WPS 2836

POLICY RESEARCH WORKING PAPER   2836

Ethnic Minority Development
in Vietnam

A Socioeconomic Perspective

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Abstract

Baulch, Chuyen, Haughton, and Haughton examine the latest quantitative evidence on disparities in living standards between and among different ethnic groups in Vietnam. Using data from the 1998 Vietnam Living Standards Survey and 1999 Census, they show that Kinh and Hoa ("majority") households have substantially higher living standards than "minority" households from Vietnam's other 52 ethnic groups. Subdividing the population into five broad categories, the authors find that while the Kinh, Hoa, Khmer, and Northern Highland minorities have benefited from economic growth in the 1990s, the growth of Central Highland minorities has stagnated. Disaggregating further, they find that the same ethnic groups whose living standards have risen fastest are those that have the highest school enrollment rates, are most likely to intermarry with Kinh partners, and are the least likely to practice a religion.

The authors then estimate and decompose a set of expenditure regressions which show that even if minority households had the same endowments as Kinh households, this would close no more than a third of the gap in per capita expenditures. While some ethnic minorities seem to be doing well with a strategy of assimilating (both culturally and economically) with the Kinh-Hoa majority, other groups are attempting to integrate economically while retaining distinct cultural identities. A third group comprising the Central Highland minorities, including the Hmong, is largely being left behind by the growth process.

Such diversity in the socioeconomic development experiences of the different ethnic minorities indicates the need for similar diversity in the policy interventions that are designed to assist them.

Produced by the Research Advisory Staff

Ethnic Minority Development in Vietnam:
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Introduction

Vietnam is an ethnically diverse society. The Kinh ("lowland Vietnamese") majority, which accounts for 84% of the population, co-exists with 53 smaller ethnic minority groups, some of which have less than 1,000 members (Dang, Son and Hung, 2000). Previous research using the Vietnam Living Standards Surveys, in which the Kinh are usually grouped together with the Hoa (Chinese), has shown that the remaining 52 ethnic minorities constitute the poorest, least educated sections of Vietnamese society (Vietnam Poverty Working Group, 1999).[1] Furthermore, the gap in living standards between the Kinh and Hoa majority and the other ethnic minorities grew between 1993 and 1998 (the years when the closely comparable Vietnam Living Standards Surveys were undertaken). Geography, in particular the fact that many ethnic minorities live in remote and mountainous areas, explains only a part of the difference in living standards between these two groups. There are systematic differences in endowments and the returns to those endowments for members of the Kinh-Hoa majority and the ethnic minorities, most of which are in favor of the majority group (Van de Walle and Gunewardana, 2001). These and other more detailed qualitative studies (see in particular, Jamieson, Cuc and Rambo, 1998; Huy and Dai, 1999, and Winrock International, 1996) have led to an emerging consensus among donors and non-governmental organizations (NGOs) that a new, more differentiated approach to ethnic minority policy is required in Vietnam.

This study seeks to contribute to this debate by examining and decomposing the latest quantitative evidence on disparities in living standards between and among the different ethnic groups in Vietnam. We first use a range of socioeconomic variables to examine the differences in living standards between the Kinh-Hoa majority and the other ethnic minorities, and how these changed between 1993 and 1998. This is followed by a more detailed examination, employing data from both the VLSS and the 1999 Population and Housing Census, of socioeconomic differences among minority groups. A more nuanced picture starts to emerge, in which the ethnic groups that have done best are shown to be those that have assimilated most with Kinh society while the less assimilated groups (particularly those in the Central Highlands and the Hmong in the Northern Uplands) have been left behind.[2]

After a brief examination of government policy toward ethnic minorities, we turn to a more detailed explanation of why many ethnic minority households are so poor. Distinguishing between endowments (comprising both physical and human capital) and returns to those endowments, we tease out the effects of each of these using the VLSS data. A set of expenditure regressions are estimated and decomposed, which show that even if ethnic minority households had the same endowments as the Kinh and Hoa, this would close no more than a third of the gap in their living standards. Such diversity in the socioeconomic development experiences of the different ethnic minority groups indicates that the need for a similar diversity in the policy interventions designed to assist them.

The Majority-Minority Gap in Living Standards

The clearest evidence of the gap in living standards between the Kinh-Hoa majority and the ethnic minorities comes from the Vietnam Living Standards Surveys of 1992-93 (VLSS93) and 1997-98 (VLSS98). The 1992-93 survey covered 4,234 Kinh and Hoa households, and 566 ethnic minority, households; the sample sizes for the 1997-98 were 5,151 and 848 households respectively. As can be seen from the map in Figure 1, with the exception of the Chinese (Hoa), the ethnic minorities are concentrated in the more remote regions of Vietnam, especially the Northern Uplands and Central Highlands.

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[1] The Hoa comprise approximately 2% of the population of Vietnam, live predominantly in urban areas and, as will be shown below, are highly assimilated with the Kinh.

[2] In conformity with usual academic usage, we use "assimilate" to mean the selective and voluntary adoption by minority groups of the economic strategies, livelihood practices and cultural norms common among the majority group. The adoption of such strategies, practices and norms are selective because they need to be compatible with the socioeconomic conditions of the minorities, and are voluntary because the decision on whether not to adopt them is made, usually on an individual or household basis, by the ethnic minorities themselves. As such our usage of word assimilate would best translate into Vietnamese as *hoa dong* or *hoa nhap*.

Where 54% of Kinh-Hoa had expenditures below the General Statistical Office (GSO)/World Bank poverty line in 1992-93, this proportion had dropped to 31% by 1997-98. During the same period the poverty headcount among for the remaining minorities only fell from 86% to 75%. So despite constituting just 14% of the total population, ethnic minorities now make up 29% of all the poor in Vietnam (Vietnam Poverty Working Group, 1999). Provincial level poverty maps constructed by merging data from the VLSS98 with the 1999 Census show that there are 14 provinces with rural poverty headcounts of over 60% (Minot and Baulch, 2001). Of these 14 provinces, 12 have populations in which ethnic minorities make up more than half of the total.

Figure 1:

Ethnicity and Expenditures

Ethnicity
Kinh
Chinese
Other_

1000 VND
Under 900
901 - 1800
1801 - 2700
2701 - 3600
Over 3600

N 1993

1998

Hanoi
Haiphong
Hue
Ho Chi Minh City

Data Sources: Vietnam Living Standards Survey
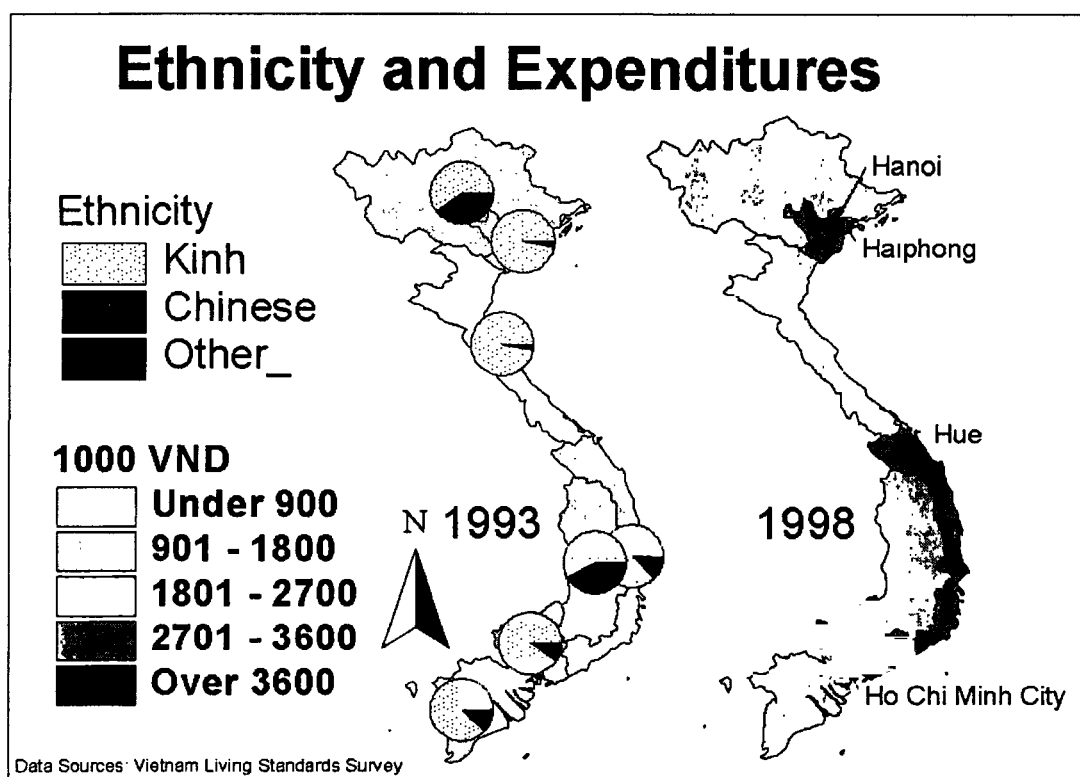
A number of socioeconomic indicators related to the household are gathered together into Table 1, which is based on the data from VLSS93 and VLSS98. For 1993, the summary measures in Table 1 are based on the full sample of 4,800 households. For 1998 we present data both for the full sample of 5,999 households living in 194 communes, and also for a sub-sample of 48 communes that are ethnically mixed.[3] This latter sub-sample can be used to examine whether the living standards of ethnic minorities households are worse than those of their Kinh and Hoa neighbors, and so provides a crude way to control for the otherwise pervasive effects of geography. To test whether the values of each of these variables are the same for majority and minority households, we have computed p-values based on t-tests (for continuous variables) and chi-squared tests (for binary variables): these are displayed in the "test" columns. The data for 1998 have been weighted to correct for the sampling design of the second VLSS (in which different households have different probabilities of being enumerated).

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[3] The full VLSS98 sample also included 140 communes with only Kinh or Hoa households and 6 communes where only ethnic minorities were enumerated.

