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Do Markets Worsen Economic Inequalities? Kuznets in the Bush

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Integration into a market economy or economic development can erode the quality of life of indigenous people by, for example, increasing income inequalities. The Kuznets hypothesis predicts that the link between income inequality and income (a proxy for economic development) resembles an inverted U. We test the hypothesis using a survey of 511 households from 59 villages of Tsimane' Amerindians, a horticultural-foraging society in the tropical rain forest of Bolivia. We measure village inequalities of three economic outcomes: income, imputed annual value of rice production, and wealth. We used three indices of inequality: the coefficient of variation, the standard deviation of the logarithm, and the Gini coefficient. Explanatory variables include either income and income squared, wealth and wealth squared, or imputed annual rice production and production squared. We used village-to-town distance as a control. We find little evidence that integration to the market increases

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inequalities of economic outcomes, with two exceptions: Wealth bore the predicted inverted U-shaped relation with wealth inequalities, and imputed rice production bore a U-shaped relation to inequality, but only when (a) using adult equivalents to express household size and (b) the Gini coefficient and the coefficient of variation to measure inequality; in no case were results robust to different econometric specifications. We advance several explanations for why economic development might not accentuate economic inequalities among relatively autarkic rural economies.

KEY WORDS: economic inequality; Kuznets; Tsimane'; Bolivia; markets; globalization.

INTRODUCTION

Economic inequalities matter for at least two reasons. First, economic inequalities touch on people's ethical beliefs about fairness that probably have evolutionary roots in our foraging past (Bowles and Gintis, 1999; Henrich *et al.*, 2002; Ray, 1998). For ethical reasons, people dislike sharp inequalities in income, wealth, or in access to resources and public services. Second, economic inequalities may harm outcomes such as health, longevity, school attainment, and rates of economic growth. For example, in nations with a Gross Domestic Product below ~$2,000/person/year (in 1985), income inequality correlates with lower rates of economic growth (Barro, 2000). People living in regions with greater income inequality may experience worse health than people living in regions with a better distribution of income (Wilkinson, 1996).

If economic inequalities produce undesirable outcomes, one should try to understand why they arise. At least two approaches have emerged in studies about the origins of economic inequalities. One approach consists of searching for empirical regularities of the determinants of economic inequalities across communities or nations without using a theory. Williamson's quantitative historical study of the development of economic inequalities in Europe illustrates the approach. He uses regression analysis to explore historical information and finds that education, technology, migration, and population size affected income inequality (Williamson, 1998). He does draw on a theory of economic inequality to guide the empirical analysis; but the emphasis, instead, lies in identifying empirical regularities from a multivariate analysis of the information.

A second approach draws on theory to guide empirical analysis. Examples of the second approach come from anthropology (including human ecology and archaeology) and from economics. Cultural anthropologists have emphasized the effects of cultural social norms in homogenizing economic outcomes. With strong norms that emphasize sharing and interdependence,

one expects inequality to be generally small, and only with a breakdown of the norms might one find people tolerating inequality (Gurven *et al.*, 2002). Archaeologists and human ecologists have shown how changes in social norms reflect demographic growth, agricultural intensification, circumscription, and warfare (Upham, 1990). Anthropologists have found regularities in the rise of inequalities as societies developed in complexity from bands, to chiefdoms, to states (Johnson and Earle, 2000). In economics, as we shall see shortly, much of the theoretical work has focused in understanding how growth in income produced by structural transformations in an economy affects the distribution of income in a society.

The theoretical approach of anthropologists and economists in studies of inequality share similarities, display differences, and have potential for synergies. Economists and anthropologists both emphasize structural transformations in an economy and polity as the underlying cause for the rise of economic inequalities. Anthropologists have emphasized variables such as population growth, circumscription, and warfare in the rise of inequalities, whereas economists have emphasized the modernization of agriculture and rural-to-urban migration produced by the modernization of agriculture as the catalyst for income inequality (Ray, 1998). Anthropologists have examined the rise of inequality over a long evolutionary stretch, from simple bands to complex industrial societies, whereas economists have focused chiefly on the rise of inequality as agrarian societies industrialize, typically since the 1800s. In methods the two disciplines also differ. In anthropology, the analysis has often rested on case studies and descriptive findings; in economics, the analysis has rested on multivariate techniques applied to cross-sectional and to longitudinal information. One area of potential synergy between anthropology and economics in the study of economic inequality lies in applying economic theory to the study of economic inequality of contemporary small-scale, relatively autarkic or economically self-sufficient rural societies as they gain a stronger foothold in the market economy.

In this article we draw on the Kuznets hypothesis of economic inequality—the idea that the link between (a) income inequality and (b) income resembles an inverted U curve—and test it with multivariate analyses using information from Tsimane' Amerindians, a horticultural-foraging society in the Bolivian rain forest. We examine the link between the average personal level of income, consumption, or wealth in a village and the amount of village inequality in income, consumption, or wealth.

We use the Kuznets hypothesis of income inequality for two reasons. First, since it was first formulated nearly a half-century ago, the Kuznets hypothesis has been used by economists to explain patterns of inequalities across and within nations. The hypothesis has held up even with the advent of better information and stricter statistical tests, though, as we shall see,

there is recent discontent with its limitations. To our knowledge the Kuznets hypothesis has never been tested in relatively autarkic rural economies using micro-level or village information of the type we are about to present.

Second, the Kuznets hypothesis allows one to address in a parsimonious way an old and venerable debate in cultural anthropology: the extent to which integration into a market economy erodes the welfare of indigenous people (Godoy, 2001). The key explanatory variable of the Kuznets hypothesis is the average level of cash income in a community or nation. In estimating the effect of this variable on inequality one can say something both about the Kuznets hypothesis itself and also about how integration into a market economy affects economic inequality.

The question of whether and how integration into a market economy, trade opening, or globalization affects quality of life among relatively autarkic rural populations has taken the center stage among scholars, the public, and policy-makers (García-Aguilar, 1999; Krugman and Venables, 1999; Meyer, 1999; Rodrik, 1998; Smith and Ward, 2000; Williamson, 1994). Cultural anthropology has a long record of documenting the harmful effects of market economies on the poor, disenfranchised, and on indigenous people (Hymes, 1972; Ortner, 1984), but it has produced sparse quantitative information and no rigorous empirical tests of whether market economies, in fact, increase economic inequalities (D'Andrade, 2001). We recognize that integration into a market economy might not affect inequality but still erode quality of life if it lowers the average level of social or economic indicators of quality of life, such as income or life expectancy.

UNIQUENESS OF INFORMATION AND APPROACH

The information and approach we use are unique in several ways. First, we draw on a recent (2000) socioeconomic and demographic survey of 511 households in 59 Tsimane' villages. The information allows us to test whether the Kuznets curve is apparent over low levels of income. Elsewhere we show that the link between household deforestation and household income in five different lowland tropical rain forest Amerindian populations ($n = 751$) resembles an inverted U curve or so-called "Kuznets curve of environmental degradation," so we have reason to believe that differences in income levels across Tsimane' villages, though low by absolute international standards, might also produce visible effects on economic inequality (Godoy, 2001). If income produces a Kuznets curve of environmental degradation at low levels of income, it could also produce a Kuznets curve of inequality if village economies have started to experience structural transformations.

