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Does consumption of market goods relates to well-being? An empirical test in the Bolivian Amazon

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Abstract

The intuition that sustainable degrowth might be the way to simultaneously reduce environmental pressures and improve human well-being comes from the environmental and the social sciences. Environmental scientists have found that, despite policies oriented to protect the environment, pressure on the environment continues to increase with economic growth. The finding implies that the model of economic growth would only exacerbate environmental pressures, which justifies the search for alternative economic models. Research in the social sciences suggests that economic growth and human well-being are not necessarily linked, which allows for conceptualizing models that increase human well-being without depending on economic growth. Here I contribute to the growing body of social science research supporting the viability of sustainable degrowth by examining the association between consumption (a standard indicator of economic growth), within-group consumption inequality, and human well-being (measured through a questionnaire on locally relevant events). Differently from previous research, mostly based on industrial nations, I use a unique body of data collected in a small-scale foraging-horticulturalist society in the Bolivian Amazon, the Tsimane'. Data include measures of consumption of market goods and two measures of subjective well-being from 355 women and 353 men. Using multivariate analyses, I found that, for this society in the early stages of integration to the market economy, expenditures in market goods are not directly associated with any of our two measures of subjective well-being. The finding questions the often assumed link between economic growth and well-being, and as such, it reinforces the argument that consumption does not increase social well-being, a premise for sustainable degrowth. Furthermore, I also found that village inequalities in consumption of luxury goods have negative effects to subjective well-being. Specifically, I found that doubling the within-village dispersion in expenditures in luxury goods would be associated to a 16% lower score in our measure of subjective well-being. This research suggests that equitable consumption of basic goods can perfectly lead to societies with good standards of well-being.

Keywords

Well-being; happiness; income; income and social inequalities; sustainable degrowth

1 Introduction

Humanity is nowadays facing a dramatic challenge: how to improve human well-being without exacerbating environmental pressures. The global economic, social, and environmental policies based on economic growth seem to have failed in addressing this challenge. Recently, researchers and activists have proposed "sustainable degrowth" as an alternative economic model that might help humanity to face the challenge (Latouche, 2003;Martinez-Alier, 2009).

Sustainable degrowth has been defined as an "equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions at the local and global level, in the short and long term" (Schneider et alt., 2010). Sustainable degrowth does not mean a recession or depression in the economy leading to a deterioration of social and environmental conditions (Schneider et al., 2010) as for example the current economic crisis. It means a downscaling of the economy (Latouche, 2003) leading to well-being improvement while assuring ecological sustainability.

Support for the intuition that sustainable degrowth might help to simultaneously reduce environmental pressures and improve human well-being comes both from the environmental and the social sciences. Environmental scientists have found that, despite the growing number of environmental policies, pressure on the environment continues to increase with economic growth (Millennium Ecosystem Assessment, 2005;Trauger et al., 2003). The finding implies that the model of economic growth would only exacerbate environmental pressures, which justifies the search for other economic models. Research in the social sciences suggests that human well-being does not necessarily bear a direct link with economic growth (Diener and Biswas-Diener, 2002;DiTella et al., 2003;Easterlin, 1974), which allows for conceptualizing models that increase human well-being without depending on economic growth.

Here, I contribute to the growing body of social science research providing support to the viability of sustainable degrowth by examining the association between consumption and human well-being. Unlike previous researchers who used data from industrial societies, for the analysis I use a unique body of data collected in a small-scale society on the initial stages of integration to the market economy.

1.1 Theory

In the next two sections I review the evidence from the environmental and the social sciences that economic growth exacerbates environmental pressures without necessarily improving human well-being.

1.1.1 Limits to economic growth and the "Sustainable degrowth" concept

In 1987, the Brundtland Report (World Commission on Environment and Development, 1987) defined Sustainable Development as "the development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The concept referred to a type of economic growth environmentally friendly and socially equitable. The major thesis in the Brundtland Report was that economic growth and ecological sustainability could be simultaneously achieved. As it has been claimed by several authors (Daly, 1990;Naredo, 1999), the definition, although politically sexy, did not considered economic flows in relation to ecosystem limits, and therefore set the basis for continuing negative impacts of economic growth on the environment.

More than twenty years after the Brundtland report, and despite the progress done in environmental policies, scientists have provided strong evidence that economic growth does have negative impacts on the environment. For example, researchers have documented the increase in global greenhouse gas emissions from 6.1GtC yr-1 in 1990 to 7.8GtC yr-1 in 2005 (IPCC, 2007). Similarly, research in the energy and material fluxes in the economy reveals that, despite the eco-efficiency efforts, there is no sign of dematerialization in the industrial nations and that energy and material consumption has continued to grow. For example, total energy consumption of the OECD countries in 1990 was 197.7 quadrillion Btu

and it reached 241.3 in 2005 (Energy Information Administration, 2009). The per capita total material requirement of the European Union rose from 45 to 49 tonnes between 1988 and 1994 (12 countries) and went up to 50 tonnes in 1997 (15 countries) (Bringezu and Schütz, 2001). Eco-efficiency has led to the so called Jevons paradox (Martinez-Alier, 1987), where technical advances have been offset by the rise in consumption and economic growth has not provided the claimed ecological sustainability.