Table 1 shows that, with an annual per capita expenditure that averaged VND1.54 million ($125) in 1998, minority households were far poorer than their Kinh and Hoa counterparts (VND3.0million).[4] And while spending for the majority groups rose by 38% in real terms between 1993 and 1998, the increase for minority households was much smaller, at 18%. The lower living standards of minority households are partly due to the fact that they tend to be larger than Kinh households (5.4 vs. 4.6 members in 1998), are more likely to include young children (15% vs. 10%) and are more likely to span three generations (27% vs. 18%). The fertility rate for minority women is about 25% higher than for Kinh and Hoa women (see Desai 2000). Ethnic minority households are also less likely to be able to speak Vietnamese and are much less likely to live in urban areas (2% vs. 27%)

| | 1993 | | 1998 | | | | | |
| | Full sample | | Full sample | | | Mixed communes only** | | |
	Kinh-Hoa	Minor-ities	Kinh-Hoa	Minor-ities	Test	Kinh-Hoa	Minor-ities	Test
Sample size (weighted)	4,234	565	5,261	738		931	575	
Expenditure per capita, '000 dong p.a.*	2,142	1,299	2,952	1,536	0.00	2,742	1,604	0.00
Household Size	4.89	5.52	4.61	5.41	0.00	4.71	5.37	0.00
Proportion of household that is:								
Aged 0-6	0.16	0.20	0.10	0.15	0.00	0.11	0.14	0.01
Aged 7-16	0.22	0.23	0.23	0.27	0.00	0.24	0.27	0.05
Male, aged over 16	0.28	0.27	0.30	0.28	0.00	0.29	0.28	0.06
Female, aged over 16	0.35	0.30	0.37	0.31	0.00	0.36	0.31	0.00
Proportion of households consisting of:								
One or two adults	0.07	0.03	0.10	0.04	0.00	0.10	0.04	0.00
Parent(s) and one child	0.15	0.12	0.14	0.07	0.00	0.11	0.07	0.02
Parent(s) and two children	0.21	0.15	0.24	0.18	0.01	0.25	0.19	0.04
Parent(s) and three or more children	0.38	0.44	0.33	0.41	0.00	0.35	0.41	0.15
Three generation household	0.17	0.23	0.18	0.27	0.00	0.17	0.27	0.00
Other	0.02	0.03	0.02	0.02	0.78	0.02	0.02	0.68
Age of head of household, years	45.8	42.1	48.3	44.2	0.00	46.8	44.0	0.00
Prop. of female-headed households	0.28	0.16	0.28	0.17	0.00	0.26	0.17	0.01
Prop. hhs interviewed in Vietnamese	1.00	0.47	1.00	0.79	0.00	1.00	0.89	0.00
Prop. of households in urban areas	0.22	0.04	0.27	0.02	0.00	0.25	0.02	0.00

Notes: * In January 1998 prices. ** Based on subsample that includes only those communes where Kinh-Hoa and minority households are present.
Sources: VLSS93 and VLSS98.

Ethnic minority households are less well-served by the health system (Desai, 2000). Just 47% of ethnic minority mothers in the 1998 VLSS sample sought prenatal care, compared with 70% for Kinh mothers. Furthermore only 30% of ethnic minority births were assisted by a doctor/physician or nurse/midwife, compared to 81% for the Kinh. Similarly, 75% of ethnic minority parents consulted a health care provider when a child (5-60 months) was sick, compared with 88% for Kinh households. And roughly 50% of minority children of one year or older have received the four main vaccinations, compared with about 60% for Kinh children.[5]

However, it is important not to overemphasize the contrasts, because an outside observer is more likely to be struck by the similarities between the socio-demographic characteristics of the two groups. For instance, Desai (2000) shows that contraceptive usage rates are broadly similar across ethnic groups: 55% of ethnic minority married women aged 15 to 44 reported that they use a modern method of contraception, compared to 59% among Kinh women and 35% among Chinese women.

Although the expenditure level of minority households is much lower than that of Kinh-Hoa households, the mean consumption of calories is only slightly lower (2,068/day/capita for minorities vs. 2,115 for Kinh); if adult equivalents are used, the difference (2,681 vs. 2,695) is negligible (Desai 2000, Table 3.6). This helps explain the otherwise surprising finding that the mean body mass index of minority men is the same as that for Kinh men (19.9), and only slightly lower for minority women (19.6) than Kinh women (20.1). Indeed Desai (2000, Table 6.2) finds that a smaller proportion of minority men are severely

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[4] The prices are those of January 1998. The exchange rate in January 1998 was VND12,290/$US.
[5] The vaccinations are BCG (for TB), DPT, polio and measles.

malnourished (3.6%) than Kinh men (6.3%), although the gap is less evident for women (8.0% for minorities vs.9.4% for Kinh). Nonetheless, it remains the case that the children of ethnic minorities are more likely to be stunted, a measure of long-term malnutrition (Haughton and Haughton 1999).

In short, by Vietnamese standards, ethnic minority households look significantly different from Kinh-Hoa households. But both fit groups broadly within Vietnamese norms, and both groups have experienced similar trends in living standards: rising expenditures, falling fertility and household size, and comparable levels of malnutrition.

Differences Among Minority Groups

(i) Expenditures

Not all ethnic minority groups are equally disadvantaged. This is an important point, because if ethnicity is used to help target government interventions such as food subsidies or scholarships, then there will be less wastage if the relevant targets can be identified more precisely. The practical problem here is that the VLSS surveys did not sample enough ethnic minority households to allow for much disaggregation; moreover the VLSS93 codes only allowed for 10 different ethnic groupings rather than the standard official list of 54 distinct groups. The VLSS questionnaires also only collected information on the ethnicity of the head of the household. This does not allow one, for instance, to analyze minority issues at the individual (as distinct from household) level, or to explore the extent of inter-marriage between ethnic groups.

The best that one can do with the VLSS data under these circumstances is to separate households into a few relatively homogeneous categories based on the ethnicity of the head. We distinguish three of the main ethnic groups (the Kinh, Hoa and Khmer) together with a composite category for ethnic minorities that traditionally live in the Central Highlands, and another for those that originate in the Northern Uplands. The relevant details are summarized in Table 2, along with a listing of ethnic groups by composite category.

	Poverty headcount (% of people)		Expenditure/capita, '000 dong, 1998 prices		Household size		Sample size (weighted)[4]		% of pop.
	1993	1998	1993	1998	1993	1998	1993	1998	
Vietnam overall	55	36	2,043	2,751	4.97	4.71	4,799	5,999	
Kinh	52	30	2,105	2,899	4.86	4.60	4,145	5,030	83.9
Hoa (Chinese)	11	8	3,843	5,119	6.55	5.18	89	121	2.0
Khmer	70	57	1,521	1,882	5.44	5.33	89	122	2.0
Central Highland Minorities[1]	92	91	1,021	1,090	6.28	5.79	103	167	2.8
Northern Upland Minorities[2]	84	73	1,323	1,594	5.33	5.31	373	560	9.3

Notes: 1. Central Highland minorities: Ba-Na, Co-Ho, E-De, Gie-Tieng, Hre, Ma, Ra Glai, Xo-Dang.
2. Northern Upland minorities: Dao, Hmong, Muong, Nung, Tay, Thai, San Diu, Dan Chay, Tho..
3. 132 households coded as belonging to "Other" ethnic minorities in VLSS93 and 39 households belong to the other category in VLSS98 have been sub-divided between the last two groups in this table using the regional and religion variables. Details are available from the authors on request. The categories may not be strictly comparable between 1993 and 1998.
4. Unweighted sample size: Kinh: 5,172. Hoa: 131. Khmer: 95. Central Highland minorities: 193. Northern Upland minorities: 411.
Sources: VLSS93 and VLSS98.

This disaggregation, crude as it may be, is helpful. The data in Table 2 show clearly that the poorest group consists of the "Central Highland minorities." Their expenditure per capita was VND1.02 million in 1993, barely rising to VND1.09 million by 1998; this stagnation meant that the Central Highland minorities saw their relative position fall, with an expenditure level that was half the national average in 1993 but little more than a third of the national average by 1998. The poverty headcount for this group went from 92% in 1993 to 91% in 1998. Having missed the economic boom of the 1990s, it is not surprising that dissatisfaction, which was also related to land and religious conflicts, bubbled over into the significant demonstrations by ethnic people that took place in several places in the Central Highlands in February 2001 (Economist Intelligence Unit 2001).

It is possible to get a more complete picture of the distribution of per capita expenditures by ethnic category from the kernel densities shown in Figure 2. These may be thought of as histograms that have been smoothed in order to iron out minor irregularities in the data (Deaton 1997; StataCorp 1999), and so draw the eye to the essential features of the distributions. In Figure 2a, the kernel densities for the Kinh, Hoa, and Khmer are shown. The density for the Hoa stands out: its peak is far to the right of the other distributions, and there is a wider variation in per capita expenditures than the other four categories. The slightly bi-modal distribution is due to the heavy, if partial, concentration of Hoa households in large urban areas, particularly in the Southeast. In contrast, the distribution of expenditures for Khmer households, who live primarily in the Mekong Delta, has a peak just below the GSO/World Bank poverty line, and most of the observations are highly concentrated in that vicinity. This indicates that as long as those regions continue to benefit from general economic growth, a large proportion of the Khmer should move out of poverty in the next five years or so.

Figures 2a and 2b: *Kernel densities of per capita expenditure for 1998, based on VLSS98 data.*
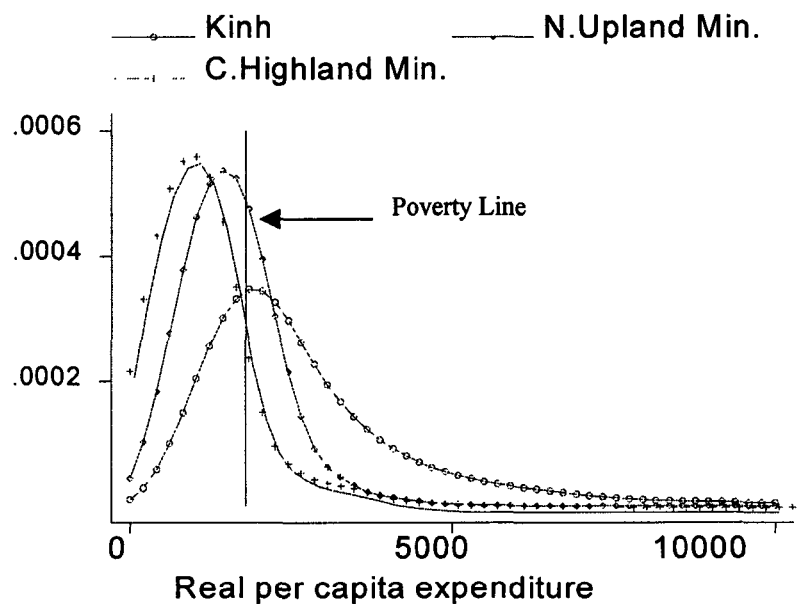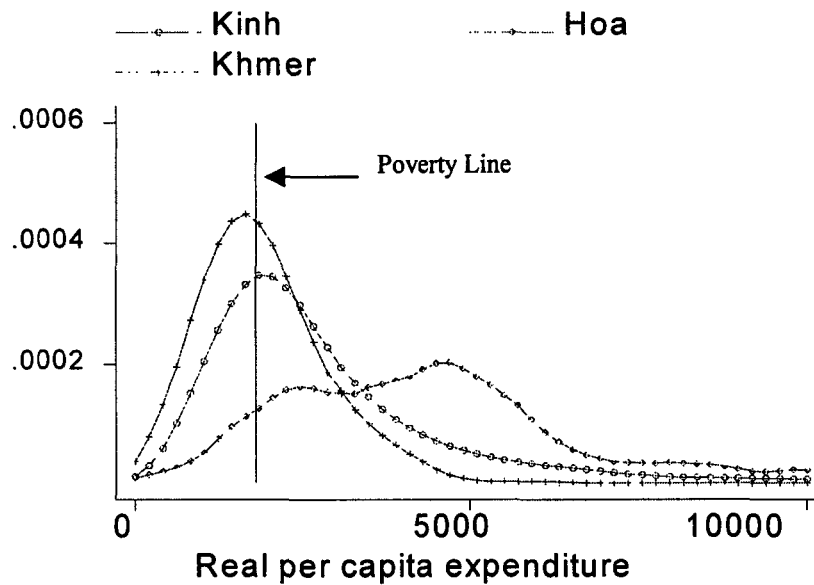
Figure 2b shows the kernel densities for the Central Highland and Northern Upland minorities, with that for the Kinh included for comparison purposes. The distributions of expenditures for Northern Upland minorities, and especially for Central Highland minorities, are even more highly concentrated than for the Khmer. The mode of the density for the Northern Upland minorities is, however, relatively close to the poverty line, indicating that they are also likely to benefit from equitable economic growth. In contrast, the Central Highland minorities are considerably poorer in expenditure terms than the other four categories, as both their density in Figure 2b and the poverty headcounts in Table 2 confirm. Exceptionally rapid growth and/or other special measures will therefore be needed if poverty is to be reduced significantly among the ethnic minorities indigenous to the Central Highlands.

