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Tsimane' Amazonian Panel Study Working Paper #23

How poor are people in autarky?

On the measure of income in autarky

and the economic (un)importance of social capital

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Abstract

Economists equate autarky with low income and they equate social capital in poor rural areas with self insurance. Anthropologists disagree, speak of the 'original affluence' of foragers, and stress the social rather than the economic importance of social capital. Economists do not work with highly autarkic peoples, and cultural anthropologists have not provided formal, comprehensive estimates of income or the monetary value of social capital in highly autarkic societies. Drawing on data from 244 households (611 adults, 929 children) in 13 villages of a highly autarkic society of hunters, gatherers, and farmers in the Bolivian Amazon, the Tsimane', we present measures of income, including the monetary value of social capital. We find that daily personal income ranges from US$2.35 to US$3.25, above the international poverty line of US$1-2, on a par with the income in the rest of Bolivia, and three times higher than the income in the rest of rural Bolivia, a region with a long history of market exposure. Contrary to the predictions of economists, we find that the Tsimane' are not poor, at least not compared with their neighbors who have long taken part in the market economy. We find that social capital in the form of gifts and labor services received from the rest of the village account for a small share of daily personal income (<5%) and that it does not get activated when people suffer a mishap. In sum, the study uncovers a more nuanced picture of well-being in autarky than one might glean from the writings of economists or anthropologists. People in autarky enjoy relative affluence, invest in social capital for social more than for economic reasons, but cope with adversity largely on their own.

Keywords: Autarky, income, poverty, Bolivia, Tsimane', Amazon

Introduction. Income refers to the value of the flow of goods and services accruing to a person or household over a finite time, such as a day, month, or year and can come from market transactions, such as earnings, or from consumption of one's own production. Income bears a positive association with many indicators of quality of life across a wide range of societies (Ray 1998). As a result, economists over the years have spent much effort refining methods to measure income (Deaton 1997). Despite much attention paid to the measure of income, economists have paid scant attention to the measure of income in highly autarkic societies in part because economists do not study such societies. Cultural and evolutionary anthropologists, who typically work in such societies, have neglected to develop formal methods to measure income because income does not figure prominently in evolutionary theory and because cultural anthropology has become increasingly qualitative over the last decades (D'Andrade 2001). Furthermore, the measure of income in highly autarkic societies poses challenges owing to the difficulties of separating income from consumption and supply from demand, in settings where markets do not operate, or do not operate well (Morduch 1995b). The gap is lamentable. The measure of income in highly autarkic societies deserves attention for at least three reasons.

First, trade theory suggests that autarky should bear a positive association with poverty (Huber 1971), but many anthropological studies suggest that economic self-sufficiency, such as one finds in foraging societies, should bear a positive association with leisure -- a form of income -- and with other indicators of quality of life associated with income, such as nutritional status (Sahlins 1972; Sacket 1996). In a classic study (Sahlins 1968),

Sahlins spoke of highly autarkic societies of foragers as the "original affluent society", and implied they had high levels of income. An empirical assessment of the income level of people in highly autarkic societies would allow one to test competing hypotheses from economics and from anthropology about well-being before the development of markets.

Second, anthropologists have long stressed the ubiquity of social capital -- sharing, reciprocity, gift giving, and other forms of pro-social behavior -- in pre-industrial, small-scale highly autarkic rural societies (Malinowski 1922; Sahlins 1972; Mauss 1990; Henrich et al. 2002; Reyes-Garcia et al. 2006). Economists and anthropologists have differed in their interpretation of social capital in such societies. Anthropologists using evolutionary theory (Hill and Kaplan 1985, 1993) and economists (Morduch 1995a) have stressed the economic importance of social capital and have seen social capital as a way to mitigate risk and self-insure. If they are right, then social capital in the form of gifts and free labor services received from unrelated kin should account for a significant share of income, particularly when adverse income shocks strike (Carter and Maluccio 2003). Anthropologists drawing on a more classic tradition of culture theory have de-emphasized the economic importance of social capital, and instead have stressed the role of social capital in signaling status, commitment to the group, and a sense of justice (Morduch 2002).

Third, in recent years social capital has taken the center stage in a wide range of fields because it presumably contributes to desirable outcomes such as democracy (Putnam, Leonardi and Nanetti 1993; Brehm and Rahn 1997), health (Kawachi et al. 1997,

Kawachi and Berkman 2000), rural income (Narayan and Prichett 1999; Woolcock and Narayan 2000), school achievement (Goldin and Katz 1999; Israel, Beaulieu and Hartless 2001), and economic growth (Knack and Keefer 1997; Dasgupta and Serageldin 2000). Here we tackle the importance of social capital from a new angle: we estimate not the association between social capital and indicators of well-being, as done routinely, but we estimate instead the contribution of social capital to income.

Drawing on cross-sectional data from a highly autarkic society of hunters, gatherers, and farmers in the Bolivian Amazon, the Tsimane', with a recent history of exposure to Westerners dating back only to the last 50 years, in this paper we have three aims: to estimate of levels of personal daily income, to estimate the share of social capital in personal daily income, and to assess the role of social capital in cushioning people against adverse income shocks.