Given the growing evidence that economic growth cannot surpass ecosystem limits without serious environmental consequences (Global Footprint Network, 2008;Wackernagel, 2002), researchers have proposed sustainable degrowth as an alternative to reach sustainable development without further threatening the environment. The concept degrowth is not new. It was first introduced in 1979 by Jacques Grinevald and Ivo Rens as a title of a book of translated articles of Nicholas Georgescu-Roegen (Georgescu-Rogen, 1979a). Georgescu-Roegen connected thermodynamics, specially the Entropy law, with the economic process showing that if the productive processes transform low entropy resources into goods and high entropy waste, there is an increase of non available energy (Georgescu-Rogen, 1971). Considering that the Earth is a system open on energy but closed in materials, Georgescu-Roegen evidenced that a scarcity on materials could be expected and argued against an infinite growth on a limited planet (Georgescu-Rogen, 1979b). He was the main source for the foundation of Ecological Economics that has produced a whole body of literature on the contradictions of the economic system and the conservation of nature (Daly, 1996). But the concept degrowth only reached the large public in February 2002, when the journal Silence published a series of articles on the topic. More recently, the topic has been object of several articles in Le Monde and elsewhere (Flipo, 2008), suggesting its growing popularity.

1.1.2 Economic growth and well-being

The second body of evidence to support the intuition that sustainable degrowth may help to simultaneously reduce environmental pressures and improve human well-being comes from the social sciences. Economists have often equated the concept of well-being with economic indicators, such as income. But other social scientists have proposed than rather than measuring economic indicators, well-being should be measured through how people themselves evaluate their lives, including aspects that range from life satisfaction to lack of depression and anxiety, and experiencing positive moods and emotions (Diener and Suh, 1997), or what is know as subjective well-being (SWB). Here, I adopt the second definition to refer to well-being.

Evidence that human well-being does not necessarily bears a direct link with economic growth comes from two streams of research on the social sciences: the economics of happiness and the income inequality literature. First, there is a large bulk of research studying the association between subjective well-being and economic factors, the so-called economics of happiness literature. The main catalyst of this body of research was a seminal paper published in early 1970s by Richard A. Easterlin showing that, across nations, the trend on happiness remained stationary despite a sharp growth in material conditions (Easterlin, 1974), updated 1995). After Easterlin, several researchers have tested the association between economic status and subjective well-being mostly finding similar results (Blanchflower and Oswald, 2004;Di Tella and MacCulloch, 2008;Diener and Oishi, 2000;Frey and Stutzer, 2002a;Inglehart and Klingemann, 2010); but see (Hagerty and Veenhoven, (2003) for contrary results). At a global level, four replicable findings have emerged regarding the relation between income and SWB (Diener and Biswas-Diener, 2002). First, there are large correlations between the wealth of nations and the mean reports of SWB in them, but –second- there are mostly small correlations between income and SWB within nations, although these correlations appear to be larger in poor nations and the risk of unhappiness is much higher for poor people. Third, in most economically developed societies economic growth in the last decades has been accompanied by little rise in SWB. Furthermore, increases in individual income lead to variable outcomes. Last, people who prize material goals more than other values tend to be substantially less happy, unless they are rich. Those findings suggest that more income enhances SWB when it means avoiding poverty, but income appears not to increase SWB when more income is gained by well-off

individuals whose material desires rise with their incomes. Because people compare with others around them, an overall increase in income results in no net effect on SWB (Diener et al., 1993;Easterlin, 2001). As (Brickman and Campbell, 1971) has put it:

"The nature of [adaptation to the improving circumstances] condemns men to live on a hedonic treadmill, to seek new levels of stimulation merely to maintain old levels of subjective pleasure, to never achieve any kind of permanent happiness or satisfaction" (Brickman and Campbell, 1971, p289)

The second line of evidence that human well-being does not necessarily bears a direct link with economic growth comes from scholars analyzing the effects of income inequality on well-being. Scholars have found that –in developing and developed countries- the increase in income inequalities that comes along with the economic growth of societies has negative effects on well-being (Alesina et al., 2004;Fahey and Smyth, 2004); but see (Senik, 2004) for contrary findings). For example, Alesina et al. (2004) report that when inequality is high individuals are less likely to report themselves happy than when inequality is low. Similarly, Fahey and Smyth (2004) find that social inequalities within European societies have strong negative effects, especially within poor European societies. Analysing poorest and isolated Nepalese households, Fafchamps and Shilpi (2008) find that they do care about relative consumption, this is, their assessments on subjective well-being increase with its own consumption and fall with consumption of others. In a similar pattern, epidemiologists suggest that the concentration of income might affect health through the breakdown of social cohesion (Wilkinson, 1997) and the creation psychological stress (Kawachi, 2002) thus affecting objective indicators of individual well-being. Economic inequality erodes social capital -- trust, safety nets, social networks, and community organizations that enable people to act collectively (Kawachi et al., 1997;Wilkinson, 1997). The erosion of social capital creates shame, distrust, envy, and antisocial and stress-related behaviour that have adverse effects on well-being.

