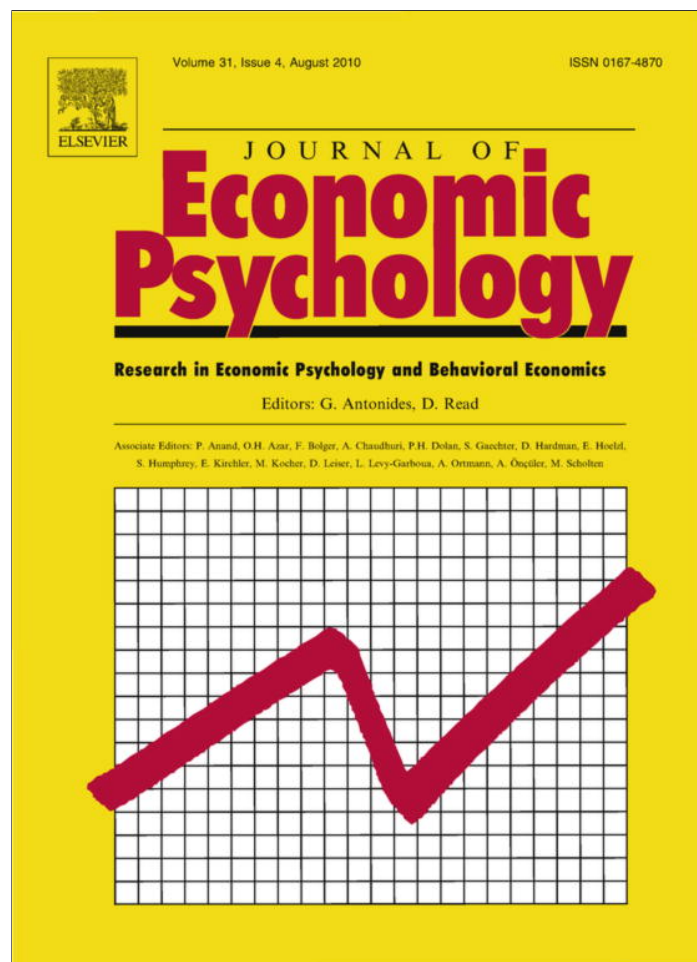


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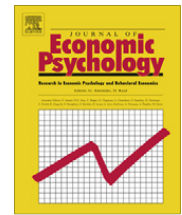
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Does civilization cause discontentment among indigenous Amazonians? Test of empirical data from the Tsimane' of Bolivia

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ABSTRACT

Despite the pervasiveness of international trade, the effects of trade opening on the psyche have received scant attention. We present three hypotheses about the likely effects of trade opening on the following five dimensions of the psyche: mirth (smiles), anger, addiction, stress, and regret. To test the hypotheses we use a survey of ~605 people ≥ 16 years of age from a highly autarkic native Amazonian society of foragers and farmers in Bolivia (Tsimane') with high levels of impulsivity. As explanatory variables we use four measures of trade opening and a wide range of controls. Regret at buying durable assets during the previous year and addiction bore a positive association with two measures of trade opening: monetary income in the last 2 weeks and outstanding monetary debts owed to one or owed to the rest of the world. International trade theory predicts that trade opening expands choices in consumption, but among impulsive people in a highly autarkic society, more choice can beget more addiction and buyer's regret. We found no association between trade opening and smiles, anger, or stress, consistent with recent findings from industrial societies suggesting weak or ambiguous links between monetary income and these indicators of subjective well-being.