The Tsimane'. A native Amazonian society, the Tsimane' number about 8000 people and live in over 100 villages scattered along river banks and logging roads, mostly in the department of Beni, Bolivia. The villages we studied contain an average of 24 nuclear households (S.D. = 10.88). Polygynous in the past, most Tsimane' at present practice monogamy and live in nuclear households run jointly by a wife and a husband. Only 10% of households are run by only one person (8% headed by a single female and 2% headed by a single male). Each household contains 6.23 people (S.D. = 2.85) made up of 2.66 adults (S.D. = 1.10) and 3.59 children (S.D. = 2.31), defined as people under the age of 16. Households contain the same number of adult females (mean=1.32, S.D. = 0.67)

and adult males (mean=1.33, S.D. = 0.69), and about the same number of girls (mean=1.69, S.D. = 1.35) and boys (mean=1.90, S.D. = 1.64). Subsistence centers on hunting, plant collection, fishing, and slash-and-burn farming (Vadez et al. 2004).

The first recorded contact of Tsimane' with Westerners goes back to the seventeenth century, but continual exposure to Westerners dates back only to the 1940s. Mobile, scattered, decentralized, and politically acephalous, Tsimane' avoided sedentary living in Catholic missions or in Spanish towns from the sixteenth century until the twentieth century. The history of the Tsimane' during the seventeenth and eighteenth centuries is peppered with attacks against Catholic missionaries and Spanish towns (Chicchón 1992; Ellis 1996). We do not have information to assess how the rubber, quinine, and mineral booms of the nineteenth and early twentieth century in Bolivia affected the Tsimane', but they probably had a weaker effect than among neighboring native peoples because Tsimane' lived in small, scattered, and mobile settlements, making it hard for employers to recruit Tsimane' as laborers (Chicchón 1992). Also, the Tsimane' territory lacks rubber trees. The boom in pelts (1940-1970) affected some Tsimane' communities, but not enough to cause dislocation of settlements or modes of production; Tsimane' acquired firearms, but continued to sell pelts and buy goods from their villages rather than to relocate to new settlements (Jones 1995).

The 1950s produced a torrent of socioeconomic changes in the department of Beni. The changes included the establishment of permanent Catholic and Protestant missions, the expansion of cattle ranches, the construction of landing strips to transport fresh beef to

mining camps in the highlands, and the building of roads across the Tsimane' territory as part of a government policy to thin out the highlands by encouraging migration to the lowlands (Riester 1993; Jones 1995).

Agents of change have included Catholic and Protestant missionaries and, more recently, encroachers such as loggers, cattle ranchers, colonist farmers, and traveling traders (Godoy et al. 1998). Encroachers hire Tsimane', buy crops and forest goods from them, and supply Tsimane' with commercial goods and credit. Non-government organizations started to work in the area during the late 1980s in projects related to health, education, farming, land demarcation, and the sale of forest goods (Añez 1992). To earn monetary income, Tsimane' work as unskilled laborers in cattle ranches, logging camps, and in the farms of colonist farmers, or else sell forest palms for thatching and farm crops, such as rice and plantains. Sale of goods take place in villages when traveling traders arrive to the village, or in towns when Tsimane' take goods to sell.

Despite five decades of intermittent exposure to the market economy and Westerners, Tsimane' remain highly autarkic. Goods bought in the market account for only 2.68% of the total value of household consumption of goods. As we shall see, 49.70% of adult women, 77.86% of adults in the bottom income quintile, and 45.30% of adults living far from the market town did not earn any monetary income during the two weeks before the day of the interview.

Data and methods. Data comes from a survey done during June-September 2005 among all households (n= 244) in 13 Tsimane' villages straddling the Maniqui river, province of Beni. Villages differed in their proximity to the market town of San Borja (population ~ 19,000). The 2005 survey formed part of a panel study going back to 1999 (Godoy et al. 2005), but we started collecting data on the economic importance of social capital in 2005 so we draw on the last survey of the panel for the analysis. Experienced interviewers and translators who had been part of the panel from the start did the 2005 survey. We collected information on income from every adult or person over 16 years of age because younger people still depend on their parents. We estimated income levels among people below 16 years of age only if they headed a household. The final sample with information on personal income included a total of 661 people (women=334, men=327). The final total sample with children included 1540 people (females=744, males=796).

Income included the monetary value of the following five components: **(a)** wage labor and sale of goods, **(b)** goods received in barter, **(c)** monetary remittances received, **(d)** consumption of farm crops and animal wildlife, and **(e)** social capital (gifts and labor help received). For each component we estimated its monetary value, as described next.

(a) Wage labor and sale of goods. We first asked people to list the monetary value of all goods they had sold and all earnings they had received from wage labor for the seven days before the day of the interview, and we then asked the same questions for the 8-14

days before the day of the interview. We limited the recall period to two weeks to reduce recall bias.

(b-c) Goods received in barter and monetary remittances received. We asked people to list all the goods they had received in barter and the value of each good for the seven days before the day of the interview, and we repeated the question for the 8-14 days before the day of the interview. Because remittances were so infrequent (95.61% of respondents had received no remittances), we did not divide the recall period into the last seven days and the last 8-14 days. Instead, we asked one question about the value of all monetary remittances received during the 14 days before the days of the interview.