In sum, research from the social sciences suggests that not only economic growth is not directly associated to an increase of human well-being, but further that the increase in economic inequalities that occur as societies experience economic growth might have a pervasive effect on human well-being.

1.2. Hypotheses and estimation strategy

1.2.1 Hypotheses

In this paper, I explore the associations between consumption of market goods and subjective well-being. Following insights from previous literature on income and well-being and from the theory of sustainable degrowth, I expect to find that the consumption of market goods is directly associated with subjective well-being. Furthermore, I also expect that -as with other indicators of economic disparities (e.g., income inequality) (Kawachi, 2002)- inequality in consumption of luxury goods would have a negative effect on individual well-being. I formalize those ideas in the following two hypotheses:

H1: Individual consumption of market goods will bear a direct link with individual subjective well-being.

Rationale: As noticed, one of the important replicable findings in research examining the relation between income and SWB is that income seems to enhance SWB only when income means avoiding poverty (Diener and Biswas-Diener, 2002). Since the Tsimane' total income is bellow the poverty level by World Bank standards (Godoy et al., 2007c), one would expect a positive association between both variables.

H2: Consumption inequality would bear a negative association with subjective well-being.

Rationale: Researchers have found that income inequality has negative impacts in subjective well-being (Alesina et al., 2004;Fahey and Smyth, 2004; Kawachi et al., 1997;Wilkinson, 1997). Building on those findings, I will test if community inequalities in consumption have negative impact on individual

subjective well-being.

1.2.2 Estimation strategy

My main aim is to estimate the association between subjective measures of well-being (outcome) and two measures of consumption (individual consumption of market goods and village consumption inequality) while controlling for variables that researchers have proposed to explain subjective well-being. For the empirical analysis, I use two proxy measures of well-being (subjective well-being and frequency of smiles). I follow the standard economic approach and divide consumed goods between basic (or inferior), normal, and luxury (or superior) goods. Since I do not have data for total income, I defined basic goods as goods that decrease in demand when consumption rises (Heffetz, 2004). I defined luxury goods as goods that increased in demand when consumption rises. To classify items as basic, normal, or luxury, I calculated the Engel curve of all the market items consumed by the study population, or how the consumption of a good varied with variation in total consumption.

I use the following expression to model the association between subjective well-being (Y) and covariates:

$$\log Y_{ihv} = \alpha + \gamma \log C_{ihv} + \lambda \log CVBas_v + \beta \log CVLux_v + \psi I_{ihv} + \zeta Hh_v + \text{?}C_v + \varepsilon_{ihv} \quad [1]$$

Assume, first, that Y captures the subjective well-being of a person, where i is the subject, h the household, and v the village. I use subjective well-being for ease of exposition, but the expression also applies to my second measure of well-being, frequency of smiles. $\log C_{ihv}$ refers to the individual annual consumption of market goods. LogCVBasicv refers to the village inequality in consumption of basic goods, defined as the logarithm of the village coefficient of variation of consumption of basic goods. LogCVLux_v refers to the village inequality in consumption of luxury goods, defined as the logarithm of the village coefficient of variation of consumption of luxury. Iihv is a vector of variables for the subject that directly affects well-being (e.g., age, sex, schooling). Hhv stands for household size. Cv stands for a set of village level variables to control for factors that could directly affect well-being and consumption (e.g., number of households in a village, proximity to market towns). εihv is a random error term with standard properties. For the estimation, I transformed the explanatory and dependent variables to logarithms and used ordinary-least square regressions with robust standard errors and clustering by village.

1.3 The Tsimane'

1.3.1 General description

The Tsimane', with about 8000 people living around 100 villages, are one of the largest native Amazonian groups in Bolivia (Instituto Nacional de Estadistica, 2003). They live mostly along the Maniqui and the Apere rivers in the department of Beni. Analysis in progress suggests that the main territory of the Tsimane' covers 3,451 km2 (Reyes-García et al., 2009b). From 1970s onward, the Tsimane' population has grown at an annual rate of 4.76% (Reyes-García, 2001) owing to a high fertility rate and a decline in mortality (Gurven et al., 2007). The Tsimane' economy centres on hunting, fishing, plant foraging, and on slash-and-burn farming, and Tsimane' have low levels of monetary income (~US$ 1-2/day/person) (Godoy et al., 2007a). Tsimane' ethnography and history has been documented by Huanca (Huanca, 2008), and analysis of their economy and well-being can be found in published articles (Godoy et al., 2002b;Godoy et al., 2005a;Reyes-García et al., 2009a;Reyes-García et al., 2010), so here I centre the discussion on three topics that directly deal with the content of the article: subjective well-being, consumption, and the effects of inequalities on well-being among the Tsimane'.