Second, we ensure robustness of empirical results by using both multiple measures of economic inequality and by using multiple economic outcomes to measure inequality, including cash income, imputed annual value of farm production, and wealth. We use multiple measures of economic inequality because each measure tells a slightly different story and emphasizes a different part of the income distribution curve. We measure inequality in different economic outcomes because it is unclear how one measures income in a relatively autarkic economy; in simple, small-scale economies, monetary income, wealth, and consumption often overlap so it is best to take a broad approach to their measurement and measure all three to ensure consistency in results (Deaton, 1997; Morduch, 1995).

THE KUZNETS HYPOTHESIS OF INCOME INEQUALITY

In the mid-1950s economist Simon Kuznets first proposed the idea that economic development (or growth in income) at first increased but then decreased income inequality in a society (Kuznets, 1955), producing a parabolic or inverted U curve of inequality as a function of the level of income in a society. What follows is our interpretation of the Kuznets hypothesis.

Initially, at low levels of income and during the early stage of economic growth, income inequalities are small because most people are poor and work chiefly in only one sector — subsistence agriculture — where wages do not differ greatly among people. As the agricultural transformation unfolds, income inequalities widen because some people leave farming to find work in higher-paying urban jobs in manufacturing or in services. As the agricultural transformation unfolds, income inequalities widen because the economy consists of people employed in two separate sectors — agriculture and manufacturing — with different wages and with different levels of skill requirements (Ray, 1998). People with skills employed in urban, industrial, or service jobs earn more than people without skills still employed in farming. In the more advanced stages of economic development, once most people move out of the countryside into cities and find jobs in manufacturing and in services, income inequality declines because agriculture shrinks as a source of employment and because the economy becomes dominated by employment in manufacturing and in services. Income inequality also falls in advanced industrial societies because governments implement public policies, such as welfare programs, to help those at the bottom of the income distribution.

At the core of the Kuznets hypothesis lies the idea that the changing structure of an economy — changes in the relative importance of different sectors in an economy and the disequilibrium produced by the changes — shapes inequality. Because average personal income and real wages rise with

the structural transformation as an economy moves from an agrarian to an industrial or service base, one can justifiably explore whether income is a chief proximate explanatory variable of inequality, even though the changing structure of the economy, rather than income *per se*, lies at the core of the Kuznets hypothesis.

EMPIRICAL EVIDENCE FOR THE KUZNETS HYPOTHESIS

As Fields, Deninger, and Squire note, tests of the Kuznets hypothesis have gone through two stages (Deninger and Squire, 1998; Fields, 2001). Until the late 1980s, researchers relied on cross-sectional information because that was all the information that was available to them. After the 1980s researchers starting drawing on longitudinal or panel information and more sophisticated econometric techniques. Ray and Fields recently reviewed the literature on the links between economic growth and income inequality (Fields, 2001; Ray, 1998). They reviewed international studies that draw on either cross-sectional or on longitudinal information and arrive at roughly similar conclusions, which we summarize next.

First, Ray and Fields note that in cross-sectional studies income explains less than 50% of the total variation of income inequality. They point to the possible role of other factors besides income, such as geographical location, that also effect inequality irrespective of a society's average level of income. When researchers control for these other factors, the effect of income on inequality declines and becomes statistically insignificant (Deninger and Squire, 1998; Fields, 2001). For example, Braun studied 3,136 counties in the United States and found that the Kuznets curve disappeared after controlling for population size, ethnic composition, education, and employment (Braun, 1991). These results confirm the point made earlier — that income matters for inequality, but only if it correlates with structural changes in the economy.

Second, researchers find that the Kuznets hypothesis is not supported when they use multivariate regressions on panel information (Deninger and Squire, 1998). In some European nations, the Kuznets curve appeared only when measured over several centuries (Ray, 1998) and even then results were sensitive to the influence of outliers. Fields finds that fixed-effect models show a decline in income inequality over the twentieth century (Fields, 2001). He even finds evidence that for many countries the link between inequality and income resembled a U curve rather than the inverted U curve predicted by Kuznets.

But other recent studies using panel information suggest that the Kuznets curve still explains regularities in the distribution of income. List and

Gallet use a panel of 71 nations (1961–1992) and find evidence of a Kuznets curve, but a rise again in income inequality among richer nations (List and Gallet, 1999). Barro uses information from a panel (1960, 1970, 1980, 1990) of ~50 nations and controls for the unit of observation (household versus individual), level of schooling, geographical region, and type of political and trade regime. He uses both random and fixed-effect estimations and finds that the Kuznets curve "emerges as a clear empirical regularity" (Barro, 2000). Like Fields and Ray, Barro finds that the Kuznets curve explains a low share of inequality in nations.

In sum, studies of income inequality and economic development suggest variability in the way income affects income inequality. Studies spanning many decades continue to support the Kuznets hypothesis although recent studies with better information and with more sophisticated statistical tools suggest that the Kuznets hypothesis might not have as much applicability as previously thought. More recent studies of the link between income and income inequality point to the need for longitudinal information and for a multivariate approach.

INEQUALITY IN TSIMANE' SOCIETY

In recent publications we have provided historical and ethnographic description of the Tsimane', documented their economic self sufficiency, and analyzed their form of subsistence and modes of incorporation into the market economy (Godoy, 2001; Reyes-García, 2001; Reyes-García *et al.*, 2003; Vadez *et al.*, 2003). Since we have described relevant aspects of the setting and the people in previous publications, here we stress the seasonality of their economic activities and inequalities of Tsimane' society since the topics have received less attention.

The Tsimane' are a horticultural and foraging society in the rain forests at the eastern foothills of the Bolivian Andes in the department of Beni. They provide an ideal case to examine the influence of market economies on economic inequalities because their villages lie at different distances from market towns, from remote villages that take many days to reach by canoe to communities that lie only a couple of hours walk from market towns.

Tsimane' labor requirements, income opportunities, and resource availability vary over the seasons. In the Bolivian Amazon, there is a distinct hot and wet growing season (November–May) when mobility is limited before the rice harvest. This season also corresponds to a period with marked drops in income from wage labor, particularly for men who account for a large share of total household income.

The cooler dry season (June–October) is marked by high labor requirements for field preparation both within the household and in neighboring communities of smallholders that hire rural laborers. Wage labor opportunities in agricultural or cattle ranching during this time accounts for the bulk of wage labor activity. In communities farther upriver, where ranching and farming are not as prevalent, wage work in the thatch palm trade is most important. The work is done during the dry season and the initial part of the wet season (August–February).

Findings from the panel study show a high degree of seasonal variability especially in cash income for the more integrated community. The highest degree is among men who account for a disproportionate amount of total household income.