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How has it happened that so many people have come to take up this strange attitude of hostility to civilization? Freud, Civilization and its Discontents (1930)

1. Introduction

From the 18th century onward the world has seen relentless critiques at the boons of the market economy and the spread of international trade (Hartwell, 1985; Hirschman, 1982; Kemp, 2007). The disquiet has taken many forms, from the anti-

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market arguments of modern defenders of socialism (Marglin, 2008) and remonstrations by globalization's critics (Mander & Goldsmith, 1996), to those pining for a bucolic age (Laslett, 2000; Watson, 1992), to Freud's acerbic critique of how the market economy warped the psyche by quelling impulses (Freud, 1964 [orig. 1927], 1989 [orig. 1930]). As Freud notes in the epigraph, one wonders why so many people, in so many places, over so many years, have so consistently faulted the many forms taken by the market economy, particularly during the 20th century. Freud (1964, p. 2) wrote about civilization, which he equated with culture and society, including pre-industrial societies, but aimed the thrust of his critique at the psychological damage inflicted by the market economy and modern society (Freud, 1989, p. 38, 73).

We use Freud's query to motivate the empirical analysis of this article about how one aspect of the market economy – trade opening – might alter the psyche. We use the term “trade opening” as a synonym for (a) integration or exposure into the market economy or (b) for movement along an idealized autarky-to-market continuum (Godoy, 2001). Economics has had little to say about how trade opening might shape despair, love, anger, angst, regret, happiness, or hope, though it has more and more to say about the reasons for people's attitude to international trade (Kemp, 2007; Krueger, 2004; Mayda & Rodrik, 2005). Perhaps because economics takes the psyche as given, or perhaps because it views the psyche as epiphenomena, economics has neglected to examine the effects of trade opening on the psyche.

In contrast, cultural anthropology and social epidemiology have accumulated evidence (reviewed later) suggesting that trade opening might harm the psyche when highly autarkic people enter the market economy. The author of these studies have found positive and negative associations between trade opening and the psyche, but have neither put trade opening and the psyche at the center stage of their analysis, nor provided hypotheses to guide their empirical inquiry.

In this article we use quantitative information from a native Amazonian society of foragers and farmers in Bolivia, the Tsimane', with high levels of impulsivity who are in the early stages of continual contact with the outside world, to test hypotheses about the effects of trade opening on the psyche. We estimate how trade opening might affect mirth (smiles), anger, addiction, stress, and regret.

Of the five outcomes, four relate to emotions (mirth, anger, regret, stress), and one outcome (addiction to addictive substances) relates to actual behavior. Addiction overlaps with one of the emotions, stress, because it causes it and reflects it. Even though addiction overlaps with stress, and even though it relates to behavior rather than to emotions, addiction enters into our analysis because it allows us to assess whether trade opening affects only emotions, or observed behaviors as well. More so than emotions, addiction reflects not only trade opening, but also a range of material determinants (e.g., income). As we shall see, trade opening affects both some emotions and addiction, so the distinction between emotions and behaviors is worth keeping.

2. Background

2.1. Trade opening and the psyche: hypotheses

In analyzing whether, how, and why trade opening might affect the psyche, at least three complementary hypotheses come to mind.

First, trade opening might insult human sentiments that have evolutionary roots. Research in psychology, sociology, and anthropology suggests that people tend to side to those most alike themselves in culture and in appearance (McPherson, Smith-Lovin, & Cook, 2001). If trade opening thrusts people into a larger, motley crowd and economic transactions begin to take place between anonymous buyers and sellers who differ along many core dimensions – such as culture and ethnicity – then the hostility to trade opening might simply mirror the psychic costs of having to deal with strangers. *Hypothesis #1*: If buyers and sellers engage in sporadic economic transactions and differ in culture and ethnicity, then trade opening will produce adverse psychological outcomes.

Second, besides what it might do to human sentiments with evolutionary roots, trade opening might also harm other dimensions of well-being when flows of information and markets work poorly. If so, the critique of trade opening might mirror the angry voices of those left behind when trade expands and markets fail, which in developing nations may be most of the times for most people (Stiglitz, 2002). *Hypothesis #2*: People with better access to information about trade and markets will be less likely to report adverse psychological outcomes with trade opening than people with poorer access to such information.