1.3.2 Well-being among the Tsimane'

Researchers have used objective and subjective indicators to analyze well-being among the Tsimane'. On a recent article analyzing trends in standard indicators of well-being (including economic, health, psychological, and social indicators) between 2002-2006, Godoy and colleagues (Godoy et al., 2009) find significant rates of improvement for seven of the twelve indicators analysed. But researchers have also

find that Tsimane' own definition of well-being differs from the standard indicators used by researchers. For example, in recent research, Reyes-García and colleagues (Reyes-García et al., 2009a;Reyes-García et al., 2010) explored the concept of well-being among the Tsimane' as a locally-defined multidimensional concept encompassing a large range of entangled human needs (Max-Neef, 1992;Max-Neef et al., 1993), finding that Tsimane' sense of well-being centres on social relations and success in subsistence activities. For example, Reyes-García (2009a) reports that Tsimane' list as their most important source of well-being spending time with close family, followed by having a good crop, and having enough to eat, particularly meat. Other important sources of well-being for the Tsimane' include drinking a home-fermented native beverage, receiving visitors, and visiting kin and kith.

1.3.3 Consumption among the Tsimane'

Tsimane' are a largely subsistence society. Forest products account for about half (52.49 – 53.11 %) of the total value of household consumption, followed by farm products (43.52 – 35.70 %). Only about 4-11% of the total value of Tsimane' income corresponds to market goods (Godoy et al., 2002a). The contribution of forest products to household consumption decreases with the distance of the village to the market.

Although consumption of markets goods is relatively recent among the Tsimane', researchers have found that Tsimane' total monetary expenditures bears a positive association with the share of expenditures allocated to luxury goods and to highly visible goods and a negative association with expenditures allocated to less visible durable goods, thus suggesting a growing trend in signalling status by consuming market goods (Godoy et al., 2007b).

1.3.4 Inequality among the Tsimane'

Previous research in economic and social inequalities among the Tsimane' has focused on the effects of those inequalities on nutritional status as an objective measure of well-being. Overall, researchers have found that the increase of inequalities have negative effects on Tsimane' nutritional status, although not all forms of material inequalities have direct negative effects. For example, using cross-sectional information Godoy et al (2005) find that village income inequality is not correlated with individual measures of nutritional status (Godoy et al., 2005a), although the increase in village income seem to reduce individual incentives to invest in social capital (Brabec et al., 2007).

More recent research among the Tsimane' using non-material form of inequality, specifically inequality in social rank, has found that that village inequality in dominance (or social rank obtained through power), but not village inequality in prestige (or freely conferred deference) is associated with short-term indices of individual nutritional status. Researchers have also found that, among the Tsimane', when decoupling individual social rank based on dominance from individual social rank based on prestige, only prestige-based social rank is associated with nutritional status (Reyes-García et al., 2009c).

In sum, previous research among the Tsimane' suggest that 1) the Tsimane' concept of well-being is associated to their traditional way of living, not to the consumption of market goods, 2) consumption of market goods among the Tsimane' is marginal, but growing probably as a way to signal status, and 3) social inequalities within a village produce negative effects on Tsimane' well-being.

2. Material and methods

For the empirical analysis, I used data from a survey done between May and October, 2006, in 13 villages along the Maniqui River in the department of Beni. The survey is part of the Tsimane' Amazonian Panel Study (Leonard and Godoy, 2008), a study in progress since 2002. Data was collected by a team of trained researchers and assistants who have worked for TAPS from its inception. Data is available to the public at www.tsimane.org/development/pgs/development.html.

Sample. Data used in this article was gathered from all Tsimane' adults in 13 villages differing in their

proximity to San Borja (mean=25.96 km; standard deviation [S.D.]=16.70), the only market town along the Maniqui River. The sample contains 355 females and 353 males over the age of 16 (or younger if they headed a household) with complete data on all outcome and explanatory variables for two or more survey years. These people came from 326 households.

Dependent variable: Well-being. Psychologists and recently economists have made ample use of subjectively evaluated measures of individual well-being (Kahneman and Krueger, 2006) (Alesina et al., 2004;Diener, 1994;Ferrer-i-Carbonell, 2005). I followed that trend. Specifically, I used two different measures of subjective well-being: a self-reported measure (subjective well-being) and a direct measure (frequency of smiles).

Subjective well-being (SWB): To identify elements that contribute to Tsimane' sense of well-being, a two steep process was followed. First, a free listing exercise was used to elicit the full range of items that Tsimane' associate with well-being (Weller, 1998). TAPS researchers asked 35 individuals from 13 villages to list "things that make you happy." Individuals were selected across age and gender (Bernard, 2005). From the free listing responses It was calculated: 1) the percentage of people who mentioned each reason, 2) the average rank of each reason across lists, and 3) the saliency (Smith's S) of each reason, which is an index that captures, on a scale from zero to one, the importance of an item across all of the lists (Bernard, 2005). Tsimane' listed 37 causes of happiness. For the second step, the seven most salient reasons from the compiled list were selected. Researchers asked all the adults in our sample about the occurrence of those salient events in the week prior to the interview. For example, Tsimane' listed "to succeed in hunt" as a factor that makes them happy, so as a part of the survey used here, researchers asked, "During the last week, how many times did you/your husband succeed in hunt?" I coded responses to those questions as (1) none, (2) a few times, or (3) many times. To generate an individual/annual score of subjective well-being, I multiplied responses to the questionnaire by the saliency of the reason, so that items contributing more to Tsimane' well-being were weighted more heavily in the score.