The rice harvest takes place between November and April and signals a period of higher availability of food resources. Hunting and fishing follow seasonal patterns—fishing during the dry season (August–October) and hunting during the cool transition from wet to dry seasons (May–July). Nontimber forest products have a seasonal demand as well. In the weeks leading up to the festival of San Borja (October 10–12), demand for items such as woven palm leaf mats (*esteras)* used in stalls and beaded jewelry for parade costumes reaches an annual high, and many Tsimane' opt to concentrate on the production and sale of these items.

The Tsimane' economy is relatively self-sufficient. In over five quarters of observations in two villages, only 2.19% of goods entering households came as purchases from the market, 10.18% came as gifts or as transfers from relatives and friends, and 87.63% came from the subject's own effort at finding and transporting goods from the fields, rivers, and forests to the home. Put in terms of monetary values, goods bought in the market accounted for only 2.68% of the total value of household consumption, transfers accounted for 6.88%, and goods brought by the subject's own efforts accounted for most (89.36%) of consumption.

Most of the goods consumed by the Tsimane' came from farm plots (42.50%), open courtyards and gardens in the immediate vicinity of the home and village (29.68%), river, brooks, and ponds (18.07%), and forests (2.99%). Only 2.47% of the goods consumed by households came from outside the village and its surrounding lands, whether from another village or from towns.

When measured through quarterly cash earnings rather than through consumption, the Tsimane' economy is less economically self-sufficient. When asked about all sources of cash they had earned during the 30 days before the day of the interview, only 26.75% of the people over the age of 13 reported earning no cash. Although 73.25% of the subjects earned cash, subjects worked on average only 3 days each month in activities to earn cash.

Nevertheless, the Tsimane' economy is linked to the regional economy in many ways. Tsimane' have been in contact with outsiders since colonial times, but they have come into more frequent and prolonged contact with outsiders only since the 1970s, when loggers, ranchers, highland colonists, and traders started to enter the area in large numbers and the government started to build roads crossing the Tsimane' territory (Ellis, 1996; Chicchón, 1992; Godoy, 2001; Reyes-García, 2001). Tsimane' need cash to buy clothing, metal tools, salt, and cooking utensils; those living in villages with schools need cash to pay for school supplies. To earn cash or to get goods from the outside world, Tsimane' sell or swap thatch palm with traders who come to the territory. Traders offer Tsimane' cash, alcohol, sugar, and clothing in exchange for future deliveries of thatch palm. The Tsimane' also earn cash by selling rice in nearby towns, by selling timber to logging firms operating in the territory, and by working as unskilled laborers for cattle ranchers, logging firms, and for highland colonist farmers who have moved into or next to the territory. Most Tsimane' make a living from agriculture or from foraging, but some work as schoolteachers or as employees of development organizations. In general, though, the Tsimane' economy has not yet experienced the structural transformations associated with the take-off stage of economic development. Personal annual income from consumption and from the sale of goods reaches only US $342, a third of the mean annual income per person in Bolivia (US $1,010)(World Bank, 2001), one of the poorest nations of Latin America.

At first inspection the Tsimane' appear as a relatively egalitarian society. Like other lowland Amerindian groups, the Tsimane' have a preferential system of cross-cousin marriage, which creates a thick and wide web of relatives linked by descent and marriage. Households visit each other often within and across villages to see relatives or to exchange goods and information (Ellis, 1996; Gurven, 2002). The 2000 survey shows that only 10% of the sample of adults lived in the same village where they had been born. Constant visiting and migration between villages homogenizes many outcomes, including traditional forms of knowledge. In a recent study we found much cultural consensus on ethnobotanical knowledge across and within Tsimane' villages (Reyes-Garcia *et al.*, 2003).

Like other lowland Amerindian populations, the Tsimane' routinely share home-brewed beer (*chicha*). Anyone can walk into a household serving *chicha* and expect to be served. Cooking is often done in open courtyards and eating is communal in the smaller villages. Successful hunters share game with others. In a longitudinal study of two villages we found that about 10% of all goods entering households from morning until dusk on days chosen at random came as gifts from friends or from relatives; those goods accounted for 6.70% of the total value of household consumption. In the survey of 2000,

we found that about a quarter of all fishing events were done communally, with nets or poison, with all members of the fishing expedition partaking of the harvest (Pérez, 2001). Communal work prevails in the construction and maintenance of schools, the clearing of soccer fields and public places, and in village festivities. In a panel study done during 2001–2002 in 37 villages we found that for the week before the interview only 7.7% of households had not made any gifts of food, 39.2% of households had not done any communal work or offered any labor help, and only 4.45% had not made either any gifts or offered any help.

But offsetting manifestations of sharing and generosity one finds evidence of accumulation and economic inequalities. The presence or lure of public schools, territorial circumscription from the encroachment of loggers, ranchers, and small farmers moving into the territory, and the debt peonage into which some Tsimane' have fallen with outside traders — all create incentives to move less and to accumulate more. With a more sedentary lifestyle the possibilities for the accumulation of wealth rise. Even without the presence of markets, one finds a strong ethos of economic independence among households, reflecting the fact that most of the diet comes from farm and forest goods produced by each household and not from goods produced communally. Young men who have entered the wage labor market often buy prestige commercial items, such as watches and bicycles. Tsimane' in some of the more accessible villages build walls to enclose their huts and even put fences around their courtyards. Some Tsimane' have also started to put locks on their doors when they leave the village to guard their possessions. Even with food one finds evidence of lack of sharing. Though people eat communally in smaller villages, they do not go out of their way to invite others to share in their meals. Ellis notes that Tsimane' often turn their backs to others when they eat (Ellis, 1996) and people in the more modern villages often complain that neighbors do not share meat. In a five-quarter panel study of two villages we found that only 5% of the sample said they had received help from kin or neighbors to cope with misfortunes such as illness or crop loss.

Table I summarizes the mean, standard deviation, and the minimum and the maximum values for Gini coefficients of income, wealth, and the imputed annual value of rice production estimated at the village level, and expressed both in adult equivalents and per person. Adult equivalents refers to the notion that people differ in their energy requirements as a function of their sex and gender, so a child might represent a fraction of an adult in energy requirements. We calculated the energy requirements using the most recent WHO protocol (James and Schofield, 1990) (FAO *et al.*, 1985). The WHO method determines energy need based on body size and on typical activity levels. This has become the preferred approach for determining food

Table I. Summary Statistics of Gini Coefficients for Economic Outcomes in Tsimane' Villages, Bolivia, 2000 ($n = 59$)

Type of Gini coefficient	Mean	Standard deviation	Minimum	Maximum	Maximum value as % of mean
Panel A: Expressed per person					
Income	0.539	0.127	0.322	0.841	0.561
Wealth	0.281	0.097	0.114	0.508	0.804
Annual value rice production	0.471	0.137	0.241	0.838	0.779
Panel B: Expressed per adult equivalent					
Income	0.535	0.127	0.311	0.834	0.558
Wealth	0.270	0.097	0.105	0.487	0.805
Annual value rice production	0.462	0.140	0.234	0.830	0.796

Note. Income is the value of sale of goods plus the value of items obtained in barter during the 2 weeks before the interview. Wealth is the value of 16 physical assets owned by the household. Annual value of rice production is the quantity of rice harvested during the year before the interview multiplied by the village price. Sample size for rice production is 58 because one village did not produce rice.

and energy requirements since we now know that dietary recalls do not accurately reflect variation in food and energy requirements.