(ii) Schooling

Although a finer breakdown by ethnic group is not possible using VLSS data, one can get greater precision using the 3% enumeration sample of the 1999 Population and Housing Census. While the Census data do not provide information on incomes or expenditure, they do allow one to construct gross and net school enrollment rates for the 12 ethnic groups for which there are at least 1,000 observations in the enumeration sample. School enrollment rates are usually highly correlated with income, and may therefore be used as a rough and ready indication of the standard of living in a community.

Table 3 shows primary school enrolment rates by sex for each of the twelve ethnic groups with more than 1,000 children of primary school age in included in the Census 3% sample. By the standards of comparably poor countries, the primary school net enrolment rates (NER) in Vietnam are quite high (91%).[6] However, primary NERs are below 70% for 5 ethnic groups: the Ba-na, Gia-rai, Xo-dang in the Central Highlands and the Dao and the Hmong in the Northern Uplands, as Table 3 shows. In addition to poverty and remoteness, one of the factors discouraging ethnic minority children in these groups from attending primary school is lack of instruction in ethnic minority languages (especially in the lowest grades).[7]

Ethnic Group	Gross	Net	Net (Boys)	Net (girls)	Sample Size
Kinh	113.6	93.4	93.5	93.4	229,503
Hoa	122.6	93.7	94.5	92.9	2,361
Khmer	114.5	76.3	77.3	75.3	3,879
Central Highlands:					
Gia-rai	126.3	66.4	67.6	65.1	1,695
Ba-na	108.9	57.8	55.0	60.4	1,335
Xo-dang	139.3	62.2	64.7	59.3	1,233
Northern Uplands:					
Tay	135.4	94.7	94.9	94.4	11,079
Thai	135.5	83.9	87.2	80.5	5,004
Muong	133.4	94.5	94.9	94.0	3,851
Nung	136.6	89.3	89.7	88.9	5,010
Hmong	80.5	41.5	51.5	31.5	4,090
Dao	126.4	71.4	73.7	68.8	4,091
All	**115.4**	**91.4**	**91.7**	**91.0**	**280,262**

Notes: To be consistent with Vietnamese school enrolment procedures, these enrolment rates have been computed using calendar year of birth as stated in the Census files to determine whether or not a child is of primary or lower secondary age. The net enrolment rate can fall by several percentage points if the child's actual age (e.g., 6 to 10 years old for primary school) is used.
Gross enrollment rate = total enrolments in level X / children eligible to attend level X.
Net enrollment rate = total enrolments in level X of children eligible to attend level X / children of age eligible to attend level X.
Source: Based on 3% enumeration sample of 1999 Census

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[6] Primary school in Vietnam extends for five years, from roughly the ages of 6 through 10, although eligibility to attend primary school is determined on the basis of the calendar year of a child's birth and not on his or her age.

[7] Only 10 of the 334 primary schools surveyed in the VLSS98 taught any lessons in ethnic minority languages. Of these 10 primary schools, 7 were in the Mekong Delta or Southeast.

On average, primary school enrolments are relatively balanced between the sexes, with an overall primary NER of 91.7% for boys and 91.0% for girls. Again this blurs differences at the level of individual ethnic minorities: for all groups except the Ba-na, primary net enrolments rates are slightly lower for girls than for boys, although in most cases the difference in NER is small and not statistically significant. Three exceptions to this rule stand out: girls' primary NERs substantially lag those for boys among three ethnic groups in the Northern Uplands: the Dao (-4.9%), the Thai (-6.7%) and, in particular, the Hmong (-20.0%).

Table 2 also shows that primary school *gross* enrolment rates (i.e. the number of pupils enrolled in primary school divided by the number of children eligible to attend primary school) are in some case very high indeed. The implication is that a substantial proportion of Vietnamese children are starting primary school late, and are repeating grades frequently; this is especially true of most ethnic minority children.

Table 4 summarizes lower secondary school enrolment rates by ethnicity and sex.[8] As expected, both gross and net lower secondary school enrolments rates are much lower than for primary school enrolment rates. For Vietnam overall (in 1999), the net enrolment rate falls from 91% for primary school to 60% for lower secondary school. At the lower secondary level a clear gap opens up between the Kinh (65%) and all other groups (52% or less). Five ethnic groups – the Gia-rai, Ba-na and Xo-dang in the Central Highlands, and the Hmong and Dao in the north – have net enrolment rates at the lower secondary level of less than 20%, with that for the Hmong just under 5%. Overall, the lower secondary NER is essentially the same for boys and girls, but this hides some variation by ethnic group: among the Hmong and Xo-dang girls' lower secondary NERs are at least 5% lower than for boys, while for the Tay and Nung the female enrolment rates are at least 5% higher than for boys.

Ethnic Group	Gross	Net	Net (Boys)	Net (girls)	Sample Size
Kinh	80.6	64.8	65.5	64.0	185772
Hoa	71.0	51.7	50.4	53.1	1989
Khmer	35.9	22.5	23.8	21.2	3041
Central Highlands:					
Gia-rai	37.1	14.9	15.2	14.5	1354
Ba-na	20.0	8.9	9.0	8.9	1024
Xo-dang	35.2	10.1	12.7	7.1	1071
Northern Uplands:					
Tay	77.0	51.0	47.1	55.2	9082
Thai	55.2	32.1	33.6	30.5	4402
Muong	76.7	52.3	50.8	53.9	3265
Nung	61.8	39.2	37.0	41.6	4055
Hmong	9.8	4.5	7.5	1.6	3092
Dao	20.3	11.8	11.9	11.8	3026
All	76.2	60.0	60.5	59.3	226649
Notes and Sources: As for Table 3.					

These findings on enrolment rates allow us to start to explore the extent to which different ethnic minorities are assimilated with the Kinh majority. If ethnic groups are classified according to the extent to which their school enrolment rates are similar to the Kinh, one might reasonably argue that the Hoa, Tay, Muong, Nung and perhaps Thai are assimilating relatively fast, while the other minorities (the Dao and Hmong in the Northern Uplands, the Khmer in the South, and all the Central Highland Minorities) are assimilating much less rapidly. If this speculation is correct, then we might expect a relatively high degree of intermarriage among the first ("more assimilated") group than among the second ("less assimilated") group. We now examine this proposition.

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[8] Lower secondary school stretches for four years, from approximately age 11 until age 14.

(iii) Intermarriage

The 3% Census enumeration sample, but not the VLSS surveys, allows us to measure the extent of intermarriage among the 12 main ethnic groups.[9] The results are summarized in Table 5. The most striking finding is that Chinese are the most likely to marry partners of a different ethnic group; a third of Chinese heads of household are married to a member of another ethnic group, primarily Kinh. The Nung and the Tay are also likely to intermarry, with one-in-four Nung and one-in-five Tay heads married to a partner from a different ethnic group.

| Ethnic Group | Married to: | | Sample Size (unweighted) |
	Member of Another Ethnic Group	Kinh Partner	
Kinh	0.9	99.1	339,633
Hoa	33.3	30.1	3,283
Khmer	11.4	10.9	4,196
Central Highlands:			
Gia-rai	1.2	0.6	1,872
Ba-na	1.4	0.3	1,440
Xo-dang	2.0	0.2	1,536
Northern Uplands:			
Tay	19.1	12.0	15,161
Thai	6.4	2.6	5,816
Muong	10.2	7.6	4,957
Nung	25.0	12.1	6,562
Hmong	0.8	0.5	3,676
Dao	6.5	4.1	4,225
All Vietnam	**2.5**	**1.1**	**399,573**

Note: 134,566 (23.6%) of household heads are single, widowed, separated, or divorced. 9.5% of married household heads are female.

Source: Author's calculations based on 3% enumeration sample of 1999 Census.

With the exception of the Thai, at least 10% of household heads in the more educated ethnic groups are married to someone from another ethnic group, typically Kinh. This is an intermarriage rate comparable or higher than that of second-generation Italian-Americans and Jews in the United States in the middle of the 20th century (Economist 2001, p.36). This suggests that the cultural and perhaps economic distance between these groups and the Kinh majority is relatively modest; we might speculate that these groups have embarked on a path of economic development that will lead to "assimilation" with the dominant group. The Khmer may also fit into this mold, although less clearly.

In contrast, the Thai appear to have chosen to keep their distance – a relatively low rate of intermarriage, particularly with Kinh partners – while emphasizing education. In this respect they are following a similar path to the (ethnically similar) Tai in Xishuangbanna, a region of southern China that abuts Vietnam. The Tai's unwillingness to assimilate mainstream Han culture has led to an increasing degree of economic marginalization (Hansen 1999).

The remaining ethnic groups, particularly the Central Highland minorities and the Hmong in the Northern Uplands, have very low rates of intermarriage with members of other groups. It is perhaps surprising that the Hmong and the Dao, who live in overlapping mountainous areas and belong to the same Kadai sub-group, intermarry very infrequently. When the Dao do intermarry, it is most often with a Tay partner.

The low-intermarriage groups are also the groups where school enrolment rates are the lowest. Whether these groups apartness is a matter of choice, or an unintended consequence of linguistic and geographic barriers, is unclear. We would, however, suggest that the most difficult challenge of public policy towards

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[9] These calculations assume monogamous marriages (*de facto* or *de jure*). Polygamy is known to have been common among affluent members of certain ethnic groups (such as the Kinh and the Hmong) in the past but is now officially prohibited. None of the households enumerated in the 1999 Census recorded polygamous marriages.

ethnic groups is bringing the "less-assimilated" groups into the economic mainstream; most of the "more-assimilated" ethnic groups are already half-way there.

Some anthropologists argue that it may be more socially acceptable for a Tay, Nung or Dao man to marry a woman from one of the other northern upland minorities, than to marry a Kinh woman. However the evidence from the 3% Census enumeration survey does not bear this out: more than half of the Tay and Dao husbands, and almost half of the Nung husbands, who have married an outsider have Kinh wives.[10]

(iv) Religion

A final aspect of the assimilation of different ethnic groups into Kinh society that can be examined using the 1999 Census is that of religion. This is a sensitive issue in Vietnam. The protests in the Central Highlands by ethnic minority groups in early 2001 were partly in response to official efforts to restrict religious practice in the region, especially among the growing number of evangelical Protestants.