Last, the theory of international trade predicts that trade opening will be associated with a greater variety of goods consumed (Krugman & Obstfeld, 2005). With trade opening, formerly autarkic people can specialize producing goods in which they enjoy a comparative advantage, and trade those goods to raise their income and gain access to a wide range of industrial goods. However, some of the new commercial goods acquired from Westerners will fit poorly into the traditional culture and fail to improve the well-being of native Amazonians. *Hypothesis #3*: During the early stages of trade opening, we should find a positive association between the variety of new goods consumed and regret at having obtained the goods.

2.2. Trade opening and the psyche among native Amazonians: two methodological concerns

Native Amazonians provide an ideal setting to study the effects of trade opening on the psyche because continual contact with Westerners dates back to the mid-20th century so one can eye the early contact of two very different economic systems. But before drawing inferences about how trade opening might affect the psyche, two methodological hurdles need attention.

First, the earliest Western traders in the Amazon not only brought commercial goods, but also brought new illnesses, religion, cultures, genocide, and forms of domination (Kiernan, 2008). The earliest trade with Europeans started in the 16th century, and centered on the exchange of metal tools and guns for slaves. Ferguson (1989, 1990) documents how post-contact trade spawned internecine war between and within native Amazonian societies as groups of kin vied with each other to capture slaves to swap for metal tools and firearms from Westerners. The introduction of commercial goods increased economic inequalities within native Amazonian societies, which generated resentment and increased accusations of sorcery and violence. The exchange of commercial goods for slaves has ended, but highlights the need to control for community economic inequality because trade-induced inequality might harm the psyche by producing grievance, envy, and perceived deprivation (Godoy et al., 2006; Subramanian & Kawachi, 2004).

Second, we know little about people's propensity to seek novelty and move closer or farther from Western traders. Failure to control for such proclivity will bias the inferences one makes about trade opening's effect on the psyche. As in any society, among native Amazonians, one sees traditionalists or those who cling obstinately to the old ways, and modernists or those who seek change (Hill & Hurtado, 1996; Murphy, 1960, p. 51). Writing about native Amazonians in Brazil, Murphy (1961) long ago hypothesized that modernists were people at the "edge of society" who saw in trade opening new economic opportunities and a way to free themselves from the shackles of superannuated customs (Ehrenreich, 1990). Trade opening allows a population to split, with some people trading more and others recoiling from trade, in line with their tendency to seek novelty. If so, then empirical estimates of the effects of trade opening on the psyche should control for adventuresomeness.

2.3. Trade with Westerners in the Amazon: variety of responses

The trade in slaves during the colonial period, and the booms and busts of the market for rubber, quinine, pelts, timber, and minerals during the 19th and 20th centuries brought Western traders into Amazonia. Western traders used political power and economic resources to try to exploit native peoples (Ferguson, 1990; Stanfield, 1998; Weinstein, 1983).

Depending on the ethnic heterogeneity of areas, native Amazonian societies reacted in two ways to the spread of international trade (Reeve, 1994, p. 108, 123). In areas with high ethnic diversity, native Amazonians abjured trade and maintained independence by withdrawing into the backlands (Milton, 1992; Montenegro & Stephens, 2006, p. 1864; Shepard, 2002, p. 203), by fighting Westerners (Harner, 1971), or by doing both (Ferguson, 1990).

In areas with strong ethnic unity, native Amazonians careened to trade with Westerners, enticed by industrial goods. For example, in Brazil, civil servants working for the Indian protection agency understood as far back as the early 1900s that commercial goods would bait highly autarkic native Amazonians. Starting in the early 1900s, government officials would place commercial goods in the open to lure native Amazonians to take the goods, and, slowly, to nurture their desire for more commercial goods and for continual contact with Westerners (Price, 1984). The allure of commercial goods had economic underpinnings. Ferguson (1990, pp. 243–245) reviews the ethnographic and the experimental evidence and finds sharp increases in farming and foraging productivity from using steel tools and firearms compared with the productivity of using traditional tools and weapons. The difference in productivity between the technology of Europeans and native Amazonians could explain the "fatal fascination" of native Amazonian for commercial goods during the initial stages of trade opening with Westerners (Ferguson, 1990).¹

2.4. Trade opening and the psyche among native Amazonians: what do we know?

Much of the research on the effects of trade opening among native Amazonians has centered on outcomes such as natural resources, health, and the economic organization of communities and households (Coimbra, Flowers, Salzano, & Santos, 2002; Godoy, Reyes-García, Byron, Leonard, & Vadez, 2005; Lu, 2007). As the discussion that follows suggests, we have almost no hard evidence about the effects of trade opening on the psyche.