(d) Consumption of farm crops and animal wildlife. We measured food consumption at the household level by asking the two household heads jointly to indicate the amount of farm crops -- plantains, manioc, rice, and maize – and animal wildlife -- birds, game, and fish -- consumed by the household during the seven days before the day of the interview. These are goods that Tsimane' typically produce or procure on their own rather than buy. We focus on the value of consuming the goods rather than on the value of consuming other foods because Tsimane' might have bought other foods in the market. Had we included the value of purchased foods, then we would have counted twice the value of food consumption because we would have already included the money to buy the foods when estimating monetary earnings. We restricted the recall period to the last seven days before the day of the interview (instead of two weeks) to reduce omission bias.

To estimate the value of farm crops consumed we asked village leaders about the most recent village selling price for the crop. If villagers had not sold a crop recently, we asked about the sales price for the crop for the last three months. All villages had price data for farm crops. Because Tsimane' rarely sell animal wildlife we had to find a proxy for the price of animal wildlife. To do so, we asked about the village selling price of one wild bird, pava (*Penelope jacquacu)*, two game animals -- deer (*Mazama americana*) and jochi pintado (*Agouti paca*) -- and two fishes – sábalo (*Prochilodus* cf. *nigricans*) and surubí (*P. fasciatum*) -- that Tsimane' sell in the town of San Borja. We used the price of these animals to impute values to other birds, game, and fish. If the village lacked a selling price for a wild animal or fish, we imputed a value by using the average price from the rest of the sample.

(e) Social capital: Gifts and labor help received. We asked about all the gifts and all the unremunerated labor help received from non-kin during the seven days before the day of the interview. We valued gifts by using village prices. Estimates of the amount of labor help received were converted to person-days of help, which, in turn, were converted to monetary values by using the village daily wage. Employers pay with money or goods, and some add a meal as part of the wage. To estimate the value of labor help received we used the average of the daily wage with and without food. The mean daily wage without food in the 13 villages was 28.84 bolivianos (S.D. = 3.62; minimum=25, maximum=35), 19% higher than the mean daily wage with food (mean=24.23 bolivianos, S.D. = 3.44; minimum=20, maximum=30).

Since the recall period used to estimate the different components of income varied between seven and 14 days for parts **(a)**, **(b)**, **(c)**, and **(e)** of income, we estimated the daily value by dividing the total amount by either seven or by 14 days. We added the daily figures for **(a)**, **(b)**, **(c)**, and **(e)** to arrive at an estimate of total daily personal income that excluded food consumption. To add an estimate of daily food consumption for each person, we divided the total value of household food consumption **(d)** for the previous seven days by the number of people in the household at the time of the survey, and we then divided the resulting amount by seven. Adding the estimates of **(a)-(e)** expressed per person per day yields an estimate of the total daily personal income in bolivianos for an adult.

To arrive at estimates of personal income for all people in the household, including children, we followed three steps. First, we added estimates **(a)**, **(b)**, **(c)**, and **(e)** for all individuals in a household and we then added the daily value of total household food consumption **(d)**. Second, we made adjustments for the different recall periods to express the estimates in terms of daily values for each household. Last, we divided the total daily value of a household by either the number of people in the household or by the male-adult equivalents in the households.

Male-adult equivalent refers to the notion that people differ in their energy requirements as a function of their sex and age, so a child might represent a fraction of an adult in energy requirements. We calculated the energy requirements using the most recent WHO protocol (Food and Agriculture Organization, World Health Organization and United

Nations University 1985; James and Schofield 1990). The WHO method determines energy needs based on body size and on typical activity levels. This has become the preferred approach for determining food and energy requirements since we now know that dietary recalls do not accurately reflect variation in food and energy requirements. The reference category for estimating adult equivalents was a male 18-59 years of age.

The estimates of daily income in bolivianos were converted into USA dollars by dividing the value in bolivianos by the local exchange rate at the time of the study (8.00 bolivianos = 1 USA dollar, August 2005). We multiplied the income figures in USA dollars by Bolivia's latest Purchasing Power Parity index (2.77) as computed by the International Monetary Fund's World Economic Outlook Database (http://imf.org/external/pubs/ft/weo/2006/01/data/index.htm). Purchasing Power Parity refers to the amount of foreign currency needed to buy a standard basket of goods in a foreign nation that in the USA would cost a fixed number of dollars (e.g., one USA dollar). The measure allows one to control for differences in the costs of living across countries that are not captured by the market exchange rate.

Biases in income estimates. Our estimate of income likely contains biases working in opposite directions, producing a net bias of unknown magnitude and direction.

Biases that lower income. We underestimated true income because self-reports of income likely exclude the value of goods stolen. As in other small-scale, pre-industrial rural societies (Winterhalder 1996; Bliege Bird and Bird 1997), Tsimane' tolerate and

engage in petty theft with each other. People take plantains, manioc, and other crops from fields. Indeed, when asked to report income shocks for the 12 months before the day of the interview, 12.11% of responses centered on theft or on the loss of objects. If respondents did not include stolen goods when reporting consumption, or if they sold stolen goods and did not include the value of the sales when reporting monetary earnings, then our estimate of daily personal income will be biased down.