Article 70 of the 1992 Constitution guarantees all Vietnamese citizens freedom of religion or non-belief, but indirect controls and local restrictions often discourage particular religious groups (UN Economic and Social Council, 1998). Furthermore, in the past, some religious groups (especially Protestant Christians in the Central Highlands and Northern Uplands) have been accused of being aligned with organizations whose aim is the overthrow of the State (Winrock International, 1996); or were historically associated with opposition to the government (for instance the Cao Dai). Although in recent years the government's attitude towards religion has become noticeably more relaxed, many *de facto* regulations still exist so that the position of many religious communities is best described as one in which "circumscribed areas of freedom are emerging within a general framework of controls, limitations and even prohibitions" (UN Economic and Social Council, 1998). For those minority groups that have large numbers of religious practitioners, these restrictions are an important source of irritation and even alienation from the central authorities.

Table 6 shows the percentage breakdown of professed religion observance at the time of the 1999 Census.[11] More than three quarters of people in Vietnam stated they had no religion, with Buddhism, Christianity (mainly Catholicism), Cai Daoism and Hoa Hao (two indigenous religions that blend a number of oriental and occidental beliefs and practices) and Islam accounting for the remainder. Some of the smaller ethnic minorities are known to have their own, often animist-based, religions and it is unclear how well these were enumerated in the Census.

Ethnic Group	No Religion	Buddhist	Christian	Other Religions
Kinh	77.7	10.9	7.9	3.3
Tay	99.3	0.3	0.1	0.0
Thai	99.6	0.0	0.1	0.0
Hoa (Chinese)	74.7	22.7	2.4	0.2
Kho-me (Khmer)	37.4	62.3	0.2	0.1
Muong	98.4	0.1	1.4	0.0
Nung	98.0	1.6	0.2	0.0
Hmong	95.2	0.1	4.5	0.0
Dao	99.2	0.2	0.3	0.0
Gia-rai	80.3	0.1	19.6	0.0
Ba-na	52.2	0.0	47.8	0.0
Xo-dang	71.3	0.0	28.6	0.0
All	78.8	10.5	7.7	3.0

Note: "Other religions" include Cao Dai, Hoa Hoa and Islam.
Source: Authors' calculations from 3% Sample of 1999 Census

[10] 11% of Tay husbands are married Kinh wives (compared to 4.8% with Nung wives) while 11.2% of Nung husbands have Kinh wives (and a further 11.2% have Tay wives). Among the Dao, of the 6.2% of husbands who intermarry, 3.8% are married to Kinh women, with a further 1.5% are married to Tay, Hoa or Muong wives.

[11] Note that the Census included two questions on religion, the first asking if an individual follows a religion with a second follow-up question inquiring further if he or she practices this religion. Table 6 is based on responses to the first question.

About three quarters of the Kinh and Hoa stated that they practiced no religion; among practitioners, Buddhism is the most common religion, followed closely by Christianity. A significant number of ethnic groups, particularly in the Northern Uplands, profess essentially no religion, including the Tay, Thai, Muong, Nung, Dao and Hmong.

On the other hand a number of the Central Highland minorities count a high proportion of believers: almost half of the Ba-Na are Christian (mainly Protestants), as are substantial percentages of the Xo-dang and Gia-rai. A majority of the Khmer are practicing Buddhists. Islam only has a significant number of adherents among the Cham, while Cao Daoism and Hoa Hao are practiced mainly by the Kinh living in the South-East and Mekong Delta. Just under 5% percentage of the Hmong are Christian (most of whom are Protestants) though it seems likely that the Hmong's traditions of spirit worship have been overlooked in the Census data.

Government Policy Towards Minority Groups

To give some context to the subsequent discussion, we now briefly summarize government policy towards ethnic minorities. The main vehicle for implementing government policies on ethnic minorities is the Committee for Ethnic Minorities in Mountainous Areas (CEMMA). This is a cabinet level committee, established in 1993, charged with identifying, coordinating, implementing and monitoring projects geared toward ethnic minority development. CEMMA has a budget of VND7.9 trillion ($546 million), to be spent on its main programs and projects over the five-year period through 2005; if realized, this would amount to a substantial $50 per ethnic minority household per year. However, since 1998 CEMMA has been criticized for various instances of corruption. In February 2001, 13 CEMMA officials were disciplined by the Communist Party for "violating regulations on management" (Cohen 2001); the following March, the 11th plenum of the Central Committee of the Party disciplined CEMMA chairman Hoang Duc Nghi (Xinhua 2001). Margot Cohen has written that "at the heart of CEMMA's failings is a top-down approach [...] Ethnic minorities rarely participate in planning development projects, and rarely know what they are entitled to once projects are implemented."

In addition, under Program 133, the Ministry of Labor, Invalids and Social Affairs (MOLISA) coordinates a Hunger Eradication and Poverty Reduction program that is designed to combat poverty by providing additional resources to the poorest communes in the country. Given the high levels of poverty among ethnic minorities, this program necessarily helps ethnic minority households disproportionately, even though MOLISA's list of poor communes includes many in lowland and midland areas. The main weakness of this program is that it is not sufficiently targeted. By spreading its largesse - about VND410 billion ($28 million) annually - so thinly, it provides only limited help to the poorest households, which dissipates its effectiveness as an anti-poverty program. The bluntness of the targeting is clear from the numbers compiled by van de Walle (2001). She reports that, in 1998, 71% of the richest rural communes had a poverty alleviation program, compared to 89% for the poorest rural communes (Table 17); and poverty alleviation programs touched villages with 84% of the rural poor and 75% of the non-poor (Table 7). Meantime, large numbers of poor people living in non-poor communes are excluded from receiving many benefits (Minot and Baulch, 2001).

A wide range of government interventions designed to help the ethnic minorities have been introduced since 1993. These interventions include: subsidizing the cost of transporting essential goods to remote areas; funds for resettlement and sedentarisation; subsidies for salt, reforestation funds, the provision of potable water, road maintenance and upgrading, the provision of livestock and seedlings to farmers; gifts of radios to remote households, subsidies for connecting villages to the national grid, and the provision of educational scholarships.

Government policy is not, however, universally supportive of ethnic minorities. On the one hand, there is official interest in maintaining (*bao ton*) and developing (*phat huy*) cultural identity, particularly dances, folklore and modes of dress. On the other hand, the standard textbooks tend to emphasize, and even glorify, Kinh culture and history. Similarly the expansion of education has, at last, led to a rapid rise in

enrollment rates for ethnic minority children. However, Vietnamese remains the dominant language of instruction, and most officially sanctioned textbooks are in Vietnamese. There is an ongoing tension between the willingness to accept differences (*cong nhan*), and cultural assimilation or Vietnamization (*dong hoa*).

The most important rural development policies have not helped, and may have hurt, many ethnic minority households. The government discourages drug production, which reduces the income of some growers in the northern mountains. Agricultural extension and research tends to favor lowland rice over upland crops (Huy and Dai 1999, p.13). The formalization of land rights has tended to squeeze slash-and-burn farmers, especially as traditional land and forest use rights are poorly defined and frequently not recognized by the formal legal system (Huy and Dai 1999). Government subsidies have encouraged people to move to the "New Economic Zones" in the Central Highlands. Even though only half of the (mostly Kinh) migrants to the Zones have stayed there, the in-migration has contributed to tension with the indigenous ethnic minorities in the Central Highlands (especially over land).

There is strong interest among donors and non-governmental organizations in projects that would alleviate poverty. These efforts have the effect of helping ethnic minority households, although not explicitly. There are also a number of projects, or components of projects, that are explicitly geared toward ethnic minorities.[12] With NGO support, an Ethnic Minority Forum (and now working group) was established in 1993, and serves as a locus for sharing experiences and lessons learned from the many efforts that are geared towards ethnic minority development.

Explaining the Divergence between Majority and Minority Living Standards

Why are Vietnam's ethnic minority households so poor? Following other studies using the VLSS, we measure material living standards using expenditure per capita. So our question becomes: why is expenditure per capita so low, and growing so slowly, among ethnic minority households? The standard economic explanations may be grouped into two.

First, people may be poor if they lack endowments. The main "factors of production" are land, physical capital and human capital (education). To the extent that a household lacks these endowments then it is likely to be relatively poor. Table 7 summarizes some of the main variables on household endowments. It shows that although ethnic minority households tend to have a relatively large quantity of land, this land is generally of poorer quality (reflected in part by the relatively low holdings of irrigated land).[13] Ethnic minority households are likely to be poorly endowed with capital, as reflected by their lack access to credit and lower receipts of remittances; in rural areas, the value of farm tools owned by Kinh households is twice as high as the value of those owned by ethnic minority households. As would be expected from the school enrolment data, ethnic minority households also have lower levels of education than the Kinh-Hoa majority. For households that remain in farming, it may not make sense to acquire more education, but the modest level of education also serves to reduce the number of economic opportunities open to them elsewhere in the country.

Second, people may be poor because their knowledge, customs or culture mean that they do not use the available factors of production as efficiently as possible; or because they face discrimination, and so would have more difficulty getting a good job than another equivalently qualified individual. Either of these would lead to the same result, which is low "returns on characteristics." For instance, a poorly educated ethnic minority farmer may not be able to get a high return on land because he or she does not know how to cultivate high-yielding crop varieties, or because the local agricultural extension agent cannot speak the local language or never visits.

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[12] Examples: UNDP-supported Ethnic Minority Development project (VIE/94/013 - VIE/96/010); UNDP/IFAD-supported Ha Giang Development Project for Ethnic Minority (VIE96/027), SIDA-supported MRDP, SIDA-supported Viet Nam-Sweden Inter-Forest (social forestry) Project, UNDP Regional Project - Highland People.

[13] In 1992, rural Kinh and Hoa households cultivated an average of 724 m^2 of "good quality" land, of which 615 m^2 was irrigated; for ethnic minorities the overall figure was 178 m^2, of which just 62 m^2 per household was irrigated. "Good quality" land is defined as land that yields four tonnes or more of paddy (or equivalent) per hectare per year.

| | 1993 | | 1998 | | | | | |
| | Full sample | | Full sample | | | Mixed communes only | | |
	Kinh-Hoa	Minor-ities	Kinh-Hoa	Minor-ities	Test	Kinh-Hoa	Minor-ities	Test
Sample size (weighted)	4,234	565	5,261	738		931	575	
Expenditure per capita, '000 dong p.a.*	2,142	1,299	2,952	1,536	0.00	2,742	1,604	0.00
Prop. hhs receiving foreign remittances	0.06	0.02	0.06	0.01	0.00	0.04	0.01	0.01
Prop. hhs receiving domes. Remittances	0.20	0.11	0.23	0.09	0.00	0.20	0.10	0.00
Land area cultivated, m^2 **	5,004	8,002	5,469	11,747	0.00	7,628	12,035	0.00
of which, area of								
Irrigated land **	1,531	569	2,704	2,403	0.52	3,176	2,886	0.65
Perennial crops **	682	959	1,079	1,454	0.39	1,164	1,284	0.61
Forest land **	170	1,112	505	4,630	0.00	1,044	5,027	0.00
Value of farm tools/household, '000 dong**	486	216	425	213	0.00	484	216	0.00
Years of education of head	6.58	4.72	7.36	5.53	0.00	7.36	6.04	0.01
Years of ed of best-educated member	9.04	6.57	9.36	6.94	0.00	9.21	7.55	0.00

Notes: * In January 1998 prices. Weighted by household weights and size. ** Rural households only Mixed communes are those with sampled households both from the Kinh-Hoa majority, and from ethnic minority groups.
Sources: VLSS93 and VLSS98.