Among the Matsigenka of the Peruvian Amazon, Izquierdo (2005) used three cross-sectional surveys spanning three decades (1968, 1975, 1998) from one community and found that objective indicators of health improved with increased trade opening, but that perceived indicators of well-being fell. She found that increased interactions with traders, missionaries, school teachers, government health workers, and personnel of oil firms and increased population density went with more stress, envy, domestic violence, fear of the future, feelings of inferiority, and sorcery accusations. In a parallel study with the Matsigenka, Shepard (2002, p. 208) found that the Matsigenka started to aim their sorcery accusations at traders, often the more Westernized native Amazonians.²

Izquierdo and Shepard document the positive association between trade opening and adverse psychological outcomes, but they do not separate the effects of different institutions and economic actors. They do not separate the independent effect on the psyche of changes in religious orientation (caused by missionaries), human capital (caused by teachers), health (caused by public health services), and trade opening itself (caused by merchants). They provide qualitative descriptions of negative psychological states that follow from greater exposure to Westerners, but leave one to wonder about the share of the population presumably harmed by trade opening.

¹ In May, 2006, the New York Times ran a story about the Nukak-Makú, a foraging society in southern Colombia with little exposure to Westerners (Forero, 2006). They left the forest to settle in a rural town because they had grown tired of foraging and wanted to use commercial goods. As reasons for leaving the forest, the Nukak-Makú mentioned their desire to have access to pots, pans, shoes, caps, matches, and soap.

² See Siskind (1975, pp. 172–173) for an example among the Sharanahua of the Peruvian Amazon of anger and murder directed at outside traders.

Along a similar ethnographic vein, Johnson (2003) draws on his experience with the Matsigenka spanning several decades to describe the many emotions Matsigenka display in their myths and in their daily life, but does not examine how the displays vary in relation to trade opening. A recent book edited by Overing and Passes (2007) contains ethnographic descriptions of the forms and meaning of emotions among native Amazonians, but does not contain an analysis of the link between emotions and trade opening. Overing and Passes find that emotions are the daily glue of native Amazonian societies, more so than kinship, religion, or than the economic organization of households and communities.

In contrast to cultural anthropologists, social epidemiologists have moved in a more quantitative direction and found mixed backing for the idea that trade opening affects the psyche. Nawaz, Rahman, Graham, Katz, and Jekel (2001) studied two forms of addiction – consumption of alcoholic beverages and cigarettes – in five communities of native Amazonians in Peru. They surveyed 179 people >15 years of age and found that men were more likely to drink alcoholic beverages (including traditional fermented beverages from manioc) and to smoke cigarettes than women. Almost three quarters (74%) of men but only 36% of women reported drinking alcohol, and 68% of men but only 27% of women reported smoking. Their study provides a quantitative snapshot of the use of addictive substances, but does not link the use of addictive substances with trade opening.

Another study from social epidemiology on the use of addictive substances found no association between trade opening and the consumption of alcoholic beverages, and found only a modest association between trade opening and cigarette consumption (Tavares et al., 2003). The Parkatêjê, a native Amazonian society in Brazil, have been in contact with Westerners only since the mid 1950s, but they have already experienced a “rapid and intensive change in lifestyle” (p. 32). Tavares et al. studied 90 Parkatêjê ≥ 20 years of age and found no chronic use of commercial alcoholic beverages and little smoking; only 25.6% of the participants in their study smoked (women = 15%; men = 35%).