A second source of downward bias has to do with the use of a narrow range of foods to measure consumption. Recall from our discussion of household consumption that we only measured the value of selected farm and forest goods. Had we included the wide range of other domesticated and wild plants and animals Tsimane' routinely use for food, construction, medicines, and for other ends (Apaza et al. 2003; Reyes-Garcia et al. 2005), we would have obtained a higher level of income.

A third source of a downward bias has to do with possible omissions when recalling gifts and free labor help received. If gift giving and other expressions of pro-social behavior are frequent and ubiquitous, then it is possible that people might forget all the relevant episodes or small gifts and help received, particularly if they took place outside the household. For example, people are often given meals and offered drinks when they visit people in other households; respondents might have failed to count these events. We return to the significance of this point later when comparing our estimate of the share of social capital in personal daily income with a previous study done during 1999-2000 in which we measured social capital with more accuracy.

Last, we did not ask about other possible sources of income, such as rental income, or income from government pensions.

Biases that increase income. Two biases likely increased estimates of income. First, our estimate of income came from information collected during the dry season, roughly from May until October. In an earlier panel study covering five consecutive quarters (May 2002 – July 2003) we found that the values of sales, wage earnings, and goods received in barter during the dry season were 44%, 17%, and 22% higher than during the rest of the year.

Second, we find evidence of forward telescoping bias – people likely brought forward to the present values that took place farther back in time. The value of sales, wage earnings, and goods received in barter should not differ between the seven days before the day of the interview and the 8-14 days before the day of the interview. However, we found that the value of sales, wage earnings, and goods received in barter were 52%, 85%, and 8% higher for the seven days preceding the interview than for the 8-14 days before the day of the interview. Correlation coefficients for the different types of earnings between the two periods of time were lowest for sales (0.07), followed by barter (0.42) and wage earnings (0.68), suggesting that estimates of sales likely contain the most severe forward telescoping bias.

Biases with unclear effects on income. Two biases produce unclear effects on income. First, data on age contained random measurement errors because most adults did not have a birth certificate and guessed when answering. We have documented the bias in another publication (Godoy et al. 2005). Random measurement error in the estimate of age would affect estimates of daily income based on adult-male equivalents.

The second source of error has to do with imputation techniques. Since the area has inchoate markets for labor and products we had to impute values to goods received in barter, gifts and help received, and to farm crops and animal wildlife consumed. It is possible that the imputation techniques described earlier may have over or underestimated the true value of goods and services.

Results.

Level of daily personal income among adults. In Table 1 we present estimates of the level and composition of income for the pooled sample of people over 16 years of age. Three results stand out.

INSERT TABLE 1 ABOUT HERE

First, section A suggests that the average Tsimane' adult had a daily personal income of 26.13 bolivianos (S.D. = 21.15) or US$3.26. In Purchasing Power Parity terms, daily personal income reached US$ 9.05. Second, sections B-C suggest that 36% of adults (238 out of 611) had no monetary earnings. Adults who earned monetary income (section C) had a mean daily personal income of 31.99 bolivianos (US$ 3.99) twice as high as the mean daily personal income of adults without monetary income (15.72

bolivianos; US$1.96) (section B). Third, for the pooled sample (section A) most income (59.08%) came from the value of consuming farm crops and animal wildlife, followed by monetary earnings (31.52%) from the sale of goods (17.56%) and wage labor (13.96%). Goods received in barter accounted for only 2.79% of daily personal income, and social capital – gifts and labor help received – accounted for 3.74% of daily personal income. Among people without monetary income, 90.26% of daily personal income came from the value of consumption (section B).

Composition of daily personal income among adults in relation to sex, income quintiles, and town proximity. The information in section B, Table 2, suggests that in the pooled sample women earned 21.29 bolivianos, 31% less than men, who earned 31.08 bolivianos. Close to half (49.70%) of women but only 22.01% of men had no monetary earnings. The most striking difference between women and men in the composition of daily personal income has to do with the share of consumption and monetary earnings in daily personal income. Among women, consumption accounted for 72.19% of daily personal income, whereas among men consumption accounted for 49.90% of daily personal income. Among women, monetary earnings accounted for 17.51% of daily personal income, but among men monetary earnings accounted for 41.40% of daily personal income. Monetary remittances, barter, and social capital accounted for roughly the same shares among women and men. Among women, monetary remittances, barter, and social capital accounted for 2.91%, 2.30%, and for 4.97% of daily personal income, whereas among men monetary remittances, barter, and social capital accounted for 2.57%, 3.18%, and 2.89% of daily personal income.

INSERT TABLE 2 ABOUT HERE

The composition of daily personal income changed in systematic ways as one moved from the lowest to the highest income quintiles (Graph 1 and columns [c]-[g], Table 2). First, the share of monetary earnings in daily personal income increased linearly from 4.76% in the bottom quintile to 45.84% in the top quintile. Second, the share of consumption in daily personal income fell linearly from the bottom quintile, where it accounts for 87.82% of daily personal income, to the top quintile, where it accounted for 40.48% of daily personal income. Monetary remittances accounted for a low share of daily personal income in the pooled sample, but they accounted for a progressively larger share of daily personal income as one went from the bottom quintile (0.11%) to the top quintile (5.55%). We cannot explain why remittances represent such a high relative share in the top quintile. The share of barter in daily personal income showed no clear trend across different income quintiles, and neither did the share of social capital. The share of income from social capital fell and role in the bottom four quintiles, and reached an apex among people in the top quintile, where it accounted for 5.51% of daily personal income.