The information in Table I suggests that for any Gini coefficient, the dispersion around the mean is relatively narrow, as shown by the low standard deviations, buttressing the points made earlier that Tsimane' society is relatively egalitarian. On average, villages resemble each other in economic inequality. But the information in Table I also suggests the presence of positive outliers. The maximum values for Gini coefficients were 55–80% higher than the mean values, suggesting that some Tsimane' villages contain much larger economic inequalities than the rest.

We next tried to identify the attributes of villages with the worst distribution of wealth, and for this we selected the villages at the top 90% of the Gini distribution, using the survey of 2000. We found that two attributes separate the villages with the worst distribution of wealth from the rest: conflict with other villagers within the same village, and distance to the nearest old-growth forest. The villages with the worst distribution of wealth reported an average of 1.33 conflicts with other villagers in the same community, whereas other villages reported an average of only 0.28 conflicts. People in villages with the worst distribution of wealth had to walk, on average, 35 min to reach the closest old-growth forest, as opposed to an average of only seven min for other villages. One should not conclude that resource scarcity drives conflict and economic inequality. We also measured conflict with other actors (e.g., loggers, ranchers) and other indicators of resource scarcity, such as perceived abundance of edible animals, and did not find any significant correlation between those variables and economic inequality in the village.

To capture inequalities across (not just within) Tsimane' villages we reestimated some of the Gini coefficients of Table I for the entire sample of 511 households and found that the Gini coefficients for the entire sample were higher than the Gini coefficients for villages. For example, we found that the Gini coefficient for wealth was 0.355 and that the Gini coefficients for the imputed value of annual rice production was 0.555 (rice) (all expressed per adult equivalents).

Since we had quarterly panel information on income and wealth for about 130 adults in two villages that we followed over five quarters, we compared the results from the cross-sectional study of 59 villages with more reliable information on individual cash income and wealth from the panel. In Table II we present information on Gini coefficients for people and households in the village of Yaranda (remote, more traditional) and in the village of San Antonio (more accessible and modern). The information from the panel is more reliable because it comes from individuals followed over time by researchers who lived and worked in the villages, whereas the information in Table I comes from a one-time cross-sectional survey.

Table II. Gini Coefficients for Cash Income and Wealth in Two Tsimane' Villages With Different Proximity to Market Estimated at the Individual and Household Level: Five Quarters (1999–2000)

	Quarters					
	First	Second	Third	Fourth	Fifth	Total
Individual income and wealth						
Panel A: Pooled results						
Cash income	0.750 (130)	0.742 (141)	0.749 (139)	0.799 (130)	0.747 (147)	0.684 (687)
Wealth	0.581 (134)	0.536 (140)	0.513 (141)	0.553 (133)	0.527 (145)	0.545 (613)
Panel B: Remote village (Yaranda)						
Cash income	0.804 (66)	0.771 (68)	0.840 (64)	0.891 (63)	0.830 (70)	0.797 (331)
Wealth	0.585 (66)	0.535 (67)	0.577 (64)	0.616 (63)	0.540 (68)	0.574 (328)
Panel C: Accessible village (San Antonio)						
Cash income	0.684 (64)	0.690 (73)	0.625 (75)	0.700 (67)	0.668 (77)	0.607 (356)
Wealth	0.564 (68)	0.529 (73)	0.442 (77)	0.485 (70)	0.509 (77)	0.514 (365)
Household income and wealth						
Panel D: Pooled results						
Cash income	0.606 (47)	0.606 (47)	0.592 (50)	0.621 (48)	0.575 (51)	0.541 (243)
Wealth	0.369 (47)	0.341 (47)	0.302 (50)	0.309 (48)	0.308 (51)	0.318 (243)
Panel E: Remote village (Yaranda)						
Cash income	0.642 (22)	0.635 (22)	0.698 (23)	0.782 (22)	0.647 (24)	0.638 (113)
Wealth	0.334 (22)	0.346 (22)	0.286 (23)	0.345 (22)	0.296 (24)	0.315 (113)
Panel F: Accessible village (San Antonio)						
Cash income	0.560 (25)	0.541 (25)	0.435 (27)	0.458 (26)	0.497 (27)	0.477 (130)
Wealth	0.380 (25)	0.326 (25)	0.306 (27)	0.273 (26)	0.304 (27)	0.317 (130)

Note. Cells contain Gini coefficients; number in parenthesis is the number of subjects or households used in the estimation. Cash income is all the cash income earned during the 30 days before the interview. Wealth is the value of a standard basket of 16 physical assets owned or co-owned by the person or the household at the time of the interview.

The results shown in Table II support the results of the cross-sectional study. First, as the information in Panel A suggests, average Gini coefficients for each of the five quarters for individual cash income and for wealth for both villages combined were high, ~0.758 for income and 0.542 for wealth. Panel D suggests that average quarterly Gini coefficients calculated at the level of the household for the pooled sample was 0.600 for income and 0.325 for wealth. The overall Gini coefficient for both villages and for all five quarters are shown in the column "Total" in Panels A and D. These Gini coefficients are slightly lower than the average quarterly Gini coefficients just discussed: 0.684 and 0.541 for individual and household income and 0.545 and 0.318 for individual and household wealth.

Second, contrary to what one might have expected, the more remote and traditional village of Yaranda generally had more inequality in both income and wealth than the more accessible and modern village of San Antonio, whether we estimate the Gini coefficient at the level of individuals or at the level of households, within each quarter or for the total number of quarters. The Gini coefficients of Panels B and E (both for Yaranda) were higher than the Gini coefficients of Panels C and F (both for San Antonio).

Last, even within 1 year, Gini coefficients varied widely. For example, for the pooled sample of the two villages the difference between the minimum and the maximum quarterly Gini coefficients per person was 6.80 percentage points for the Gini of wealth (Panel A: 0.581 minus 0.513 from first to third quarter) and 5.70 percentage points for the Gini of cash income (Panel A: 0.799 minus 0.742 from second to fourth quarter).

THE MEASURES OF INCOME INEQUALITY

How one defines inequality can affect the results of empirical analysis. For example, Fields shows how Puerto Rico, Mexico, and Argentina had different historical trends in income inequality depending on the index of income inequality used (Fields, 1980). From 1953 until 1963 the income distribution of Puerto Rico worsened if one uses the Gini coefficient or if one uses the income share of the poorest 40% of the population, but it improved if one uses the coefficient of variation or the income share of the richest 5% of the population.

Theoretical and practical reasons influence the choice between different measures of inequality (Deaton, 1997). As Sen notes, measures of inequality fall into two camps: positive measures which make no explicit concept of social welfare and normative measures, which reflect the loss of social welfare from inequality (Sen, 1997). In this article we concentrate only on positive measures, particularly: (1) the coefficient of variation, (2) the standard

deviation of the logarithm, and (3) the Gini coefficient. We focus on three measures rather than on just one to ensure consistency in empirical results. Also, these measures have become standard in analysis of inequality (Ray, 1998; Sen, 1997).