The finding by Tavares et al. about no chronic use of commercial alcoholic beverages among the Parkatêjê contrasts with the findings by Seale, Seale, Alvarado, Vogel, and Terry (2002), Seale, Shellenberger, Rodríguez, Seale, and Alvarado (2003) in two villages of “an indigenous Venezuelan tribe of Carib origin” (Seale, Shellenberger, Rodríguez, Seale, & Alvarado, 2003, p. 603). In each village Seale et al. did focus groups and surveyed 105 people >15 years of age. They found that before the mid 1940s, people during village festivities drank beverages brewed from maize. After the mid 1940s, owing to “increasing contact with Western civilization” (Seale et al., 2003) and to the establishment of Catholic missions, commercial beer and rum replaced drinks brewed from maize, and people (particularly men) started to drink more often, alone, and year round. With the new pattern of alcohol consumption came more domestic and intra-household violence. Eighty-six percent of men and 7.5% of women were problem drinkers, with rates of alcoholism rising as one moved farther from market towns (Seale, Seale, Alvarado, Vogel, & Terry, 2002, p. 202). Participants in the study did not mention “sadness, despair, and hopelessness” or poverty as reasons for alcoholism (p. 608); in fact, Seale et al. found that monetary income and alcoholism were positively associated. The authors suggest that alcoholism might reflect the decline in the price of commercial alcoholic beverages relative to the price (or costs) of beverages brewed from maize, and the leveling effect of trade opening. Before continual exposure to Westerners, only some villagers could brew maize and then only for village festivities; trade opening allowed more people to have access to commercial alcoholic beverages, on more occasions, and to decide when to drink.

The study by Seale et al. contains mixed messages about the effect of trade opening on the psyche. They imply that, over time, exposure to Westerners undermined traditional forms of drinking alcoholic beverages and increased dependence on commercial alcoholic beverages, but they also found that people in more isolated villages with less exposure to Western merchants drank more commercial alcoholic beverages than people closer to market towns.

We draw two conclusions from the literature just reviewed. First, we found no quantitative studies explicitly linking trade opening with the psyche. Ethnographic studies have delved into the etiology and expressions of emotions, but have elided explanations that link emotions with trade opening. Second, studies from social epidemiology have found inter-cultural variation in levels of alcohol addiction. Among the Parkatêjê, Tavares et al. (2003) found no chronic alcohol use whereas among native Amazonians in Venezuela, Seale et al. (2002) found “one of the highest prevalence rates for problem drinking reported in the world literature” (p. 198).

3. Ethnographic description

Elsewhere (Godoy, Reyes-García, Huanca et al., 2005; Godoy et al., 2006, 2007) we document the autarky and the forms that trade opening have taken among the Tsimane'. In earlier work we have stressed the recentness and the intermittency of trade openness. Earlier work has also documented the high levels of impulsivity of Tsimane' (Godoy et al., 2004; Kirby et al., 2002). Since we have already covered these topics, below we provide ethnographic vignettes of the emotions used as outcomes.

The Tsimane' word for smile or laughter, *dyisi*, connotes happiness or to make fun of someone. Tsimane' often sit in a circle quaffing beverages made from fermented manioc or maize, or from commercial alcohol. At those times they make jokes, triggering smiles and loud laughter. Tsimane' believe that a married man should not laugh openly in front of a married woman, and vice versa. A pregnant woman and the father should not laugh, smile, or make fun of a person with a disability because the fetus, when born, might acquire the disability. Tsimane' say one should not smile in front of strangers because the smile might allow the stranger to bewitch the person who smiles. One myth tells of a time when there was no sun and when a taboo proscribed women from smiling. Worms filled the vagina of women who broke the taboo.

Tsimane' distinguish between several types of anger and display it in different ways. The word *fudyi'dyi'dye'* refers to the annoyance a husband feels when his wife does not make the traditional fermented beverage to welcome him back after a long hunting trip. The words *facoi'* or *facoijdye* connote open displays of rage, and apply to fractious people before a brawl. A milder form of anger, *fara'naqui*, refers to people using scurrilous language, grousing at a misfortune, or sulking after receiving criticism.