Frequency of Smiles: A major problem in using data on subjective well-being is that individuals may interpret and use the response categories differently (Kahneman and Krueger, 2006). To circumvent the problem, I also proxied well-being with a second variable based in direct observations of subjects. The individual-level interview from which these data was obtained included a variety of topics related to the socioeconomic and health condition of the person and her/his family and lasted about 45 minutes. At the end of the interview, interviewers noted whether the subject: (1) neither laughed nor smiled during the interview, (2) only smiled, (3) smiled and laughed, (4) and laughed openly and frequently. The variable 'frequency of smiles' thus captures a range of intensity in emotive expressions. A distinction between laughter and smile was made because people might use the two responses in different contexts (Kraut and Johnston, 1979). Previous research has proved that the propensity to smile or laugh is not affected by the interviewer (Godoy et al., 2005b).

Explanatory variables:

Total annual consumption: Adults in the sample were also asked to list all the monetary expenditures in durable market goods during the 12 months before the interview and to indicate the quantity and the value of each good in Bolivianos (1US$ = 8.01Bs in 2006). In order to reduce omissions from faulty recall, when they finished listing market goods, interviewers prompted their memory by reading them a list of goods common in the area. If informants remembered new items, they were also recorded.

Consumption inequality: I used information on consumption of market goods during the week previous to the interview to construct a measure of village consumption inequality that reduces colinearity with the measure of total annual consumption. Interviewers asked participants to indicate the goods acquired through market transactions during the week previous to the interview and their value in Bs. I grouped market goods in categories (Table 1) and draw the Engel Curves for each category. I used the results from the Engel curves to divide the categories of goods in (a) necessities and normal goods, or goods that

decrease in demand when consumption rises and (b) luxury goods, or goods that increase in demand when consumption rises. Table 1 contains a lists of all products included in each category.

Based on the individual measures of consumption, I then constructed a set of variables that proxy for village inequality in consumption. I calculated the village coefficient of variation (CV), or the ratio of the standard deviation to the mean of the variables basic consumption and luxury consumption.

Control variables. Controls in my regression analysis include variables that, according to the literature (Dolan et al., 2008;Frey and Stutzer, 2002b), affect well-being. Specifically, my controls include sex, age, schooling, value of annual non-market consumption, social capital, household size, and village level variables that might affect both inequality in consumption and well-being, such as village-to-town distance, village size, and village income inequality. I provide the definition and summary statistics of the outcome, explanatory, and control variables in Table 2.

Table 1 Tsimane' individual consumption of market goods during the 7 days before the interview (1$ = 8,01 Bs in 2006)

Category	Description	Mean	Stand dev	Min	Max	%%
Necessities and normal goods						
Bread/noodles /Flour	Bolivianos (Bs) spent in bread/noodles/flour	2.67	8.79	0	86	17.4
Durable Assets Hygiene	Bs spent in durable assets related to hygiene (e.g., mosquito net and plastic comb)	0.11	2.88	0	75	0.4
Durable Assets-household	Bs spent in durable assets household (e.g., mirror and candles)	0.06	0.12	0	3	0.02
Hygienic goods	Bs spent in hygienic goods (e.g., soap and toothpaste)	0.47	2.20	0	28	6.2
Meat	Bs spent in meat	2.49	9.26	0	84	16.4
Milk/cheese	Bs spent in dietary products	0.03	0.62	0	18	0.1
Salt / Condiments	Bs spent in salt/condiments	0.36	2.09	0	30	2.9
School supplies	Bs spent in school supplies	0.01	0.31	0	8	0.03
Sweets	Bs spent in sweets	3.34	12.94	0	190	23.4
Transport	Bs spent in transport	0.72	4.58	0	80	4.4
Luxury goods						
Alcoholic beverages	Bs spent in alcoholic beverages	0.06	1.40	0	36	0.3
Clothing	Bs spent in clothing	2.22	13.65	0	173	6.1
Durable assets – kitchen	Bs spent in durable assets kitchen (e.g., aluminium tub and pot, plastic water container)	13.91	2.01	0	40	2.8
Durable assets home improvement	Bs spent in durable assets related to home improvement (e.g., nails and tin roof)	0.15	0.38	0	10	0.1
Durable assets luxury	Bs spent in durable assets (e.g., radio, toy, mobile)	1.09	8.30	0	183	5.8
Durable assets tools	Bs spent in tools (e.g., machete and fishing net)	2.47	19.13	0	350	5.3
Durable Assets Transport	Bs spent in durable assets related to transport (e.g., canoe, bicycle)	0.04	0.96	0	25	0.2
Oil	Bs spent in oil during the 7 days before the interview	1.04	8.68	0	148	3.3
Other foods	Bs spent in other foods	1.71	21.65	0	450	3.9
Restaurants	Bs spent in restaurants	0.93	10.82	0	200	3.1

Based on the individual measures of consumption, I then constructed a set of variables that proxy for village inequality in consumption. I calculated the village coefficient of variation (CV), or the ratio of the standard deviation to the mean of the variables basic consumption and luxury consumption.