Ethnic minority people have low endowments, and poor returns to characteristics, in part because many of them live in remote areas, and hence are disconnected from the rest of the economy. Traditionally, remoteness is seen as a geographic concept. Households living in remote areas find it expensive to buy inputs or to bring their goods to market. If the density of population is low, it is harder to provide schooling and other amenities. But remoteness may also be thought of as a social concept, so that some households may be distant from their neighbors because of barriers of language or culture. The ethnic minority households in rural areas that do not speak Vietnamese have per capita expenditures (1.074 million dong) that are only three-fifths as high as those of their Vietnamese-speaking counterparts (1.641 million dong), according to the VLSS98. Many minority groups also feel remote from the process of policy- and decision-making; the recent (April 2001) elevation of Nong Duc Manh, an ethnic Tay, to the position of General Secretary of the Communist Part, is an exception to this rule. Remoteness is more likely to be a problem if there are additional barriers – administrative, social or other – that prevent households from migrating in response to better opportunities elsewhere.

Several measures of remoteness are summarized in Table 8. Children from ethnic minorities have to travel further to school. Their parents have to travel further to go to a market, hospital, post office, or factory. Their families are less likely to live in a village or commune that is served by public transport, electricity or a telephone.

Although they use a somewhat different vocabulary, Vietnamese social scientists typically point to similar causes of poverty among the ethnic minorities. Ethnologist Bui Van Dao (personal communication) argues that ethnic minorities are persistently poor because of "objective reasons" (isolated villages, poor soils, inadequate water, unsuitable climate), "subjective reasons" (low educational levels, population pressure, shortage of capital, slow technical change), and "institutional reasons" (government policy insufficiently targeted, overlapping programs, top-down administration).

Pham and Tuan (1999) come up with a similar list, but they add that the socio-political institutions and customs of ethnic minorities are "still backward," and that "subversive forces" have "abused" religion and ethnicity "to destroy national unity." Implicit in this diagnosis is that the solution is for ethnic minorities to assimilate. This is the most widely held view in official circles. The reference to national unity is important, because a number of the ethnic minority groups worked closely with the Americans during the war in the 1960s and 1970s, and their political reliability is still considered to be suspect.

Others have argued that ethnic minorities are poor because they have been trapped in a downward spiral: population growth puts pressure on the natural carrying capacity of the uplands, which leads to environmental degradation and poverty (Jamieson, Cuc and Rambo, 1998). This in turn leads to social, cultural and economic marginalization and increased dependence on non-local support systems (NGOs,

government subsidies), which make it even harder for them to rise out of poverty. Jamieson, Cuc and Rambo stress this last component. Decision making, they argue, is too centralized and remote. It also occurs without adequate representation of local people, which in turn fuels distrust and misunderstanding.

	Full sample			Mixed communes only		
	Kinh + Hoa	Minorities	Test	Kinh + Hoa	Minorities	Test
Prop. With primary school in village	0.35	0.43	0.43	0.38	0.43	0.66
Km. to nearest primary school	1.4	2.0	0.02	1.8	1.9	0.70
Km. to nearest lower secondary school	1.9	3.0	0.01	2.5	2.6	0.83
Km. to nearest upper secondary school	5.0	8.0	0.03			
Km. to district center	8.8	18.9	0.00	9.1	16.5	0.04
Km. to nearest post office	4.2	10.1	0.01	5.2	6.7	0.12
Prop. With factory within 10 km	0.63	0.48	0.13	0.55	0.54	0.95
Prop. With any market in the commune	0.48	0.19	0.00	0.38	0.21	0.03
Km. to closest market	1.5	5.8	0.00	2.4	4.0	0.01
Prop. With electricity	0.96	0.70	0.00	0.95	0.83	0.04
Prop. With public transport available	0.48	0.31	0.05	0.41	0.31	0.41
Prop. With phone in commune	0.66	0.29	0.00	0.54	0.33	0.06
Km. to closest phone	1.4	8.2	0.01	2.7	4.5	0.14
Km. to nearest hospital	8.3	13.6	0.06	8.5	11.2	0.15
Proportion living in villages where births are usually at home	0.19	0.60	0.00	0.33	0.53	0.06
Sources: VLSS93 and VLSS98.						

Much less has been written about how minority people characterize and explain their own poverty. As part of a participatory poverty assessment, a recent study in Lao Cai found that people place great emphasis on the lack of natural resources, particularly high quality land and reliable water supplies, in explaining their own poverty (Vietnam-Sweden 2000). Bùi Minh Dao also argues that many ethnic groups explain poverty on the basis of superstitions (*tam linh*). People become rich thanks to spiritual support, or are poor because they are encountering a bad time (*van han*).

While a listing of the possible causes of poverty is certainly useful, such an exercise does not give a good sense of what the most influential factors might be. In an important study based on the VLSS93 data, van de Walle and Gunewardena (2001) examine the relative contributions of characteristics, the return to characteristics, and geography in explaining why ethnic minority households are poorer than the rest of society. They use the Blinder-Oaxaca decomposition (described below) to determine the extent to which the lower expenditure levels of minority households is due to the fact that they have weaker characteristics (i.e. lower educational levels, poorer quality land), and how much is due to lower returns on these characteristics. Using expenditure regressions estimated for households living in rural areas of Northern and Central Vietnam, they find that about half of the difference in expenditure per capita between the two groups is due to differences in their characteristics and endowments, with the remainder attributable to the lower "return to characteristics" obtained by minority households. Some writers interpret the portion of the expenditure differential due to "return to characteristics" as a measure of discrimination. However this is not entirely satisfactory, because the differences in characteristics between majority and minority households may themselves be the result of unequal treatment in the past. Nor is discrimination the only possible explanation of the expenditure differential; other unobserved factors, including cultural history, could play a role.

Do the findings of van de Walle and Gunewardena still hold? They used data from 1993, when restrictions on in-country migration had only just been eased, and were still of some importance. In the next section we apply their model to the VLSS98 data using both the simple majority-minority split and the disaggregation into composite categories (Kinh, Hoa, Central Highland Minorities, and Northern Uplands Minorities) developed above. We find that the differences in "returns to characteristics" by ethnicity are generally stronger than they were in 1993; certainly they remain very important.

In order to "explain" the gap between the living standards of majority and minority households, we begin by estimating regressions in which the dependent variable is the log of expenditure per capita (ln$E$) and the independent variables consist of household and community level endowments and characteristics (X). Formally, we regress

$$\ln(E_{ijk}) = X_{ijk}\,\beta_{jk} + \eta_{jk} + \varepsilon_{ijk}$$

where the observations are for the i'th household in the j'th ethnic group in the k'th commune. Here the η_{jk} are fixed, commune-level effects and ε_{ijk} is a random error with zero mean. Separate regressions may be estimated for each ethnic group. For instance, indexing the Kinh and Hoa majority with a and the ethnic minorities with b, it can be shown that:

$$\ln\overline{E}_a - \ln\overline{E}_b = (\overline{X}_a - \overline{X}_b)\beta_a + \overline{X}_a(\beta_a - \beta_b)$$

Total difference = Characteristics + Structure

where the ln$\overline{E}$ terms represent the mean log of expenditure per capita and the X_i give the mean characteristics of each group. This is the Blinder-Oaxaca decomposition (Blinder 1973; Oaxaca 1973), which separates the differences in expenditure per capita into the part that is due to the different characteristics of the two groups, and another component that reflects "structural" differences between the two groups. Note that the decomposition shown here uses the parameters for group a, but this choice is arbitrary. One could equally well use the parameters from the equations estimated for group b, and this will generally give a different decomposition. When fixed effects are included (the η_{jk} terms) in the regressions, they drop out of the decomposition provided that the equations for each group are estimated for communes where there are both majority and minority households - in our terms, the "mixed commune sample."

Our regression results are set out in Appendix 1 for the full sample, and Appendix 2 for the mixed-commune sample (which includes only the 48 communes with both majority and minority households). The dependent variable is the log of per capita expenditure. Separate equations are estimated, using the STATA statistical package, for the Kinh and Hoa majority and for ethnic minority households.[14] In each case we estimate a version of the equation with commune-level fixed effects, and another without these effects. The regressions are weighted by the inverse of the probability that a household is sampled and they also account for clustering and stratification of the 1998 VLSS (see Stata Corp 1999, Vol.4, pp.18-30).

There is clear evidence that the minority and majority regressions are structurally different, in the sense that at least some of the coefficients are not the same in the two cases. For the full data set, a Chow test of the equality of coefficients is rejected at the 1% level both for the case of no fixed effects (F(20,164)=14.09) and when there are fixed effects (F(20,164) = 2.75); in the latter case we are testing for the equality of all the coefficients except for the commune fixed effects dummies. When the sample is reduced to those communes that include both majority and minority households, the Chow test rejects the null hypothesis of equal coefficients at the 1% level when there are no fixed effects (F(21,18) = 6.29), but when fixed effects are included, the equality of the non-commune coefficients is only rejected at the 5% level (F(21,18)=2.64). This hints at the possibility that much of the explanation for the differences in per capita expenditure level between majority and minority households is due to the fixed location effects.

Further evidence that the factors that influence Kinh-Hoa households differ from those that affect ethnic minority households comes from estimates of multiple adaptive regression spline (MARS) models. These models allow for non-linearities as well as interactions among the variables in the models, but aim to identify parsimonious sets of basis functions (Friedman, 1991). Separate MARS models were estimated for Kinh-Hoa, and for ethnic minority households and these yielded very different models (see Appendix 3 for details). For Kinh-Hoa households, the MARS model shows (among other things) that education has the most dramatic effect on living standards for those who have little or no land. For the ethnic minority

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[14] We also estimated separate equations for Urban Kinh and Urban Hoa; and for rural Kinh and Hoa, rural Khmer, rural Central Highland Minorities, and rural Northern Upland Minorities. The results are not reported here, but were used in the decompositions reported in Table 7 below.

households, the MARS model shows that the profitability of land is closely associated with complementary family labor inputs; the ethnic minorities need large families to make their land productive.

By and large the regressions in Appendices 1 and 2 accord with our prior expectations. Larger households have lower per capita expenditure levels; both for minority and majority households, an extra household member is associated with a drop in per capita expenditure of about 7%. Having a higher proportion of adults in the household also raises per capita expenditures, an effect that is significantly stronger for majority than minority households (as may be seen from the "p, eq. Coeff." column, which gives the p-values for a test of coefficient equality; where the coefficients differ between majority and minority households, they are shown in bold face).