INSERT GRAPH 1 ABOUT HERE

Last, columns [h] and [i] suggest that people who lived far from the market town had a daily personal income of only 21.84 bolivianos, 31% less than people who lived close to the market town, who had a daily personal income of 31.69 bolivianos. 45.30% of people far from the market town had no monetary earnings, but only 23.95% of people close to the market town had no monetary earnings. The composition of income did not differ in visible ways in relation to town propinquity. Among adults close to the market town, monetary earnings and social capital accounted for 33.62% and 4.82% of daily

personal income, whereas among adults far from town monetary earnings and social capital accounted for 29.20% and 2.50% of daily personal income. Among adults far from the market town, barter and consumption accounted for 2.60% and 62.68% of daily personal income, but among adults close to market town barter and consumption accounted for 2.96% and 55.85% of daily personal income.

In sum, we draw the following tentative conclusions about the composition of income among adults from Table 2: **(a)** consumption accounted for the largest share of daily personal income, and accounted for a larger share among women than among men, **(b)** people without monetary earnings were more likely to be women, people in the bottom quintile of the income distribution, and people living far from the market town, **(c)** as daily personal income increased, the share of consumption in daily personal income declined while the share of monetary earning in daily personal income rose, and **(d)** social capital accounted for less than 4.00% of daily personal income, except among people in the top income quintile, women, and people close to towns, where it accounted for close to 5.00% of daily personal income.

Level of personal income for all people in the household. In Table 3 we include estimates of daily personal income for all people in the household, including children. Two findings stand out.

INSERT TABLE 3 ABOUT HERE

First, if we use a head count to estimate household size, as done in section A of Table 3, then estimates of daily personal income reach 18.86 bolivianos, or US$ 2.35. Expressed

in Purchasing Power Parity terms, daily personal income reaches US$ 6.53. If, instead, we use male-adult equivalents to proxy for household size, as done in section B of Table 3, then estimates of daily personal income are higher, reaching 28.19 bolivianos, US$3.52, or US$9.77 using the index of Purchasing Power Parity.

The second salient finding relates to the composition of income. As already seen in Table 1, column [c], Parts A-B, of Table 3 suggests that the largest share of daily personal income for the entire population continued to come from the value of consumption (75.55-75.73%), followed by earnings (18.76-18.58%). Barter, monetary remittances and social capital accounted for only 1.69-1.73%, and 2.22-2.23% of daily personal income, consistent with the findings presented earlier.

Social capital as insurance. The information in Tables 1-3 suggest that social capital accounts for a small share of daily personal income. For the pooled sample of adults (column [c], Table 1), the share reached 3.74%, and for the pooled sample of all people, including children, (column [c], Table 3) the share dropped to 2.22%. The share of daily personal income that came from social capital among women, men, people of different income levels, and people living far and close to the market town averaged about 2-5%. The evidence we have presented may be accurate but incomplete. The monetary value of social capital might not reflect its economic importance if social capital serves as self-insurance. We therefore next examine the role of social capital in cushioning people against income shocks.

During the survey we asked adults to list all misfortunes they had experience during the 12 months before the day of the interview and for each misfortune we asked them how they had coped. In only 11.66% of the 223 episodes of misfortunes did people rely on an unrelated kin for help; most people struck with a mishap weathered the spell on their own. The results are not unique to the 2005 survey. In an earlier panel study over five quarters (1999-2000) with all households (n=42) in two villages we asked the same two questions. We found that most household (82.08%) weathered mishaps on their own, without help from others (Godoy et al. 2005).

Discussion and conclusions. To conclude we turn to the queries motivating the article: How poor are people in highly autarkic societies? Does social capital play a prominent role in income in such societies? And does social capital protect people against mishaps?

The information in Table 3 suggests that for the sample of all people, including children, daily personal income in USA dollars ranged from a low US$2.35 to a high of US$3.52; the range depends on how one expresses household size. Is this a reliable estimate of income? During the 1999-2000 study over five quarters in two villages we measured income among all households by doing monthly income surveys and weigh days (Godoy et al. 2002). In weigh days, researchers identified, counted, weighed, and valued all goods entering households from 7am until 6pm on a day chosen at random each quarter. During weigh days researchers also asked about the provenience of goods (e.g., bought, gifts). In the earlier study we found that mean personal daily income reached $0.90, about half as high as the current estimate of $2.35. The difference between the two

estimates five years apart reflects the effect of inflation and changes in real prices, and the inclusion of aspects of income ignored in the earlier study, such as barter, monetary remittances, and social capital.