Control variables. Controls in my regression analysis include variables that, according to the literature (Dolan et al., 2008;Frey and Stutzer, 2002b), affect well-being. Specifically, my controls include sex, age, schooling, value of annual non-market consumption, social capital, household size, and village level variables that might affect both inequality in consumption and well-being, such as village-to-town distance, village size, and village income inequality. I provide the definition and summary statistics of the outcome, explanatory, and control variables in Table 2.

Table 2. Definition and summary statistics of variables used in regressions

Variable	Definition	N	Mean	Stand dev
I. Outcome variables (in regressions entered in natural logarithm):				
SWB	Score on a questionnaire on the occurrence of events that contribute to Tsimane' happiness. Range: 0- 14	676	7.49	1.83
Smiles	Smiling during quarterly interviews. Range: 0 to 4 (1: neither laughed nor smiled; 2: only smiled; 3: laughed and smiled; 4: laughed openly and frequently)	676	2.81	0.98
II. Explanatory variable (in regressions entered in natural logarithm):				
Individual Consumption				
Total annual consumption	Bs expend by subject in durable market goods during the 12 months before the interview	674	217	404
Consumption inequality:				
CV basic consumption	Coefficient of variation of Bs expend by subjects in necessities and normal goods during the 7 days before the interview	13	2.47	1.19
CV luxury consumption	Coefficient of variation of total Bs expend by subjects in luxury goods during the 7 days before the interview	13	3.56	1.57
III. Control variables				
Individual level				
Age	Age of participant (years)	668	35.11	16.92
Value of non-market consumption	Total value of individual farm and forest products consumed by the individual during the 7 days before the interview, in Bs	676	140.95	80.35
Social capital	Total value of gifts and labor help received from other households, in Bs	676	2.94	8.15
Household level				
Household size	Number of people living in the household at the moment of the interview	262	6.06	2.78
Village level				
Number houses	Number of households in a village	13	26.93	13.67
Income inequality	Coefficient of variation of village cash income	13	1.93	0.55
Mean basic	Average village expenditures in necessities and normal goods, in Bs	13	10.54	5.54
Mean luxury	Average village expenditures in luxury goods, in Bs	13	8.99	7.22

Caveats: Three caveats apply to my estimations. First, since I only have 13 villages in the sample and the explanatory variables are constructed at the village level, my statistical power is low. Second, I might have measurement error in the explanatory variable due to faulty of recall in the items consumed or in the imputation of prices. The field team tried to overcome the first problem by reading a list of goods during the interview, but I cannot discard the possibility of faulty recall. Last, my estimations might be biased by the role of omitted variables. In the robustness analysis, I try to overcome this caveat by adding other variables to the core model.

3. Results

Tsimane' consumption of market goods: The average annual expenditure in market goods in the sample was low. On average, Tsimane' spent 216 Bs per year (SD= 404) in market products. The amount is low even in the local context, as it represents about 10 days of wage labour (at 20 Bs/day). The amount is also low compared with the imputed value of non-market consumption. As shown in Table 1, the total value of individual farm and forest products consumed by the individual during the seven days before the

interview is of 141 Bs, which might result in 7.473 Bs/year a much larger amount than the 216Bs spent in market goods. Therefore, the average Tsimane' market expenditures represent only about 3% of Tsimane' consumption value.

Minimum and maximum values for annual expenditures in market goods ranged from 0 to 3680 Bs. About 26% of the Tsimane' in our sample had no expenditures. The percentage of women who had no expenditures in our sample was higher than the percentage of men who had no expenditures (41% versus 11%), suggesting that in our sample women and men had different pattern of expenditures, with men acquiring more market goods than women.

Data also suggest that Tsimane' monetary expenditures in necessities and normal goods is almost three-fold the amount of Tsimane' monetary expenditures in luxury goods (71% versus 29%). Within the category of necessities and normal goods three types of edible market goods stood out: Sweets (representing 23.4% of the total expenditures), Bread/Noodles/Floor (17.4%) and Meat (16.4%) (Table 1). Other non-edible goods that represented an important share in Tsimane' monetary expenditures in necessities and normal goods include Hygienic goods (6.2%) and Transport (4.4%). The category of luxury goods includes types of goods with a lower share in total expenditure. Among luxury goods the largest share was spent in Clothing (6.1%), followed by Durable assets (5.8%) such as radio and mobile phones.

Consumption inequality: I found a higher CV of consumption of luxury than of basic goods. Across the 13 villages, the average CV of consumption of basic goods was 2.47 (SD=1.19; min=1.29; max=5.20) whereas the average CV of consumption of luxury goods was 3.56 (SD=1.57; min=1.87; max=7.13). Since a higher CV indicates more dispersion and since I found higher CV for consumption of luxury than of basic goods, data should be interpreted as few individuals concentrating most of the expenditures in luxury goods whereas consumption of basic goods is more evenly spread.

Individual well-being: Results from the two indicators of well-being suggested that Tsimane' well-being is slightly above the mathematical mid-point in the scales used (Table 2). From a scale from 0-14 the average subjective well-being was 7.49, with low variation across individuals (SD=1.83). From a scale from 0 to 4 the frequency of smiles was 2.81 (SD=0.98).