Each measure has strengths and drawbacks. The coefficient of variation, defined as the standard deviation divided by the mean, is equally sensitive to changes at all levels of income, so a small transfer from a poor to a less poor person is equally important as a transfer of the same size from a rich person to a slightly less rich person. The standard deviation of the logarithm is more sensitive to income changes among the poor or to inequality at the bottom of the income distribution, but is insensitive to income changes among the rich. The magnitude of inequality can be difficult to interpret using the standard deviation of the logarithm because values can be negative. The Gini coefficient has become the most widely used measure of income inequality (Fields, 2001), and is defined as the area between the Lorenz curve and the line of perfect equality (or 45° line from the origin) divided by the entire area below the line of perfect equality (Ehrenberg and Smith, 2000). The Gini coefficient, which ranges from 0 to 1, allows ranking of inequalities when two Lorenz curves cross and is easy to interpret. For example, a village with a Gini coefficient of income inequality of 0.40 has twice as much inequality as a village with a Gini coefficient of income inequality of only 0.20. The Gini coefficient is sensitive to the number of people falling between different levels of income (Sen, 1997) and is more sensitive to inequality or to measurement errors at the top of the income distribution (Deaton, 2001).

THE SURVEY, VARIABLES, AND FUNCTIONAL FORM

The information for the analysis comes from a survey conducted between June–November, 2000 among 511 households of Tsimane' in 59 villages in the department of Beni in the tropical lowlands of Bolivia. During May–June, 2000 we tested the survey in Tsimane' villages close to the town of San Borja (population ~16,000). The design and the administration of the survey were informed by $1\frac{1}{2}$ years of fieldwork by five researchers in two villages — one close to and one far from the town of San Borja. The $1\frac{1}{2}$-year study allowed us to probe how best to investigate socioeconomic and demographic variables.

For the survey we selected villages in the main Tsimane' regions. In each region, we selected villages that varied in distance from surrounding towns. In each village we first conducted a population census and we then randomly sampled 12–15 households (with replacement if villagers were absent at the time of the survey) for the survey. We selected at random one

of the two household heads to answer survey questions. According to the census of lowland Bolivian Indians, most indigenous households are nuclear (76%) or extended (22%) (Government of Bolivia, 1995), so having one of the two household heads answer the survey questions captured one of the most important decision makers of the household. The latest Bolivian census puts the Tsimane' population at ~8,000 people. If one assumes the average household contains about six people, the Tsimane' population would contain 1,170 households. Since we surveyed a total of 511 households, we covered 38% of the Tsimane' population.

Dependent Variables

We used three different economic outcomes to construct the inequality measure used as dependent variables: (1) household income, (2) imputed annual value of household rice production, and (3) household wealth. We focused on inequality at the level of the village because that is the social unit in which most day-to-day interactions occur.

Household Income

To measure household income we asked about the cash value the entire household had obtained from the sale of goods and from wage labor. To the value of cash income we added the value of goods received by the household through barter. We limited the recall period to the 2 weeks before the interview to reduce informant error.

Imputed Annual Value of Household Rice Production

We estimate consumption or income by measuring the value of farm production. We decided to focus only on rice because it is the most important crop for subsistence and for sale (Vadez *et al.*, 2003). We asked about the total quantity of rice produced during the previous year and multiplied the harvest by the village selling price to arrive at an imputed annual value of rice production for the household.

Household Wealth

We defined wealth as the total financial value of a standard basket of traditional (e.g., bows) and modern physical assets (e.g., metal fishhooks) owned by the household at the time of the interview. The 16 assets included

in the basket captured the range of assets likely to be owned by a typical household. To arrive at the value of the asset we multiplied the quantity of an asset owned by the household by the selling price of the asset in the village.

Some dependent variables were measured with more accuracy than others. For example, income earned during the 2 weeks before the interview may not reflect true annual income because of seasonal variation. The imputed annual value of rice production captures the value of the most important crop, but is an imperfect measure of income or consumption because it excludes other crops and goods. Further, rice is subject to seasonal variation—supplies are plentiful during March–August after the harvest, but scarce during December–January. Since the survey took place during the second part of the year, we probably underestimated rice consumption and probably captured less of the true variability. Measures of wealth are more reliable and capture the gross net worth of the household, but wealth is not a substitute for income or consumption. Also, one could argue that wealth does not capture a household's true net worth because it excludes the financial liabilities of the household, which might be significant among villagers trading thatch palm. People in those villages are mortgaged to traders who advance credit in exchange for future deliveries of thatch palm.

We divided income, rice output, and wealth by the number of people in the household or by adult equivalents that we got from an anthropometric and nutritional study spanning five consecutive quarters in two Tsimane' villages (Reyes-García, 2001). Since regression results did not vary by how we defined household size, we express values in adult equivalents.

Since income, wealth, and production might overlap, we decided to estimate pair-wise correlations between the three variables to decide on the overlap of the dependent variables. Pair-wise correlations between mean village income, wealth, and imputed value of rice production yielded the following coefficients: 0.27 (income and wealth; $p < 0.19$), 0.17 (rice and income; $p < 0.69$), and -0.05 (rice and wealth; $p < 0.99$). The results suggest that the dependent variables capture different dimensions of household economic behavior and should be included as separate dependent variables.

Explanatory Variables

We used three different sets of explanatory variables to capture economic development and used each set in a different regression. First, we used the average village income and income squared. Second, we used the average village wealth and wealth squared. Last, we used the average imputed value of annual rice production and the imputed value of rice production squared.

Average refers to the value of income, wealth, or rice production in the household divided by the adult equivalents of the household; we then averaged those values for the village.

Because the sample size included only 59 communities, we did not have enough degrees of freedom to include many control variables and so used only distance in a straight line from the village to the nearest market town. We used a Global Positioning System (GPS) receiver to measure village-to-town distance. Distance and the various measures of economic inequalities had low pair-wise correlation coefficients; probability values in bivariate regressions between the mean village value of the economic variable and distance to the nearest market town were ~0.50, suggesting modest overlap between distance and other explanatory variables.

We considered using village population size as a covariate instead of distance. Recall that in the historical study by Williamson (1998) previously cited demography proved a significant determinant of inequality in Europe. In a study among the Aché Amerindians of Paraguay, Gurven and his colleagues found that Gini coefficients on meat consumption correlated positively with group size (Gurven *et al.*, 2002). In separate bivariate regressions (not shown) we also found that village size correlated positively with Gini coefficients of income ($p < 0.09$), negatively with the Gini coefficient of the imputed value of rice production ($p < 0.03$), and weakly with the Gini coefficient of wealth ($p < 0.33$). The use of distance yielded essentially the same results as the use of village size, though the regression of the Gini coefficient of rice on income yielded stronger results when using village size as a control.