Education, as proxied by the number of years of education of the best-educated household member who is not in school, is also a significant predictor of expenditures, but the results differ depending on whether the full sample, or only the sample of households in mixed communes is used. Using the full sample, the relative return to education (as measured by the percentage change in expenditure per capita relative to a change in the numbers of years of education achieved by the best-educated household member) is higher for minority than majority households, up to 7 years of education. Beyond that point the relative return to education is slightly higher for majority households. However, when one confines the sample to only those living in mixed communes, then the relative return to education is higher for majority households.[15] A plausible interpretation is that education brings a high return to ethnic minority households when they also are free to migrate, an effect that is best seen when using the full sample. On the other hand when migration is limited (for legal, linguistic, institutional or cultural reasons) then it is more difficult to find profitable outlets for additional education. Thus the efficacy of education as a way to raise the living standards of ethnic minorities depends fundamentally on the degree to which they are geographically mobile and are willing to become assimilated.

The quality of education received by children from ethnic minority groups may also be poorer; in 1998 their curriculum was shorter while the instruction is most often in Vietnamese (a foreign language for many minority children). It is plausible that minority children need to have at least several years of schooling before they are able to acquire the language and other skills needed for inclusion into the economic mainstream.

Finally, when the sample is confined to households in ethnically mixed communes, access to land appears to play a bigger role, especially for minority households. Minority households, when asked, tend to emphasize the importance of land as a cause of poverty (see Vietnam-Sweden 2000). The regression results in Appendix 2 help one to understand why this might be so. Confining the sample to households in ethnically mixed communes, and allowing for fixed effects, an extra hectare of irrigated land is associated with additional expenditure per capita of approximately 2 million VND, both for majority and minority households. While an extra hectare of irrigated land would raise the per capita expenditure of a typical Kinh-Hoa household by 13%, it would boost expenditures for a minority household by 25% on average. It is hardly surprising, then, that ethnic minority households put more emphasis on access to land as a way out of poverty.

In Table 9 we present the main results of our decomposition analysis. As explained above, this decomposes the sources of differences in per capita expenditure levels between pairs of ethnic groups into a component that is due to different characteristics (age, education, land, gender, location, etc.) and a component that may be interpreted as reflecting different "returns to characteristics." To interpret the table, consider the first line: the difference in predicted per capita expenditures between the Kinh-Hoa majority and minority groups is VND 1,173,000 (in the prices of January 1998). Of this difference, 44% is because minority households have less education, fewer remittances, and other characteristics than the Kinh-Hoa majority; the remaining 56% is attributable to differences in returns to those characteristics. So if the characteristics of minority households could be boosted up to the level of the majority, then almost half of the expenditure gap would disappear. However, there would still be a substantial gap because of the lower "returns to

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[15] A similar effect was found by Van de Walle and Gunewardena (2000) using the 1993 VLSS.

characteristics" of ethnic minorities: even if minority households had the same characteristics as the Kinh-Hoa majority, they would still be substantially poorer.

	Reference equation	Per capita expenditure (000s 1998 VND) of reference group	% of difference due to different characteristics	% due to different "returns to characteristics"	Number of observations
1. All Vietnam	Kinh-Hoa	2,651	44	56	5,294
	Other minorities	1,478	31	69	698
2. All Vietnam	Kinh-Hoa	2,456	45	55	993
(mixed)	Other minorities	1,563	29	72	510
3. All Vietnam	Kinh-Hoa	2,456	66	34	993
(mixed, fixed)	Other minorities	1,563	54	46	510
4. Rural areas	Kinh-Hoa	2,254	29	71	4,377
	Other minorities	1,460	38	62	679
5. Rural areas	Kinh-Hoa	2,254	28	72	4,377
	Central Highland Min.	1,012	34	66	191
6. Rural areas	Kinh-Hoa	2,254	26	74	4,377
	Northern Upland Min.	1,551	16	84	402
7. Urban areas	Kinh	4,249	-80	180	1,484
	Hoa	5,426	-61	161	112

Notes: For each pairwise comparison, the decomposition based on the Kinh-Hoa (or, for urban areas, the Kinh) equation is reported first, and the results based on the minority equation follows on the next line. The per capita expenditures are geometric mean values.
(Mixed) = regressions based on data from communes where there were both minority and non-minority households.
(Fixed) = regressions included community fixed effects.
Sources: Based on VLSS98.

The magnitude of the components due to different characteristics and "returns to characteristics" are substantially different depending on which group is used as the reference and which sample is used. If the sample is confined to those communes where there are both Kinh-Hoa and minority households (the "mixed" communes), we again find that about 45% of the expenditure per capita differential is attributable to differences in characteristics. However when the equation is estimated with commune fixed effects (section 3 of Table 9), almost two thirds of the difference in per capita expenditure is due to differences in characteristics. In other words, when we compare Kinh-Hoa with minority households within a given commune, much of the gap between the groups is due to such factors as differences in education. Minority households are thus poor in part because they lack education and other assets, but also because they are disproportionately located in poorer communes.

Only 19 of the households surveyed by the VLSS98 consisted of ethnic minority households in urban areas (out of a total urban sample of 1,200 urban households). So it may make more sense to confine the sample to rural areas and to compute the Blinder-Oaxaca decomposition for this subset. The results are shown in sections 4-6 of Table 9. For minority households overall, and for the Central Highland Minorities, about a third of the differences in per capita expenditure is attributable to differences in characteristics such as education or age. This proportion is closer to a fifth for Northern Upland minority groups; even if this group had the same characteristics as the Kinh-Hoa majority, four fifths of the per capita expenditure gap would remain.[16]

Table 9 also reveals an interesting result when the living standards of the urban Kinh and the urban Chinese are decomposed. The Chinese are more affluent, but actually have lower levels of education and other observable expenditure-raising characteristics than do the Kinh. Thus the difference in per capita expenditure between the two groups is entirely due to the higher returns to characteristics that Chinese households enjoy. Formally, our model must be missing some important, and possibly unobservable, determinant of expenditures: an obvious candidate is the strength of business bonds and mutual aid within the Chinese community.

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[16] The Khmer have been excluded from our decomposition analysis due to the small number (95) of Khmer included in the VLSS98, together with problems of missing data for some of the Khmer households that were sampled.

Whichever set of estimates are used, differential returns to characteristics appear to be central. Van de Walle and Gunewardena (2001) reached broadly similar conclusions using the VLSS93 – albeit with greater weight on "returns to characteristics". We should, however, add that their results are not directly comparable with ours because Van de Walle and Gunewardena used a slightly different set of regressors and excluded households living in urban areas plus the Southeast and Mekong Delta regions from their sample.

Overall this analysis has an important, if somewhat abstract, implication. If our concern is to close the gap between minority and majority living standards, while maintaining ethnic identities, then it will not be sufficient simply to improve minority education or provide minority households with more land. Our regression analysis shows that minority households appear to generate their expenditure levels in a qualitatively different way, which means that anti-poverty programs that are geared to minority groups will in general have to look different from those geared to the majority. This will presumably require considerable amounts of input from minority groups themselves ("empowerment") and from those who have a thorough knowledge of ethnic minority societies.

Summary and Conclusions

We conclude by drawing together the main strands of our analysis and examining their implications for ethnic minority policies in Vietnam. Using data from the 1998 Vietnam Living Standards Survey, we have shown clearly that Kinh and Hoa ("majority") households have substantially higher living standards (as measured by per capita expenditure) than ethnic minority households. This gap is also reflected in lower school enrolment rates, higher fertility and poorer access to health services by minority households. However, ethnic minority households do not appear to be more malnourished than the population at large.

The sample size of the VLSS98 allows a crude breakdown of the 54 ethnic groups into five broad categories: the Kinh, Hoa, Khmer and two composite categories, the "Central Highland Minorities" and the "Northern Upland Minorities." Based on this categorization, we find that both the Kinh and Hoa experienced rapid growth in their per capita expenditures between 1993 and 1998, and are now markedly materially better off than before. The Khmer and Northern Upland Minorities also experienced reasonable growth in per capita expenditures during the 1990s and now have expenditures distributions that are clustered at or just below the poverty line. This indicates that as long as economic growth is distributed equitably in the future, rapid and significant reductions in poverty are likely to be experienced by these groups in the next five years or so. In contrast, the poorest people are members of the Central Highland Minorities, whose average level of expenditure per capita has remained stagnant since 1993.

For a finer disaggregation of the ethnic minorities, we turned to the 3% enumeration sample of the 1999 Census, where we can distinguish 12 separate ethnic groups with adequate sample sizes. The Census data do not include information on expenditures or incomes, but they do allow us to compute gross and net school enrolment rates and to examine patterns of intermarriage and religious observance. Although school enrolment rates are generally high in Vietnam, they are low for the Central Highland Minorities, and for some of the Northern Upland Minorities (especially the Hmong). These are also the ethnic groups that are least likely to intermarry and are the most likely to be religious. Since the high-intermarriage/non-religious groups (such as the Tay and Nung, and to a lesser extent the Thai) are also the groups where school enrolments are the highest, we hypothesize that these are the ethnic groups that have assimilated the most with the Kinh and Hoa majority.

Why are ethnic minority households so poor? They may lack endowments (physical and human capital) or they may have low returns on their endowments, perhaps because of discrimination, or for cultural or informational reasons. The low endowments and returns thereon are in turn partly due to the remoteness of many ethnic minority households. To tease out the relative importance of the main effects we estimate and decompose a set of expenditure equations. The results of these decompositions suggest that geographic and cultural remoteness is important. More importantly, our decomposition analysis shows that even if minority households had the same endowments as Kinh households, this would close no more than a third of the gap in living standards. This implies that, for some reason, minority households have a lower return to their endowments than the Kinh and Hoa majority.

There are thus at least two paths to prosperity for the ethnic minorities. One path is to assimilate, both economically and culturally, with the majority group, and in effect obtain the same return on endowments as the majority. This is the path that some ethnic groups, such as the Tay, Nung, and Muong appear to be following quite successfully. A second path, pursued by such groups as the Khmer and Thai (and possibly the Dao), is to integrate economically with the Kinh while retaining their own group's cultural identity. However, a third group of ethnic minorities, comprising almost all the minorities that are indigenous to the Central Highlands plus the Hmong do not appear to be benefiting from the rising living standards experienced by the majority. If this third group of ethnic minorities is not to be left further behind by the growth process, specific interventions need to be designed that are appropriate to their circumstances, needs and aspirations. The Government of Vietnam and other development agencies should recognize that that the interventions that work to reduce poverty among the Kinh and Hoa majority will not be effective for all other minority groups. Abstractly, the diversity of socioeconomic development experiences of the different ethnic groups calls for greater diversity in the anti-poverty and other policy interventions designed to assist them. Concretely, this will require far more input from ethnic minority households, and more decentralization in anti-poverty programs, than has occurred up to now.