Regression results: In Table 3, I present the regression results. I organize the presentation of the results around the two hypotheses of this work.

Hypothesis 1: I hypothesized that individual consumption of market goods would bear a direct link with individual well-being. I found a positive association between total annual consumption and the two indicators of well-being used: subjective well-being (Column [1]) and frequency of smiles (Column [2]). The association, however, was low in real terms and not statistically significant suggesting that, as hypothesized, for the Tsimane', the rise in individual expenditures in market goods does not translate in an increase of individual well-being.

Hypothesis 2: I also hypothesized that village consumption inequality would bear a negative association with individual subjective well-being. The evidence from Table 3 suggests that inequality in the consumption of luxury goods has a statistically significant and negative association with our two individual measures of well-being. The higher the inequality in consumption of luxury goods in a village, the lower the individual well-being of people in the village. Specifically, doubling the CV of consumption of luxury goods in a village, i.e., doubling the within-village dispersion in expenditures in luxury goods would be associated to a 16% lower score in our measure of subjective well-being (column [1]) and to a 25% lower score in frequency of smiles (Column [2]). For the two regressions the association was significant at the 95% confidence interval.

Table 3 Regression results of indicators of well-being against individual consumption and inequality in consumption for Tsimane' 2006 (>=16 years)

	Outcome variable. Natural logarithm of:			
	[1] SWB		[2] Smiles	
Explanatory variables:	Coef	Std Err	Coef	Std Err
Total annual consumption	.000	.000	.000	.000
CV – basic consumption, log	.126***	.009	.192***	.009
CV – luxury consumption, log	-.161***	.008	-.249***	.006
Controls				
Individual level variables				
Male	.028	.020	.026	.025
Age	.000	.006	.002	.000
Value of annual non-market consumption	.001***	.000	.000	.000
Social capital	.001	.001	-.002	.002
Household level variables				
Household size	.014**	.003	.009	.006
Village level variables				
Number houses	-.001	.000	.002***	.001
Income inequality	-.104***	.005	-.002***	.008
Mean basic	-.018***	.000	-.022***	.000
Mean luxury	.002	.000	.020***	.001
Constant	2.23	.034	.848	.047

Note: Column [1] are Ordinary least squares (OLS) regressions with robust standard errors and clustering by village when the Breusch-Pagan test for heteroskedasticity Prob>chi2 lower than 0.10. Column [2] is a poisson regression model for count variables. For definition of variables see Table 2. *, ** and *** significant at the 10%, 5%, and 1% level. It include a set of village dummies, year of the interview.

Hypothesis 1: I hypothesized that individual consumption of market goods would bear a direct link with individual well-being. I found a positive association between total annual consumption and the two indicators of well-being used: subjective well-being (Column [1]) and frequency of smiles (Column [2]). The association, however, was low in real terms and not statistically significant suggesting that, as hypothesized, for the Tsimane', the rise in individual expenditures in market goods does not translate in an increase of individual well-being.

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I also found that the inequality of consumption of basic goods bore a statistically significant and positive association with the two measures of well-being: the higher the CV of consumption of basic goods in a village, the higher the individual well-being of people in the village, as measured by our indicators of individual well-being. Specifically, doubling the CV of consumption of basic goods in a village, i.e., doubling the dispersion in expenditures in normal and basic goods would be associated to a 13% higher score in our measure of subjective well-being (column [1]), and a 19% higher score in the frequency of smiles (Column [2]). For the two regressions the association was significant at the 95% confidence interval.

Robustness: To test the robustness of the results, I ran additional tests (Table 4). First, because men and women have different expenditure patterns, I separated men (line [B]) and women (line [C]) in the sample. Second, in line [D] I eliminated from the sample individuals without expenditures. Third, to control for individual income, in line [E] I added to the core model the variable cash income, defined as the monetary income generated in the seven days previous to the interview from wage, sale, and barter plus the monetary value of farm and forest products. Finally, in line [F] I ran the core model, but changing the definition of basic and luxury consumption. For this, I used my ethnographic understanding of the Tsimane' to classify market goods into (a) basic goods, or goods that account for basic consumption such as Meat, Clothing, and School Supplies; (b) improvement goods or goods that might improve the quality of life without constituting luxuries such as Durable Assets Tools, Oil, and Transport; and (c) luxury goods or goods that account for luxury in the Tsimane' context, such as Sweets, Restaurants, and Durable Assets related to Transport. In all the tests, I used the same controls than in the core model. Results from the robustness analyses mesh with results from the core model, except when I change the definition of basic and luxury consumption. When using the ethnographic definition to categorize consumption goods, the CV of consumption of luxury goods bores a positive and significant association with the two measures of well-being.

4. Discussion

I organize the discussion around three important findings of this work. First, for the Tsimane', individual expenditures in market goods are not associated with individual well-being. Second, I found that village inequalities in consumption of luxury goods have negative effects to individual well-being among the Tsimane'. The third important finding of this work is that inequalities in consumption of basic goods have positive association with subjective well-being.

