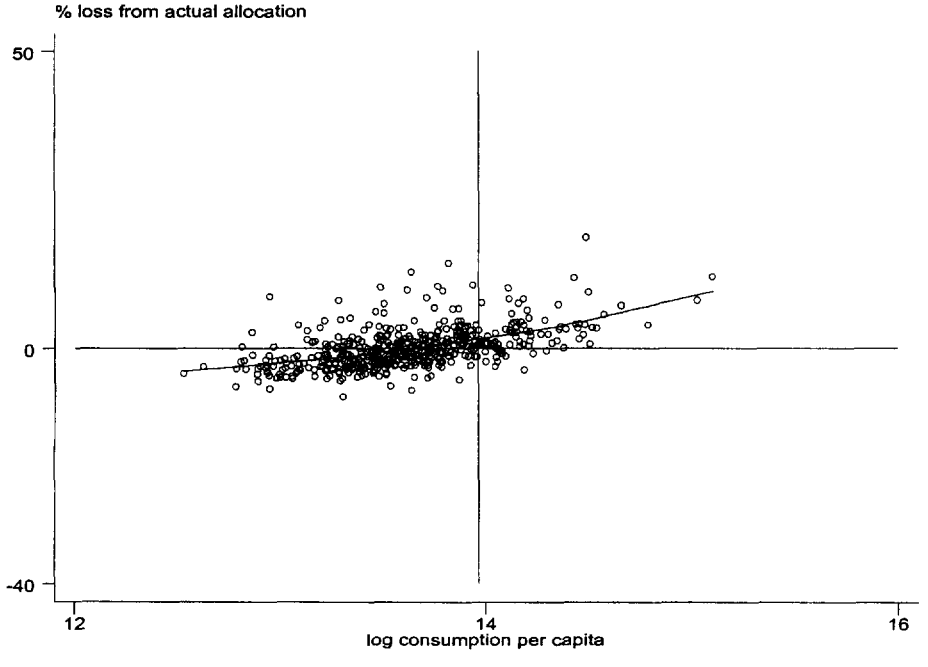
(ii) Northern Uplands



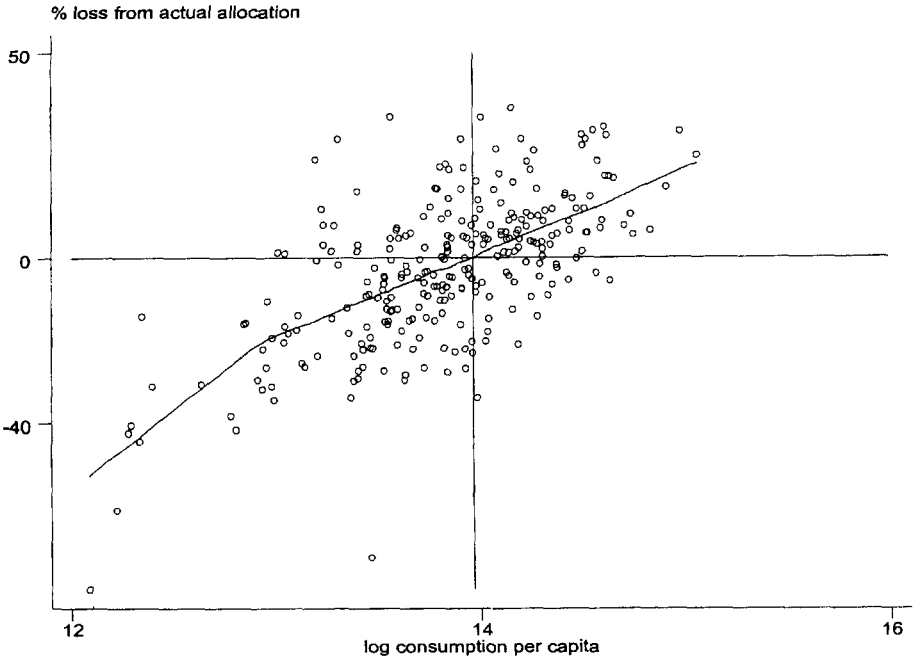
(iii) Red River



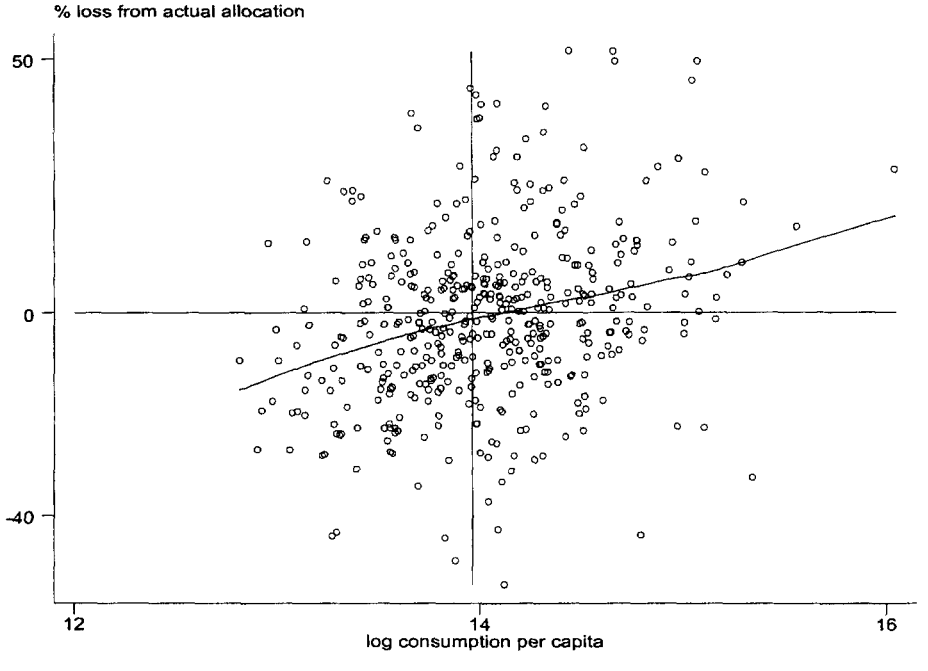
(iv) North Coast



(v) Central Coast



(vi) Mekong Delta



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