	Full sample, no fixed effects					Full sample, fixed effects*				
	Kinh-Hoa Coeff-icient	p	Minority Coeff-icient	p	p, eq. Coeff.	Kinh-Hoa Coeff-icient	p	Minority Coeff-icient	p	p, eq. Coeff.
Dependent variable	Ln. of per capita expenditure									
Household Demographics										
Household size	-0.037	0.00	-0.079	0.00	0.00	-0.069	0.00	-0.075	0.00	0.48
Prop. hh members 7-16	0.475	0.00	0.609	0.00	0.31	0.454	0.00	0.487	0.00	0.38
Prop. hh members, male over 16	**0.958**	0.00	**0.497**	0.00	0.00	**0.589**	0.00	**0.362**	0.00	0.07
Prop. hh members, female over 16	0.864	0.00	0.558	0.00	0.06	0.582	0.00	0.349	0.01	0.35
Three generation household	-0.105	0.02	-0.182	0.15	0.55	-0.194	0.00	-0.303	0.00	0.18
Parents + 1 child	0.025	0.65	-0.108	0.38	0.28	-0.134	0.00	-0.182	0.05	0.24
Parents + 2 children	-0.031	0.76	-0.178	0.14	0.22	-0.186	0.00	-0.272	0.01	0.23
Parents + 3 children	-0.133	0.00	-0.225	0.09	0.49	-0.222	0.00	-0.341	0.00	0.10
Other household structure	-0.077	0.17	-0.303	0.03	0.09	-0.229	0.00	-0.301	0.01	0.35
Age of household head	**0.016**	0.00	**-0.001**	0.86	0.05	0.008	0.02	0.009	0.12	0.80
Age of head, squared (÷1000)	**0.185**	0.00	**0.001**	0.99	0.02	0.092	0.00	0.080	0.15	0.59
Gender of head (female=1)	**0.068**	0.00	**-0.066**	0.02	0.00	-0.021	0.14	-0.048	0.04	0.27
Household Education, Remittances										
Max. yrs. Ed. Of adults in hh	**-0.012**	0.12	**0.028**	0.07	0.03	0.015	0.02	0.025	0.01	0.10
Yrs of ed squared	**0.003**	0.00	**-0.000**	0.82	0.00	0.001	0.00	0.000	0.51	0.11
HH receives remittances (yes=1)	0.123	0.00	0.112	0.04	0.86	0.061	0.00	0.093	0.02	0.14
Household Land										
Irrigated land, ha.	**-0.211**	0.00	**0.392**	0.00	0.00	**0.126**	0.00	**0.254**	0.00	0.03
Other annual land, ha.	-0.295	0.00	-0.173	0.15	0.38	0.088	0.01	0.339	0.03	0.18
Perennial land, ha.	0.156	0.00	0.177	0.11	0.85	0.152	0.00	0.168	0.08	0.73
Forest land, ha.	-0.030	0.55	0.075	0.02	0.08	0.065	0.05	0.068	0.11	0.93
Other ag. Land, ha.	-0.419	0.04	-0.103	0.42	0.18	0.039	0.67	0.194	0.00	0.27
Irrigated land, squared	**0.057**	0.00	**-0.046**	0.14	0.01	-0.008	0.09	-0.029	0.17	0.18
Other annual land, squared	0.059	0.00	0.085	0.04	0.56	-0.006	0.36	-.077	0.22	0.39
Perennial land, squared	-0.006	0.03	0.011	0.65	0.47	-0.007	0.00	-0.005	0.77	0.55
Forest land, squared	**0.009**	0.11	**-0.008**	0.02	0.01	-0.002	0.56	-0.007	0.13	0.43
Other land, squared	0.182	0.04	0.021	0.41	0.08	0.003	0.94	-0.022	0.13	0.99
Constant	**6.794**	0.00	**7.146**	0.00	0.00	7.870	0.00	7.526	0.00	0.00
Statistics										
R squared	0.32		0.44			0.63		0.64		
No. of observations	5,294		698			5,294		698		

Notes: Pairs of coefficients highlighted in bold face are statistically different at the 5% level.
    p, eq. coeff tests for the equality of coefficients across the two equations.
    * Coefficients on commune fixed effects are not shown here.
Source: Based on VLSS98.

	Mixed commune sample, no fixed effects					Mixed commune sample, fixed effects*				
	Kinh-Hoa		Minority			Kinh-Hoa		Minority		
	Coeff-icient	p	Coeff-icient	p	p, eq. Coeff.	Coeff-icient	p	Coeff-icient	p	p, eq. Coeff.
Dependent variable	Ln. of per capita expenditure									
Household Demographics										
Household size	-0.034	0.11	-0.083	0.00	0.06	-0.065	0.00	-0.084	0.00	0.23
Prop. hh members 7-16	0.480	0.00	0.709	0.00	0.16	0.481	0.00	0.526	0.00	0.28
Prop. hh members, male over 16	0.882	0.00	0.510	0.00	0.11	0.562	0.00	0.405	0.00	0.48
Prop. hh members, female over 16	0.939	0.00	0.502	0.00	0.06	0.602	0.00	0.299	0.05	0.41
Three generation household	-0.138	0.22	-0.268	0.02	0.37	-0.207	0.01	-0.314	0.00	0.37
Parents + 1 child	0.045	0.57	-0.200	0.12	0.11	-0.146	0.04	-0.215	0.06	0.33
Parents + 2 children	-0.053	0.50	-0.256	0.03	0.15	-0.196	0.02	-0.290	0.01	0.39
Parents + 3 children	-0.126	0.22	-0.355	0.00	0.07	-0.238	0.01	-0.382	0.00	0.18
Other household structure	**0.047**	0.75	**-0.323**	0.03	0.03	-0.176	0.03	-0.318	0.01	0.24
Age of household head	0.023	0.01	0.005	0.53	0.09	0.014	0.09	0.011	0.06	0.44
Age of head, squared (÷1000)	0.237	0.01	-0.023	0.77	0.06	-0.138	0.09	-0.090	0.11	0.40
Gender of head (female=1)	0.019	0.68	-0.075	0.01	0.11	-0.02	0.48	-0.041	0.07	0.47
Household Education, Remittances										
Max. yrs. Ed. Of adults in hh	0.004	0.83	0.024	0.12	0.43	0.039	0.01	0.024	0.08	0.94
Yrs of ed squared	0.002	0.03	0.000	0.83	0.14	-0.068	0.92	0.000	0.73	0.83
HH receives remittances (yes=1)	0.171	0.00	0.075	0.13	0.23	0.089..	0.02	0.078	0.06	0.74
Household Land										
Irrigated land, ha.	**-0.060**	0.47	**0.369**	0.00	0.00	**0.122**	0.04	**0.298**	0.00	0.00
Other annual land, ha.	-0.236	0.02	-0.169	0.14	0.61	**0.035**	0.51	**0.446**	0.00	0.02
Perennial land, ha.	0.145	0.03	0.176	0.18	0.82	0.144	0.06	0.302	0.01	0.71
Forest land, ha.	-0.041	0.44	0.037	0.12	0.23	-0.001	0.98	0.035	0.37	0.44
Other ag. Land, ha.	-0.009	0.98	0.048	0.30	0.83	0.142	0.47	0.169	0.01	0.65
Irrigated land, squared	0.024	0.09	-0.042	0.18	0.06	**-0.012**	0.28	**-0.040**	0.05	0.05
Other annual land, squared	0.042	0.02	0.082	0.03	0.31	0.003	0.72	-0.105	0.12	0.11
Perennial land, squared	-0.007	0.18	-0.049	0.41	0.47	-0.009	0.08	-0.146	0.02	0.12
Forest land, squared	**0.012**	0.04	**-0.005**	0.07	0.02	0.006	0.10	-0.004	0.37	0.09
Other land, squared	-0.066	0.73	-0.021	0.13	0.81	-0.005	0.97	-0.030	0.01	0.42
Constant	**6.502**	0.00	**7.211**	0.00	0.00	**6.501**	0.00	**7.575**	0.00	0.00
Statistics										
R squared	0.31		0.41			0.63		0.62		
No. of observations	993		510			993		510		

Notes: Pairs of coefficients highlighted in bold face are statistically different at the 5% level.
p, eq. coeff tests for the equality of coefficients across the two equations.
* Coefficients on commune fixed effects are not shown here.
Source: Based on VLSS98.

The models of expenditure presented in Appendices 1 and 2 are essentially linear, include a large number of variables, and do not take account of possible interactions among variables. Could one build a more parsimonious model? To answer this, we turned to the multiple adaptive regression spline (MARS) methodology (Friedman, 1991).

Given a set of variables that are specified by the researcher, MARS mines the data for non-linearities and interactions. More specifically, it creates a piecewise linear function for each continuous independent variable, starting with too many change points (knots) and then pruning the number of knots using a backward procedure. For categorical variables, MARS arranges the categories for the best fit possible. It then looks for suitable interactions between independent variables. The result is a set of *basis functions*, which are transformations of independent variables taking into account non-linearities and interactions. MARS then estimates a least-squares model using the base functions as independent variables. Because the models are so non-linear, the results are typically presented with the aid of graphs.

For this study the dependent variable is the log of real per capita expenditure; separate MARS models were estimated for the Kinh-Hoa majority, and for minority households. For the Kinh-Hoa majority, the basis functions were determined to be the following:

```
BF1  = max(0, IRRLAND - 131.000);         BF11 = max(0, NIRRLAND - 120.000);
BF2  = max(0, 131.000 - IRRLAND );        BF12 = max(0, 120.000 - NIRRLAND );
BF3  = max(0, WORKED98 - 6.000) * BF2;    BF13 = max(0, HEADAGE - 43.000);
BF4  = max(0, 6.000 - WORKED98 ) * BF2;   BF14 = max(0, 43.000 - HEADAGE );
BF5  = max(0, HHSIZE - 6.000);            BF15 = max(0, WORKED98 + .258859E-06)*BF12;
BF6  = max(0, 6.000 - HHSIZE );           BF16 = ( REMIT = 0) * BF12;
BF7  = max(0, NIRRLAND - 400.000) * BF2;  BF18 = max(0, PELAND + .186998E-04) * BF1;
BF8  = max(0, 400.000 - NIRRLAND ) * BF2; BF19 = max(0, PELAND - 300.000) * BF2;
BF9  = max(0, PAGE17M - 0.250) * BF5;     BF20 = max(0, 300.000 - PELAND ) * BF2;
BF10 = max(0, 0.250 - PAGE17M ) * BF5;
```

```
Definitions of Variables
        IRRLAND.  Area of irrigated land, in m².
        WORKED98. Years of education achieved by head of household.
        HHSIZE.   Number of household members.
        NIRRLAND. Area of non-irrigated annual land, in m².
        PAGE17M.  Proportion of household consisting of males 17 and older.
        HEADAGE.  Age of head of household.
        REMIT.    Value of remittances received by household.
        PELAND.   Area of land planted in tree crops.
```

The final model for Kinh-Hoa was:

```
Y =   7.471 + .139911E-04 * BF1 - 0.001 * BF2 + .282305E-03 * BF3 - .198950E-03 * BF4 -
      0.045 * BF5 + 0.120 * BF6 + .389904E-07 * BF7 + .633461E-05 * BF8 + 0.175 * BF9 -
      0.690 * BF10 + .438774E-05 * BF11 - .435589E-03 * BF12 - 0.004 * BF13 - 0.017 *
      BF14 + .219940E-03 * BF15 - .761529E-03 * BF16 + .212414E-08 * BF18 + .607371E-07
      * BF19 + .388523E-05 * BF20;
```

This OLS model had an adjusted R^2 of 0.43, or much better than the R^2 of 0.31 that we found for the model in Appendix 1. The MARS model achieves this with just eight variables (see table above), and so helps one to focus just on the essential elements.