The present estimate of US$2.35-3.52/person/day lies above the international poverty line of US$1-2/person/day and puts the Tsimane' at the same level of income as the rest of Bolivia. The latest (1999-2001) information on income in Bolivia puts personal daily income at US$2.44, but personal daily income in rural areas of the highlands and valleys reaches only US$0.83 (Jiménez and Lizárraga 2003). The highlands and valleys have a long tradition of participating in the market economy dating back to the sixteenth century when they started to supply labor and goods to the Spanish crown. Compared with the rest of rural Bolivia, which has a longer tradition of market exposure, the Tsimane' fare better. The fact that Tsimane' have income levels three times higher than rural dwellers in the rest of Bolivia explains why almost no Tsimane' leaves the Tsimane' territory, and why, on the contrary, people from the rest of Bolivia move into the Tsimane' territory (Godoy et al. 1998).

Does a daily personal income of US$2.35-3.52 imply Tsimane' live in affluence, as suggested by Sahlins's hypothesis? The answer depends on the currency used to measure income and on the point of comparison. A daily personal income of US$2.35-3.52 translates into much higher levels of daily personal income -- US$6.53-9.77 – if one uses the index of Purchasing Power Parity. Furthermore, a daily personal income of only US$2.35-3.52, though low by absolute international standards, is three times higher than

the income of people in the rest of rural Bolivia. If people use neighbors to judge their own well-being, then a daily personal income of US$2.35-3.52 would make the Tsimane' feel affluent relative to their neighbors. In sum, we find stronger support for Sahlins's idea that people in relative autarky live in affluence than for the idea from trade theory that equates autarky with poverty.

The second significant finding relates to the economic unimportance of social capital in daily personal income. When we examine the pooled sample, and when we break up the sample by sex, income quintiles, and proximity to market town, we find that social capital accounted for a small share of daily personal income. Even among people without any monetary income (section B, Table 1), social capital accounted for only 2.66% of daily personal income.

Is ours a reliable estimate of the financial value of social capital? Again, we turn to the 1999-2000 study of two villages. Analysis of data from weigh days suggests that gifts and remittances accounted for 6.88% of the value of consumption of all goods in the household. Column [a] of Table 3 suggests that gifts and remittances at present accounted for 3.36% of food consumption (3.36 = (0.30+0.18)/14.25). The difference in estimates between the two surveys might reflect one or more of the following: decline in pro-social behavior between 1999-2000 and 2005, greater errors in 2005 from omissions of gifts when asked to recall gifts received during the seven days before the day of the interview, and a greater value for food consumption during 2005 because the survey was

done during the dry season. Note, though, that the higher financial value of social capital in the earlier study still amounts to only 6.88% of daily personal income.

We also find evidence that social capital did not get activated in times of need. The finding meshes with results of studies from other low-income areas of developing nations, which suggest that informal transfers provide incomplete insurance in times of need (Rosenzweig 1988; Morduch 2002). Our finding goes against the view of economists and evolutionary anthropologists who see material underpinning in pro-social behavior, and supports, instead, a more cultural interpretation of social capital. Generalized sharing and reciprocity probably contribute to group cohesion, signal status, and give people a sense of belonging, time, fairness, and place. Social capital does not contribute much to income or serve as insurance in times of need.

In sum, the study uncovers a more nuanced picture of well-being in autarky than one might glean from the writings of economists or anthropologists. People in highly autarkic societies enjoy relative affluence, invest in social capital for social more than for economic reasons, but cope with adversity largely on their own.

Table 1. Composition of daily personal income among Tsimane' adults, 2005, in bolivianos, USA dollars, and Purchasing Power Parity (PPP)

Item	***Bolivianos***			***USA dollars***		***PPP***	
	Mean	*S.D.*	*%*	*Mean*	*S.D.*	*Mean*	*S.D.*
	[a]	***[b]***	***[c]***	***[d]***	***[e]***	***[f]***	***[g]***
A. Pooled sample (n=661)							
1. Monetary earnings:							
Sales	4.59	12.11	17.56	0.57	1.51	1.59	4.19
Wages	3.65	8.83	13.96	0.45	1.10	1.26	3.06
Sub-total	(8.25)	(15.01)	(31.52)	(1.03)	(1.87)	(2.86)	(5.20)
2. Barter	0.73	2.35	2.79	0.09	0.29	0.25	0.81
3. Remittances	0.71	7.50	2.71	0.08	0.93	0.24	2.60
4. Social capital:							
Gifts	0.42	1.47	1.60	.05	.18	0.14	0.51
Labor	0.56	3.30	2.14	.07	.41	0.19	1.14
Sub-total	(0.98)	(3.70)	(3.74)	(0.12)	(1.08)	(0.34)	(1.28)
5. Consumption	15.44	8.69	59.08	1.90	1.08	5.35	3.01
Total	26.13	21.15	100.00	3.26	2.64	9.05	7.33
B. Adults without monetary earnings (n=238)							
1. Monetary earnings:	Not applicable						
Sales							
Wages							
Sub-total							
2. Barter	0.39	1.19	2.48	0.04	0.14	0.13	0.41
3. Remittances	0.71	8.46	4.51	0.08	1.05	0.24	2.93
4. Social capital:							
Gifts	0.19	0.59	1.20	0.02	0.07	0.06	0.20
Labor	0.23	1.63	1.46	0.02	0.20	0.08	0.56
Sub-total	(0.42)	(1.77)**	(2.66)	(0.05)	(0.22)	(0.14)	(0.61)
5. Consumption	14.19	0.04	90.26	1.77	1.13	4.19	3.13
Total	15.72	14.70	100.00	1.96	1.83	5.45	5.09
C. Adults with monetary earnings (n=423)							
1. Monetary earnings:							
Sales	7.18	14.51	22.44	0.89	1.81	2.49	5.03
Wages	5.71	10.50	17.84	0.71	1.31	1.98	3.64
Sub-total	(12.90)	(17.09)	(40.28)	(1.61)	(2.13)	(4.47)	(5.92)
2. Barter	0.93	2.79	2.90	0.11	0.34	0.32	0.96
3. Remittances	0.70	6.92	2.18	0.08	0.86	0.24	2.39
4. Social capital:							
Gifts	0.55	1.77	1.71	0.06	0.22	0.19	0.61
Labor	0.75	3.93	2.34	0.09	0.49	0.26	1.36
Sub-total	(1.30)	(4.40)	(4.05)	(0.16)	(0.55)	(0.45)	(1.52)
5. Consumption	16.14	8.42	50.45	2.01	1.05	5.59	2.91
Total	31.99	21.98	100.00	3.99	2.74	11.08	7.61