Functional Form

We used two functional forms. In one we used income (or wealth, or value of rice production) and income (or wealth, or value of rice production) squared and tested whether the sign of the coefficient for the first term was positive and whether the sign of the coefficient for the second term was negative. The functional form reflects a parabola and has become the standard in tests of the Kuznets hypothesis. In the second functional form we used income (or wealth, or value of rice production) and the inverse of income (or wealth, or value of rice production) and tested whether the signs of the two coefficients were negative. The second functional form reflects a skewed curve. In both functional forms we tested whether the maximum of the parabola fell within the range of the information available. Since results were generally robust to the functional form used, we only report results of regressions using quadratic terms, but note when the second functional form produced different results.

CAVEATS AND LIMITATIONS

At least three caveats deserve mention before discussing the regression results. First, we did not have repeated observations of the same households over time, so we had to rely on cross-sectional estimations. Failure to control for unseen village and household fixed-effects will likely overstate the impact of income on income inequality (Fields, 2001). Second, we had a small sample of villages ($n = 59$), which limited the number of control variables we could include. The effect of explanatory variables on various measures of inequality that we discuss later could pick up the effect of either unseen, fixed attributes of localities and households or the effect of other omitted variables. We saw that village size bore a strong relation to different types of Gini coefficients, but we excluded village size from the regression because of the small sample size of villages and because the use of village-to-town distance produced similar results. Last, none of our proxies for integration to the market or income were measured with complete accuracy; random measurement errors will produce an attenuation bias.

RESULTS

Table III contains the regression results. At least three findings deserve discussion. First, as is true with the international comparisons reviewed earlier, the models explained a low proportion of the total variation in inequalities. Adjusted R squares were low (mean = 0.06; median = 0.032), suggesting that other factors not included in the regressions shape economic inequalities.

Second, as Panel A at the top of Table III suggests, current income and current income squared and the imputed value of rice production (and rice production squared) had none of the effects on inequalities predicted by the Kuznets hypothesis. When using current income we found no evidence of a Kuznets curve of inequality. The level of income correlated negatively with income inequality, but it bore no correlation with inequalities in wealth or rice production. The level of income correlated only with lower inequalities of income only when using the coefficient of variation or the Gini coefficient; in both cases, the coefficient for the income variable was significant at the 90% (coefficient of variation) or at the 95% (Gini coefficient) confidence level.

This pattern also applied to rice. Panel B shows that the imputed annual value of rice production bore a U-shaped relation to inequalities in rice production, but only when using the coefficient of variation or the Gini coefficient.

Table III. The Effect of Income or Wealth on Village Inequalities in Income, Rice, and Wealth Among Tsimane' Amerindians, Bolivia, 2000 ($n = 59$): Results of multivariate Regressions

	Inequalities[a] in								
	Income[b]			Rice production[c]			Wealth[d]		
Inequality index	Coefficient variation	Standard deviation of logarithm	Gini	Coefficient of variation	Standard deviation of logarithm	Gini	Coefficient of variation	Standard deviation of logarithm	Gini
Panel A: Models with income and income squared									
Income[e]	−9.496*	6.853	−3.814**	−5.116	−6.081	−1.244	−1.543	−2.275	−0.561
Income^2	0.047	−0.034	0.016	0.045	0.047	0.010	0.020	0.024	0.005
Distance[f]	−0.602	1.887	−0.278	6.885**	6.275**	2.647***	0.573	1.221	0.306
Adj R^2	0.050	0.0004	0.152	0.141	0.150	0.127	0.015	0.030	−0.032
Maximum[g]									
Panel B: Models with imputed value of rice production and rice production squared									
Rice[f]	0.111	0.066	0.043	−0.509**	−0.321	−0.175**	0.114	0.004	0.054
Rice^2	−0.075	0.125	−0.032	0.184*	0.060	0.061*	−0.029	0.032	−0.016
Distance[f]	−0.618	2.491	−0.247	6.912	5.972***	2.65***	0.311	1.130	0.238
Adj R^2	−0.041	0.108	−0.029	0.169	0.178	0.220	−0.039	−0.012	−0.036
Maximum[g]				1380[I]		1420[I]			
Panel C: Models with wealth and wealth squared									
Wealth[f]	0.639	1.683*	0.296	0.126	0.804	0.120	1.510***	1.334***	0.735***
Wealth^2	−0.0004	−0.001**	−0.0002	−0.0003	−0.0006	−0.0001	−0.0007***	−0.0006***	−0.0004***
Distance[f]	−0.847	0.571	−0.364	6.510***	5.895**	2.457***	0.07	0.792	0.074
Adj R^2	−0.039	0.032	−0.023	0.135	0.134	0.227	0.159	0.155	0.182
Maximum[g]		703[I]					946[I]	963[I]	898[I]

Notes. Regressions are ordinary least squares with constant (not shown). Cook–Weisberg test for homoskedasticity used; robust standard errors used when $p < 0.10$. *, **, and *** significant at ≤10%, ≤5%, and ≤1%.

[a] Household income, consumption, wealth, and imputed value of rice production have been divided by adult equivalents before estimating measures of inequality.

[b] Income = income from wage labor, sale of goods, and value of good received in barter during 2 weeks before the week of the interview divided by adult equivalents in household. Expressed in *bolivianos* (US$ 1 = 6.03 *bolivianos* at time of fieldwork).

[c] Rice production = gross rice production during 1999 times the village selling price divided by the adult equivalents of the household.

[d] Wealth = value in *bolivianos* of 16 physical assets owned by household divided by adult equivalents in household.

[e] Explanatory variables defined under *b*, *c*, and *e*, but divided by 1000.

[f] Distance in miles from village to nearest market town; in 1000s.

[g] Maximum is the turning point of the parabola. Maximum values reported only when x and x squared were statistically significant at the 90% confidence level or higher.

[I] Indicates that maximum fell within data range.

Third, as Panel C shows, the link between the level of wealth (and wealth squared) and inequalities in income and wealth resembled an inverted U curve, and in several cases the relation was statistically significant at the 90% confidence level or above. The strongest support for the Kuznets hypothesis comes from the regressions with wealth inequalities as a dependent variable. In all three regressions with the three different indices of wealth inequality as a dependent variable, the average level of wealth correlated at first with an increase and then with a decrease in wealth inequalities. Results held up whether we measured wealth inequalities with the Gini coefficient, with the coefficient of variation, or with the standard deviation of the logarithm of wealth. In all three cases, the maximum of the parabolas (898–963) fell above the mean level of wealth (606; standard deviation = 240) but within the range of wealth for the sample population (minimum = 258; maximum = 1,465).

The relation between income inequality and the level of wealth also resembled an inverted U curve, but the result was statistically significant only when using the standard deviation of the logarithm of income to measure inequality. Recall that the standard deviation of the logarithm of income is more sensitive to income changes at the bottom of the income distribution, so the strength of the correlation just discussed might change with income changes among the poorest. In the regression with the standard deviation of the logarithm of income as a dependent variable and with wealth and wealth squared as explanatory variables the maximum point of the parabola (703) fell within the range of wealth levels covered by the information (minimum = 258; maximum = 1,465).

To ensure consistency in results when using wealth inequalities as a dependent variable and wealth and wealth squared as explanatory variables, we ran a different econometric specification (not shown). In the new specification, we used wealth and the inverse of wealth on the right side of the equation and distance from the village to the nearest market town as a control. None of those results were statistically significant, suggesting that the results discussed earlier about the strong inverted U-shaped link between wealth inequalities and the level of wealth must be read with caution.