My first finding is that, contrary to the original expectation, for the Tsimane', individual expenditures in market goods are not associated with individual well-being. The finding is robust to the two measures of well-being used. The finding partially meshes with the results from previous research, namely with the research initiated by Easterlin (Easterlin, 1974), updated 1995) since as Easterlin, I found that human well-being does not necessarily bear a direct link with consumption of market goods, an indicator of economic growth. My findings, however, contradict the finding that income seems to enhance SWB only when income means avoiding poverty. A potential explanation for this contradictory finding lies in the Tsimane' definition of well-being. As mentioned before, Tsimane' sense of well-being centres on social relations and success in subsistence activities (Reyes-García et al., 2010), this is, Tsimane' sense of well-being is not related to economic activities related to the market economy (such as generating income, or increasing consumption). The explanation has ethnographic validity, but it is also consistent with the theory that people who prize material goals more than other values tend to be substantially less happy, unless they are rich (Diener and Biswas-Diener, 2002). This first finding allows for conceptualizing models that increase human well-being without depending on consumption of market goods, a premise for sustainable degrowth theory.

The second important finding of this work is that village inequalities in consumption of luxury goods seem to have negative effects on individual subjective well-being among the Tsimane'. The finding dovetails with the evidences found in the literature regarding the relative income effect in well-being. Researchers have found that people compare themselves with others around them and –from this comparison- construct a standard for judgments of well-being (Diener, et alt., 1993; Easterlin, 2001). For example, Heffetz (2004) found that people tend to invest in luxury goods with more cultural visibility. Applying this line of research to Tsimane', researchers (Godoy et al., 2007a) have found partial support that Tsimane' signal status by investing in luxury market goods. Then, if Tsimane' compare their own consumption with

Table 4 Robustness analysis)

		Explanatory variable: Total annual consumption		Explanatory variable: CV – basic consumption, log		Explanatory variable: CV – luxury consumption, log	
		Outcome variable. Natural logarithm of:		Outcome variable. Natural logarithm of:		Outcome variable. Natural logarithm of:	
		SWB	Smiles	SWB	Smiles	SWB	Smiles
	Changes	[1]	[2]	[1]	[2]	[1]	[2]
[A]	Core model	.000 (.000)	.000 (.000)	.126*** (.009)	.192*** (.009)	-.161*** (.008)	-.249*** (.006)
[B]	Only Men	.000 (.000)	.000 (.000)	.145*** (.010)	.080*** (.012)	-.176*** (.011)	-.184*** (.013)
[C]	Only Women	.000 (.000)	.000 (.000)	.109*** (.016)	.036*** (.017)	-.159*** (.018)	.332*** (.018)
[D]	Only people with some expenditures	.000 (.000)	.000 (.000)	.121*** (.008)	.119*** (.011)	-.109*** (.006)	-.278*** (.007)
[E]	Added cash income	.000 (.000)	.000 (.000)	.126*** (.089)	.192*** (.009).	-.148*** (.008)	-.247*** (.007)
		Explanatory variable: Total annual consumption		Explanatory variable: CV – ethnographic improve consumption, log		Explanatory variable: CV – ethnographic luxury consumption, log	
		Outcome variable. Natural logarithm of: SWB		Outcome variable. Natural logarithm of: SWB		Outcome variable. Natural logarithm of: SWB	
[F]	Ethnographic classification of market goods	.000 (.000)		-.006 (.011)		.059*** (.007)	

the consumption of others around them, they might focus on the consumption of luxury goods (such as radio, mobile, etc.) as those goods are more visible. Following the same intuition, it is possible that they pay less attention to changes in consumption of basic and necessity goods (which consist mainly in food products), which are less visible. As a consequence, higher inequality in the consumption of luxury goods negatively affects the well-being of Tsimane' while higher inequality in the consumption of basic goods do not have an effect in well-being. This second finding suggests that degrowth in the consumption of non-basic goods (especially luxury goods) will not generate unhappiness within societies.

4. Discussion

I organize the discussion around three important findings of this work. First, for the Tsimane', individual expenditures in market goods are not associated with individual well-being. Second, I found that village inequalities in consumption of luxury goods have negative effects to individual well-being among the Tsimane'. The third important finding of this work is that inequalities in consumption of basic goods have positive association with subjective well-being.

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The third important finding of this work is that inequalities in consumption of basic goods have positive association with subjective well-being. What would explain this contra intuitive finding? As appears from Table 1, many of the basic goods that Tsimane' acquire through the market are food. Since Tsimane' extensively share food with others around them (Godoy et al., 2007b), the positive association between

the inequality in consumption of basic goods and well-being could be explained by extensive sharing of food. Even if some individuals acquire more basic goods than others, these expenditures would reach the group since they will be shared. This finding suggests that equitable consumption of basic goods can perfectly lead to societies with good standards of well-being.

5. Conclusions

In sum, I found evidences that the social premises for sustainable degrowth, such as, that human well-being does not necessarily bear a direct link with economic growth, also that inequalities have pervasive effects to human well-being are true also in small pre-scale industrial societies.

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