Table 1. Composition of daily personal income among Tsimane' adults, 2005, in bolivianos, USA dollars, and Purchasing Power Parity (PPP)

Notes: PPP=2839. Exchange = 8 bolivianos = 1 USA dollar. Household size used to value consumption/person. Consumption includes the daily value of maize, rice, plantains, manioc, pigeon peas, and all animal wildlife consumed by the household divided by the total number of people residing in the household at the time of the interview.

Table 2. Composition (%) of daily personal income among Tsimane' adults, 2005, by sex, income quintiles, and proximity to market

	Sex:		Income quintiles:					Proximity to market:	
	Women	Men	≤20%	20-≤40%	40-≤60%	60≤-80%	>80%	Close	Far
Observations	334	327	131	133	131	132	134	288	373
	[a]	***[b]***	***[c]***	***[d]***	***[e]***	***[f]***	***[g]***	***[h]***	***[i]***
A. Level of income in bolivianos from different sources:									
1. Monetary earnings:									
Sales	3.34	5.88	0.34	1.50	2.57	4.27	14.12	6.94	2.78
Wages	0.39	6.99	0.06	0.43	1.40	4.51	11.72	3.72	3.60
Sub-total	(3.73)	(12.87)	(0.41)	(1.94)	(3.97)	(8.78)	(25.84)	(10.67)	(6.39)
2. Barter	0.49	0.99	0.32	0.22	0.62	1.06	1.44	0.94	0.57
3. Remittances	0.62	0.80	0.01	0.02	0.06	0.26	3.13	0.83	0.61
4. Social capital:									
Gifts	0.46	0.38	0.14	0.23	0.41	0.39	0.91	0.49	0.36
Labor	0.60	0.52	0.11	0.02	0.14	0.30	2.20	1.04	0.19
Sub-total	(1.06)	(0.90)	(0.26)	(0.26)	(0.56)	(0.69)	(3.11)	(1.53)	(0.56)
5. Consumption	15.37	15.51	7.36	12.39	15.70	18.76	22.82	17.70	13.69
Total income									
Mean	21.29	31.08	8.38	14.86	20.93	29.58	56.36	31.69	21.84
Standard deviation	18.07	22.89	2.44	1.87	1.73	3.48	28.30	24.63	16.83
% without monetary earnings	49.70	22.01	77.86	48.12	34.35	12.87	7.46	23.95	45.30
B. Share (%) of total income from different sources:									
1. Monetary earnings:									
Sales	15.68	18.91	4.05	10.09	12.27	14.43	25.05	21.89	12.72
Wages	1.83	22.49	0.71	2.89	6.68	15.24	20.79	11.73	16.48
Sub-total	(17.51)	(41.40)	(4.76)	(12.98)	(18.95)	(29.67)	(45.84)	(33.62)	(29.20)
2. Barter	2.30	3.18	3.81	1.48	2.96	3.58	2.55	2.96	2.60
3. Remittances	2.91	2.57	0.11	0.13	0.28	0.87	5.55	2.61	2.79
4. Social capital:									
Gifts	2.16	1.22	1.67	1.54	1.95	1.31	1.61	1.54	1.64
Labor	2.81	1.67	1.31	0.13	0.66	1.01	3.90	3.28	0.86
Sub-total	(4.97)	(2.89)	(2.98)	(1.67)	(2.61)	(2.32)	(5.51)	(4.82)	(2.50)
5. Consumption	72.19	49.90	87.82	83.37	75.01	63.42	40.48	55.85	62.68
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