DISCUSSION

Why might integration to the market economy fail to correlate with increased economic inequalities? We have no convincing answer, but offer several hypotheses to guide future empirical research.

First, although the Tsimane' have been linked with the outside world for centuries, strong and continuous exposure to the market is recent, dating back only to the 1970s. Even today, exposure to the market and daily

interactions with outsiders is slight in comparison with local smallholder populations (Gurven, 2002). Perhaps not enough time has elapsed for markets to exert their full influence on inequalities, which again suggests that longitudinal information is better than cross-sectional information for exploring the dynamic determinants of inequality. Although Tsimane' villages vary in their level of market access and in numerous indicators of economic development (Reyes-García, 2001), the overall variation in structural economic change among Tsimane' villages may represent only a small portion of the variation envisioned in the original Kuznets hypothesis. However, one should then expect to find only increasing levels of inequality with increases in income and wealth, yet the regression results in Table III suggest a parabolic relation.

Second, social capital and systems of redistribution and reciprocity of the Tsimane' may take many years to weaken and disappear, and could still be smoothing potential disparities in economic outcomes as markets expand and envelop Tsimane' society. The frequent sharing of food and drinks and the frequent migration between villages discussed earlier are examples of ways to reduce inequalities within and across villages. Another example comes from the relaxed attitude toward rules of usufruct and ownership of physical assets. Motor boats and domesticated animals aside, most Tsimane' can have access to the physical assets of other villagers by simply taking them or by asking for them. They also have a relaxed attitude toward the proper maintenance of physical assets. Norms of reciprocity, visiting, and tolerated scrounging (Bliege Bird and Bird, 1997) probably do much to shield Tsimane' society from becoming polarized by dampening the emergence of sharp economic inequalities. Experimental work in 15 small-scale societies around the world suggests the possibility that the level of pro-social behavior — at least expressed in experimental games — might increase as people become more integrated into the market (Henrich *et al.*, 2002), though the experiments with the Tsimane' showed ambiguous results and no clear indication that integration to the market affected pro-social norms (Gurven, 2002).

A more recent panel survey of 2001 and 2002 allows us to explore in more detail the link between income, sharing, and inequality. In that data set we found a strong positive and statistically significant correlation between income and generosity among ~300 households in 37 villages that we surveyed twice. People with higher income gave more gifts and provided more labor help to others. For example, we found that a 1% increase in income correlated with a 1.02–1.24 increase in the frequency with which a household gave gifts of manioc or home-brewed beer in a week. For other commodities the magnitude ranged from a low of 0.77 (meat) to a high of 0.77–0.85 (seeds, maize, fish). If we focus on communal labor or on labor help offered to others as a dependent variable, we again see a positive and significant correlation

between income and pro-social behavior. A 1% increase in income correlated with a household increasing the frequency of communal labor and help offered by 0.41–0.48 (buying and hunting) to 0.61–0.98 (farming and curing) in a week. In sum, the reason why income might not accentuate inequalities might have to do with the positive correlation between income and pro-social behavior at low levels of income.

A problem with the sharing explanation for the lack of consistent income or wealth effects on inequality is that most sharing occurs within, rather than between, villages, yet Tables I and II showed relatively high levels of inequality within villages, rather than across them. Also, income and wealth items tend to be shared less widely across households than game, fish, and home-brewed beer. However, even non-egalitarian sharing patterns may reduce inequalities within villages, but not substantially, so that the net inequality after sharing may be similar across villages.

A third possible reason for the weak results might relate to random measurement errors and to low variance in all the explanatory variables that capture integration to the market: income, wealth, and imputed annual value of rice production. Random measurement errors in the explanatory variable produces an attenuation bias and low variance will raise standard errors, increasing the probability of accepting the null hypothesis of no effect.

A fourth possible reason relates to biases from self-selection in the cross-sectional sample. Tsimane' households are not randomly scattered across the Bolivian landscape, but are instead arranged in kin-based clusters within larger clusters or villages, the units of our cross-sectional analysis. People select where to live and how to earn income. If people only tolerate a certain amount of inequality within a village, then once inequality surpasses the threshold people might move to another, more egalitarian village. At the equilibrium, villages should have similar levels of inequality. To investigate whether self-selection leads to similar levels of inequality across villages, we selected 59 different random samples of households with an average of 12 households for each draw (without replacement) from the original household survey and estimated the Gini coefficient for wealth per adult equivalent for each of the 59 random draws. We found that the average Gini coefficient from the random draws was 0.308 (standard deviation = 0.071), slightly above the average Gini coefficients for wealth per adult equivalent from the actual village survey (0.270; standard deviation = 0.097; Table I). Since the standard deviations of the Gini coefficients for wealth per adult equivalent from the survey and from the random draws were similar (0.071 and 0.097), as were the mean Gini coefficients (0.270 and 0.308), we rule out the possibility that self-selection could explain the lack of a strong fit between inequality in wealth and the level of wealth.

CONCLUSIONS

In this study we have made several contributions to the study of economic inequality. First, we have contributed to the debate about the harmful effects of markets, trade opening, and globalization on the quality of life of rural populations in the developing world. Much of that debate has been acrimonious and ideological, with a weak, microlevel empirical base. In a recent article discussed earlier that draws on a panel of nations, Barro (2000) shows that trade opening and globalization worsens the distribution of income in poor countries. Others have echoed the findings (Soros, 2002; Stiglitz, 2002). Their findings confirm the popular view that globalization imposes costs on poor nations. Here, on the other hand, using more microlevel information, we have presented evidence suggesting that greater integration into a market economy does not accentuate economic inequalities within Tsimane' society, although it could accentuate inequalities between the Tsimane' and the rest of Bolivian society. We found weak evidence for the idea that market openness — measured through income, wealth, or the annual value of rice production — resembled a Kuznets curve of inequality, or even that it causes a linear accentuation of inequalities. Second, we have shown that the mean levels of inequality, as measured by the Gini coefficient, were relatively high for a so-called egalitarian society.

Third, despite relatively high levels of inequality and despite the variable access villages have to markets, education, and wage labor opportunities, we saw little evidence for much variation in inequality across villages. On the other hand, we saw that measures of inequality varied temporally in the panel study of the two villages.

Fourth, as is true in some of the international studies reviewed earlier, here we also found that definitions and measurements mattered in the analysis and in the results. We saw that a vague but important concept, inequality, varied widely depending on the way it was defined and empirically investigated.

Last, we saw that the Kuznet hypothesis of income inequality did not explain much. The strongest support for the Kuznets hypothesis came from the regression of wealth inequality as a function of wealth and wealth squared, but even this result lost significance when we used a different functional form to verify the relationship.