Besides raising their voice and fighting, Tsimane' display anger through subtle body movements, such as how they sit, spit, or how they hold a drinking gourd (Ellis, 2002). Ellis says that as spats or rancorous arguments get out of hand, Tsimane' prefer to leave a village rather than to openly display anger because people associate displays of anger with sorcery. She quotes a Tsimane' aphorism, "Those who get angry know how to commit sorcery and kill", and notes that Tsimane' will attribute their illness to the anger-induced witchcraft of others, often Western traders (Ellis, 2002).

Tsimane' sell or swap goods to get ardent spirits. Several researchers have said that most alcoholic beverages enter Tsimane' households through the chicanery of traders, logging firms, and politicians (Byron, 2003; Reyes-García, 2001; Rioja, 1992). Traders who ply rivers and logging roads give drinking alcohol (ethanol, 96% concentration) to Tsimane' as an advance for future deliveries of crops or forest goods. Tsimane' Protestants abstain from drinking alcohol, but will buy commercial alcoholic beverages to sell or to swap with villagers during festivities. Village stores have started to stock commercial alcohol for sale. For the past half century Protestant missionaries have inveighed against drinking alcohol, but most Tsimane' have ignored the exhortations.

Tsimane' have local varieties of coca and tobacco, but the continual use of coca and commercial cigarettes as an anodyne to accompany the toil and moil of work, or to beguile time is recent and probably reflects the influence of highlanders who have moved into the Amazon basin in the last five decades. Tsimane' buy coca leaves and commercial cigarettes in town or swap them from traveling traders when traders come to villages to get crops and forest goods. In villages near the market town of San Borja, coca chewing is widespread among men, particularly during cold spells or when they have to work in agriculture. Tsimane' smoked tobacco in the past as part of rituals, but today some Tsimane' smoke commercial cigarettes for pleasure.

We found no word for stress, but two expressions – *jam junbu'yi* (literally not enough time) and *dyijy* (worry) – come close. *Jam junbu'yi* reflects frustration at not having enough time or other resources to accomplish all the tasks one needs to accomplish. For example, an adult might use – *jam junbu'yi* at the frustration of reaching a river and not finding a canoe to cross it, or at the frustration at not having enough time in a day to do the required farm and household chores. Parents use *dyijy* to capture the worry they feel when their children get sick. *Dyijy* reflects the angst a person might feel after forgetting a tool in a field next to a well-travelled road where someone else could take it.

The Tsimane' refer to regret with the word *otejyeban*, which translates as being sorry or having second thoughts about a past action. The expression, *caman djiyeban*, refers to remembrances of things past with a touch of disappointment. Neither expression maps exactly with the Western concept of regret, but they both reflect disappointment at one's decisions. Regret brings a tinge of sadness and disappointment but is not considered a rueful plight.

When asked in informal interviews why they rued having bought durable goods, respondents mentioned the quality of the good, disappointment by the other spouse, lower remaining purchasing power, and inappropriateness of the good. Examples of inappropriateness included buying goods that work only in town because they require electricity (e.g., television) but not in a village, or buying clothes that fit poorly. Stores in the town of San Borja do not generally accept merchandise returns, and Tsimane say they are too shy and not confident enough in their ability to bargain in Spanish to return the goods to stores.

4. Materials and methods

4.1. Sample

Primary data for this article comes from a panel study in progress that started in 2002 in 13 Tsimane' villages along the Maniqui River, Department of Beni. Villages differed in their proximity to the market town of San Borja (pop ~19,000). The average village in the panel was 25.96 km (SD = 16.70) from San Borja in a straight trajectory.

For this article we use data from the 2006 survey. The 2006 survey happened during June–September and included all people in all households ($n = 255$) of the 13 villages of the panel study, plus seven households that split from the panel in 2005 and moved to a village farther in the backlands. An unusual feature of our sample is that we tracked the seven households that attrited, allowing us to assess whether those who moved away from Western trade differed in measured attributes from those who stayed in the sample. Three experienced interviewers from the Bolivian highlands and three experienced Tsimane' translators who had worked in the panel from the beginning did the surveys. Interviewers administered the survey to people ≥ 16 years of age, or younger if they headed a household. The final sample with complete data on all outcome and explanatory variables included ~605 people.³ On average, surveyors took about an hour and a half to interview a person.