Three insights emerge, which can best be explained with the help of the graphs in Figure A1. First, as the age of the household head rises to 43, households become better off; after that, older heads are associated with poorer households (panel 1 in Figure A1). Second, more annual land (irrigated and unirrigated) is associated with higher per capita income. Only for households with no land does the educational level of the household head have an important effect on income, suggesting that more education (and perhaps a move to an urban area) might be a substitute for more land (panels 2 and 3 in Figure A1). This raises the intriguing possibility that as population pressure leads to greater scarcity of land, there will be a stronger incentive to acquire more education, which in due course will increase the opportunities that emerge in an increasingly urban and non-agricultural society. Third, as household size rises, households are poorer (as

measured by per capita expenditure); however for larger households, this effect is moderated if there is a high proportion of adult males (panel 4 in Figure A1).
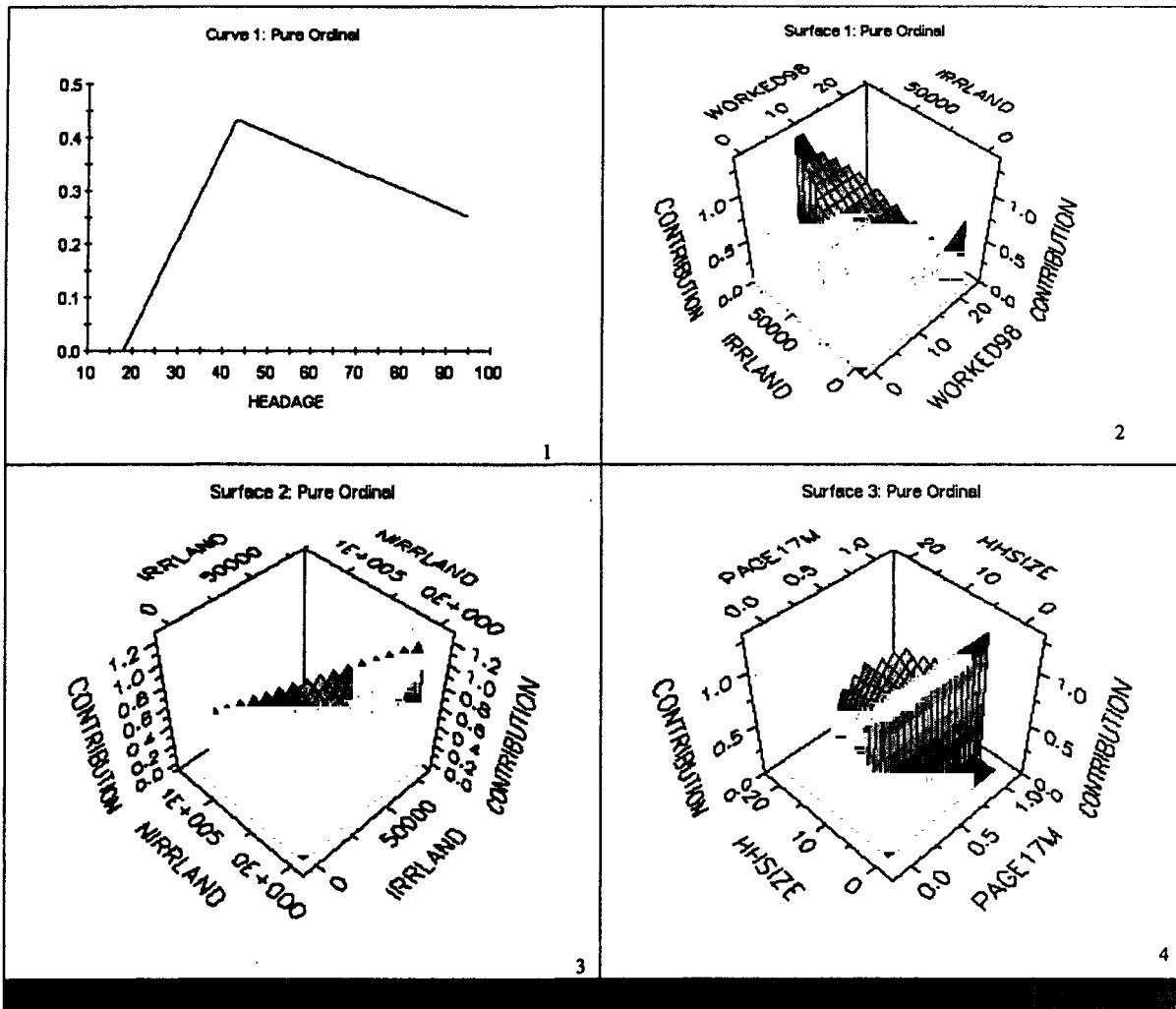

The MARS model for minority households looks quite different, although many of the same variables come into play. The basis functions, and subsequent model, are as follows:

BF1 = max(0, HHSIZE - 8.000);	BF11 = max(0, 48.000 - HEADAGE) * BF3;
BF2 = max(0, 8.000 - HHSIZE);	BF13 = max(0, 11080.000 - FLAND) * BF6;
BF3 = max(0, WORKED98 - 5.000);	BF14 = max(0, PAGE0716 + .120596E-07)* BF6;
BF4 = max(0, 5.000 - WORKED98);	BF15 = max(0, OTHELAND - 6500.000) * BF4;
BF6 = max(0, 18000.000 - IRRLAND);	BF16 = max(0, 6500.000 - OTHELAND) * BF4;
BF7 = max(0, PELAND + .252347E-04) * BF6;	BF18 = max(0, 360.000 - OTHELAND) * BF2;
BF8 = max(0, HHSIZE - 3.000) * BF6;	BF19 = max(0, NIRRLAND - 3994.000);
BF9 = max(0, 3.000 - HHSIZE) * BF6;	BF20 = max(0, 3994.000 - NIRRLAND);

Definitions of Variables
```
        HHSIZE.   Number of household members.
        WORKED98. Years of education achieved by head of household.
        IRRLAND.  Area of irrigated land, in m².
        PELAND.   Area of land planted in tree crops.
        HEADAGE.  Age of head of household.
        FLAND.    Area of forest land operated by household.
        PAGE0716. Proportion of household aged 7 to 16.
        OTHELAND. Area of land in other uses.(i.e. not annual, perennial, or forest).
        NIRRLAND. Area of non-irrigated annual land, in m².
```

```
Y =    7.349 - 0.061 * BF1 + 0.193 * BF2 + 0.046 * BF3 - 0.137 * BF4 - .486490E-04 * BF6
     + .120914E-08 * BF7 + .344804E-05 * BF8 + .101408E-04 * BF9 - 0.002 * BF11 -
     .723555E-09 * BF13 + .171787E-04 * BF14 + .252554E-05 * BF15 + .163910E-04 * BF16
     - .987590E-04 * BF18 + .194643E-04 * BF19 + .305935E-04 * BF20;
```

In this case the fit of the MARS model (R^2=0.46) is close to that of the conventional model (R^2=0.44), but the MARS model is more parsimonious. Not surprisingly, the more land households have under irrigation or perennial crops, the better off they are (panel 1 in Figure A2); irrigated land has a particularly large effect on per capita consumption levels. However the ability to use irrigated land profitably requires complementary labor inputs, particularly from the household, as panel 2 in Figure A2 shows.
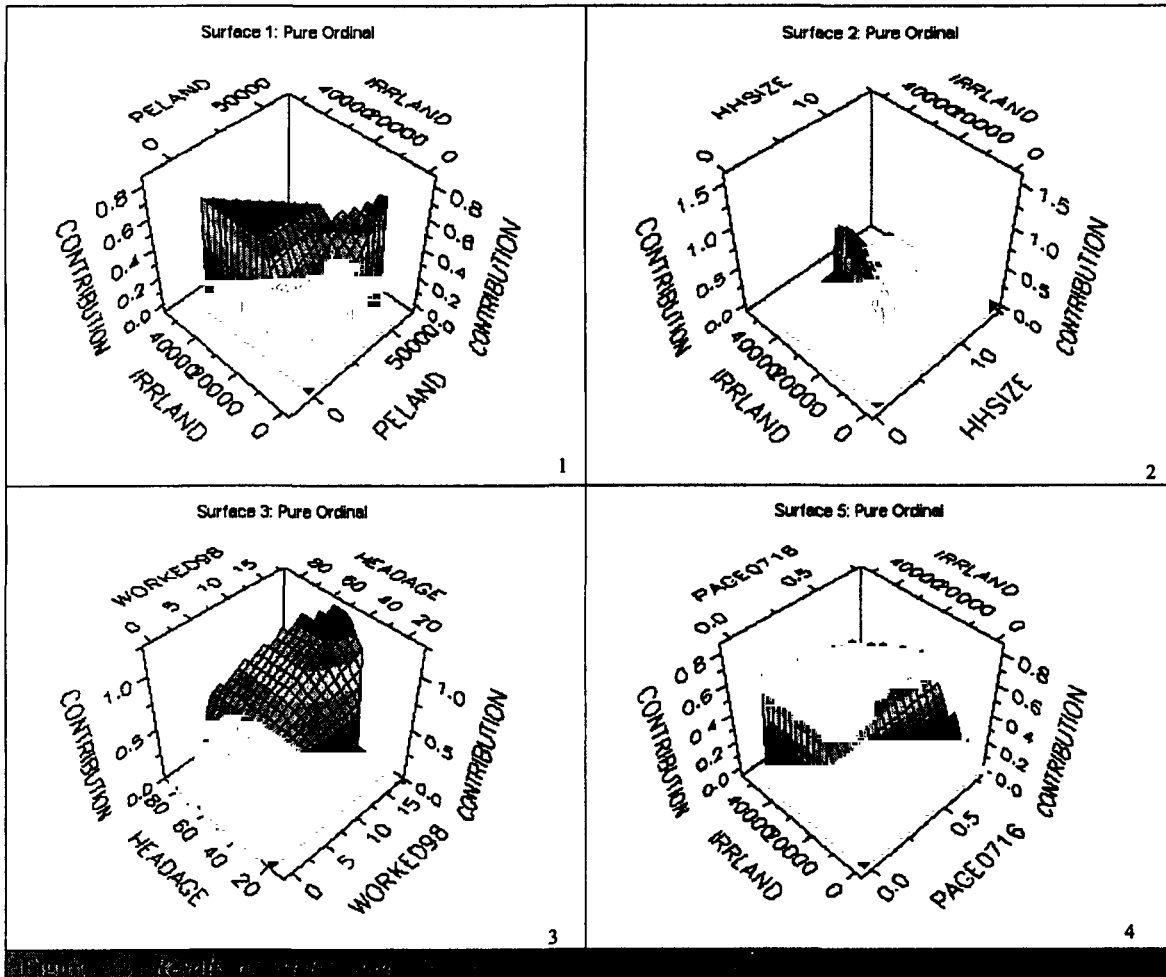
The third panel in Figure A2 shows classic age and educational effects. Reading along the age axis one sees that income rises quickly, reaching a plateau once the head of the household is 48 years old. The effect is particularly pronounced for households with highly-educated heads. Looking along the education axis we see that more education is associated with higher living standards. Finally, the presence of a high proportion of adolescents in the household appears to be associated with a slightly lower return on irrigated land (panel 4 in Figure A2).

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