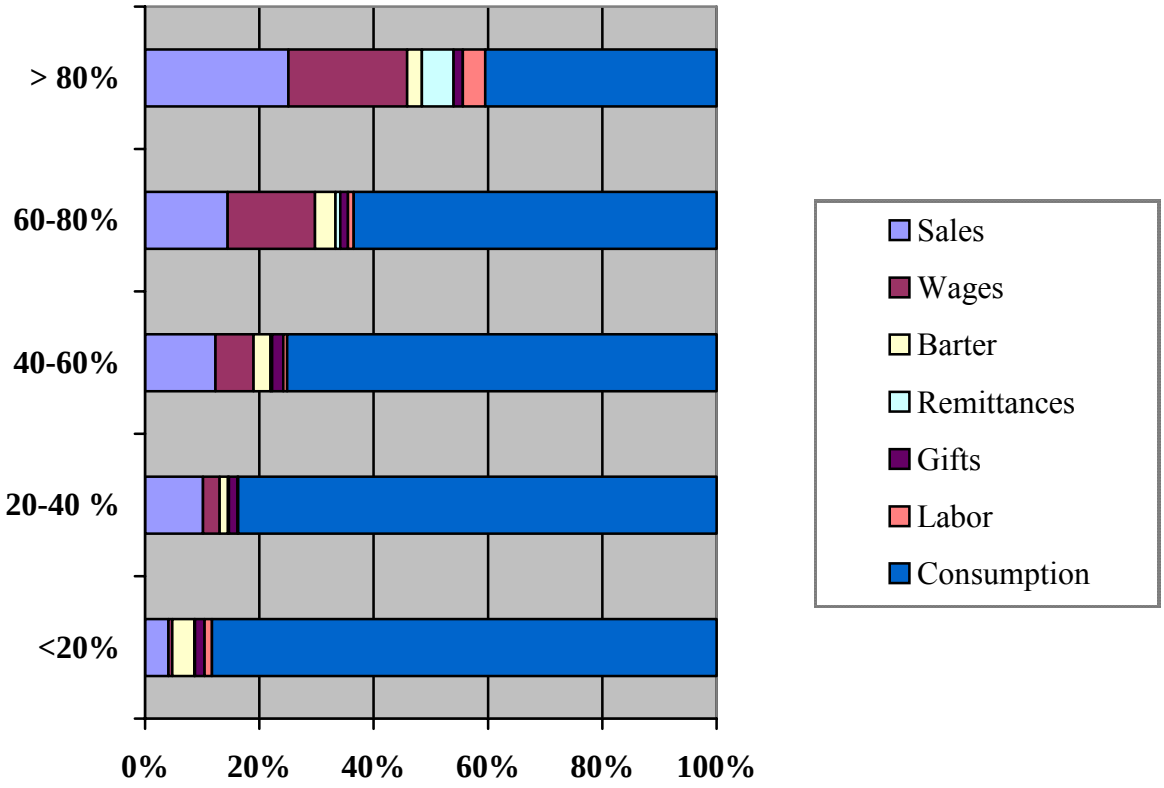
Notes: Close and far means below and above median village-to-town distance.

Table 3. Composition of daily personal income among all Tsimane', 2005, in bolivianos, USA dollars, and Purchasing Power Parity (PPP) (n=1540)

Item	***Bolivianos***			***USA dollars***		***PPP***	
	Mean	*S.D.*	*%*	*Mean*	*S.D.*	*Mean*	*S.D.*
	[a]	***[b]***	***[c]***	***[d]***	***[e]***	***[f]***	***[g]***
A. Household size = head count							
1. Monetary earnings:							
Sales	1.98	3.46	10.49	0.24	0.43	0.68	1.20
Wages	1.56	2.61	8.27	0.19	0.32	0.54	0.90
Sub-total	(3.55)	(4.25)	(18.76)	(0.44)	(0.53)	(1.23)	(1.47)
2. Barter	0.32	0.60	1.69	0.04	0.07	0.11	0.20
3. Remittances	0.30	3.86	1.59	0.03	0.48	0.10	1.34
4. Social capital:							
Gifts	0.18	0.46	0.95	0.02	0.05	0.06	0.16
Labor	0.24	1.30	1.27	0.03	0.16	0.08	0.45
Sub-total	(0.42)	(1.43)	(2.22)	(0.05)	(0.17)	(0.14)	(0.49)
5. Consumption	14.25	7.74	75.55	1.78	0.96	4.94	2.68
Total	18.86	11.21	100.00	2.35	1.40	6.53	3.88
B. Household size = male-adult equivalents							
1. Monetary earnings:							
Sales	2.96	5.18	10.50	0.37	0.64	1.02	1.79
Wages	2.28	3.59	8.08	0.28	0.44	0.79	1.24
Sub-total	(5.24)	(6.14)	(18.58)	(0.65)	(0.76)	(1.81)	(2.13)
2. Barter	0.49	0.95	1.73	0.06	0.11	0.17	0.33
3. Remittances	0.46	6.12	1.63	0.05	0.76	0.16	2.12
4. Social capital:							
Gifts	0.28	0.71	0.99	0.03	0.08	0.09	0.24
Labor	0.35	1.82	1.24	0.04	0.22	0.12	0.63
Sub-total	(0.63)	(2.05)	(2.23)	(0.07)	(0.25)	(0.21)	(0.71)
5. Consumption	21.35	11.40	75.73	2.66	1.42	7.40	3.95
Total	28.19	16.54	100.00	3.52	2.06	9.77	5.73

Notes: PPP=2839. Exchange rate = 8 bolivianos = 1 USA dollar.

Graph 1. Composition (%) of daily personal income among Tsimane' adults by income quintiles



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