If one of the most powerful theories in the social sciences to explain economic inequalities, the Kuznets hypothesis, did not explain village-level variation in inequality, what could? We have no convincing answer but offer two suggestions. The first suggestion would be to take a rigorously empirical approach of the sort Williamson took in his historical analysis of inequalities in Europe to mine available information for regularities. The second sug-

gestion, which is not a substitute for the first, would be to develop and test a new hypothesis. If scholars grow increasingly dissatisfied with the limited explanatory power of the Kuznets hypothesis (Fields, 2001), then the rationale for developing a new theory increases. Irrespective of the approach chosen, the ideal sample of information for future empirical work should have much variation in inequality between communities and in exogenous variables, contain repeated measures of the same units over time, and contain a large number of cross-sectional observations to control for the role of potential confounding variables.

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REFERENCES

Barro, R. J. (2000). Inequality and growth in a panel of countries. *Journal of Economic Growth* 5: 5–32.

Bliege Bird, R. L., and Bird, D. W. (1997). Delayed reciprocity and tolerated theft. *Current Anthropology* 38: 49–78.

Bowles, S., and Gintis, H. (1999). Is inequality passé? Homo reciprocans and the future of egalitarian politics. *Boston Review* 23: 23–58.

Braun, D. (1991). Income inequality and economic development: Geographic divergence. *Social Science Quarterly* 72: 520–536.

Chicchón, A. (1992). *Chimane Resource Use and Market Involvement in the Beni Biosphere Reserve, Bolivia*, PhD Thesis, University of Florida, Gainesville.

D'Andrade, R. (2001). The sad story of anthropology 1950–1999. In Cerroni-Long, E. L. (ed.), *Anthropological Theory in North America*, Berin & Garvey, Westport, Connecticut, pp. 23–52.

Deaton, A. (1997). *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*, Johns Hopkins University Press, Baltimore, MD.

Deaton, A. (2001). Health, Inequality, and economic development. Manuscript submitted for publication.

Deninger, K., and Squire, L. (1998). New ways of looking at old issues: Inequality and growth. *Journal of Development Economics* 57: 259–287.
Ehrenberg, R. G., and Smith, R. S. (2000). *Modern Labor Economics: Theory and Public Policy*, Addison-Wesley, New York.
Ellis, R. (1996). *A Taste for Movement: An Exploration of the Social Ethics of the Tsimanes of Lowland Bolivia*. PhD Thesis, St. Andrews University, Scotland.
Fields, G. (1980). *Poverty, Inequality, and Development*. Cambridge University Press, Cambridge, UK.
Fields, G. (2001). *Distribution and Development. A New Look at the Developing World*, MIT Press, Cambridge, MA.
Food and Agriculture Organization, World Health Organization, and United Nations University (1985). *Energy and Protein Requirements*, World Health Organization, Geneva.
García-Aguilar, J. L. (1999). The autonomy and democracy of indigenous peoples in Canada and Mexico. *Annals of the American Academy of Political and Social Sciences* 565: 79–90.
Godoy, R. A. (2001). *Indians, Markets, and Rain Forests: Theory, Methods, Analysis.* Columbia University Press, New York.
Government of Bolivia (1995). *Censo Indígena del Oriente, Chaco y Amazonía*, *1994–1995*. Secretaría de Asuntos Etnicos, de Genero y Generacionales, Ministry of Human Development, Government of Bolivia, La Paz, Bolivia
Gurven, M. (2002). *Does market exposure affect economic behavior? The ultimatum game and public goods game among the Tsimane' of Bolivia*. Manuscript submitted for publication.
Gurven, M., Hill, K., and Kaplan, H. (2002). From forest to reservation: Transition in food sharing behavior among the Ache of Paraguay. *Journal of Anthropological Research* 58: 45–63.
Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., and McElreath, R. (2002). Cooperation, reciprocity, and punishment in fifteen small-scale societies. *American Economic Review* 91(2): 73–79.
Hymes, D. (ed.) (1972). *Reinventing Anthropology*, Random House, New York.
James, W. P. T., and Schofield, E. C. (1990). *Human Energy Requirements: A Manual for Planners and Nutritionists*, Oxford University Press, Oxford.
Johnson, A. W., and Earle, T. (2000). *The Evolution of Human Societies: From Foraging Group to Agrarian State*, Stanford University Press, Stanford, CA.
Krugman, P., and Venables, A. J. (1999). Globalization and the inequality of nations. In Armstrong, H., and Taylor, J. (eds.), *The Economics of Regional Policy*, Elgar, Cheltenham, UK, pp. 129–152.
Kuznets, S. (1955). Economic growth and income inequality. *American Economic Review* 45: 1–28.
List, J. A., and Gallet, C. A. (1999). The Kuznets curve: What happens after the inverted U? *Review of Development Economics* 3: 200–206.
Meyer, C. (1999). Globalization and rising inequality in developed countries. *Global Business and Economics Review* 1: 108–118.
Morduch, J. (1995). Income smoothing and consumption smoothing. *Journal of Economic Perspectives* 9: 103–114.
Ortner, S. (1984). Theory in anthropology since the sixties. *Comparative Studies in Society and History* 26: 126–166.
Pérez, E. (2001). *Uso de la ictiofauna entre los Tsimane'*. BSc, Universidad Mayor de San Andrés, La Paz, Bolivia.
Ray, D. (1998). *Development Economics*, Princeton University Press, Princeton, New Jersey.
Reyes-García, V. (2001). *Indigenous People, Ethnobotanical Knowledge, and Market Economy: A Case Study of the Tsimane' Amerindians in Lowland Bolivia*. PhD Thesis University of Florida, Gainesville.
Reyes-Garcia, V., Godoy, R. A., Vadez, V., Apaza, L., Byron, E., Huanca, T., Leonard, W., and Perez, E. (2003). Indigenous people share botanical knowledge. Estimates from an Amerindian society in Bolivia. *Science* 299: 1707.

Rodrik, D. (1998). Symposium on globalization in perspective: An introduction. *Journal of Economic Perspectives* 12: 3–8.
Sen, A. (1997). *On Economic Inequality*, Clarendon, Oxford.
Smith, C., and Ward, G. K. (2000). *Indigenous Cultures in an Interconnected World*, University of British Columbia Press, Vancouver, Canada.
Soros, G. (2002). *On Globalization*, Public Affairs, New York.
Stiglitz, J. E. (2002). *Globalization and Its Discontents*, Norton, New York.
Upham, S. (1990). *The Evolution of Political Systems: Sociopolitics in Small-Scale Sedentary Societies*, Cambridge University Press, New York.
Vadez, V., Reyes-Garcia, V., Godoy, R. A., Apaza, L., Byron, E., Huanca, T., Leonard, W. R., Wilkie, D., and Perez, E. (in press). Does integration to the market threaten agricultural diversity? Panel and cross-sectional evidence from a horticultural-foraging society in the Bolivian Amazon. *Human Ecology*.
Wilkinson, R. G. (1996). *Unhealthy Societies: The Affliction of Inequality*, Routledge, London.
Williamson, J. G. (1994). Globalization and inequality: Past and present. *World Bank Research Observer* 12: 117–135.
Williamson, J. G. (1998). Growth, distribution, and demography: Some lessons from history. *Explorations in Economic History* 35: 241–271.
World Bank (2001). *World Development Report 2000/2001. Attacking Poverty*, Oxford University Press, New York.