³ The sample size varied slightly, depending on the dependent variable.

4.2. Outcome variables: rationale and measure

We selected the following five outcomes to capture different dimensions of the psyche and behaviors associated with the psyche: smiles, anger, addiction, stress, and regret. Recent ethnographic research among native Amazonians documents the positive role of mirth (e.g., laughter, smiles, humor) and the negative role of anger in shaping daily conviviality (Overing & Passes, 2007). Research in psychology, reviewed elsewhere (Godoy et al., 2005), suggest that smiles proxy reliably for subjective happiness. Substance addiction is a canonical marker of stress that reflects and influences negative psychological states (e.g., depression) (Sinha, Fuse, Aubin, & O'Malley, 2000). As noted earlier, substance addiction is the only outcome related to actual behavior (as opposed to emotions) and as measured by asking about the consumption of alcoholic beverages, coca leaves, and commercial cigarettes (see below). Regret overlaps with disappointment, embarrassment, humiliation, remorse, impulsivity, myopia, and the inability to accurately weigh choices across time (Irons & Hepburn, 2007; King & Hicks, 2007; Loomes & Sugden, 1987).

To measure *smiles*, surveyors coded the following outcomes about the interviewee as the interview unfolded: (1) neither laughed nor smiled, (2) smiled without laughter, (3) smiled and laughed, and (4) laughed openly and energetically. To measure *anger* surveyors asked people how often they had felt angry during the seven days before the day of the interview. To measure *addiction*, surveyors asked a total of six questions about the following topics: (i) frequency and volume of consumption of commercial alcoholic beverages (e.g., beer), (ii) number of commercial cigarettes smoked during the seven days before the day of the interview, and (iii) number of times the person had chewed coca leaves during the seven days before the day of the interview. Chronbach's alpha for the six questions on addiction was 0.75, so we used principal component factor analysis to create a summary variable or Z-score of addiction. Our measure of addiction reflects consumption of potentially addictive substances, not necessarily physiological addiction. We use the word addiction for convenience. To assess *stress*, we used the following question from Cohen, Kamarck, and Mermelstein (1983) measure of perceived stress: "During the last month, how many times did you feel you could not solve your problems?" To measure *regret* we asked people to list all the durable goods they had bought with cash during last year and, for each good, to say whether they rued having bought the good. We coded answers about each good as follow: 1 = regret, 0 = no regret. We added all the answers to questions about regret to arrive at a summary measure of buyers regret for the person.

Chronbach's alpha for the five outcomes – smiles, anger, Z-score of addiction, stress, and regret – was 0.34. Since the five outcomes did not mirror one underlying dimension, we treat each of the five outcomes as a separate dependent variable.

4.3. Explanatory variables

Because one can define and measure trade opening in different ways (Lu, 2007), we used four different measures of trade opening. The four measures included: (a) total value of monetary earnings from wage labor and from the sale of goods during the 2 weeks before the day of the interview, (b) total value of monetary expenditures in all goods and services during the 2 weeks before the day of the interview, (c) monetary value of all durable commercial goods acquired through purchase or barter last year, and (d) a dummy variable indicating whether the person had any monetary debts outstanding to or from the rest of the world (1 = rest of the world owes one or one owes money to the rest of the world; 0 = no debts outstanding to or from the rest of the world). Pearson correlation coefficients between the four measures using the Šidák method to adjust significance levels for multiple comparisons were all positive but low, ranging from +0.11 [(b) and (d)] to +0.34 [(a) and (b)]. Chronbach's alpha for the four measures of trade opening was 0.56. The results support Lu's point about the many forms taken by trade opening, and the usefulness of treating each measure as a separate regressor to ensure results remain robust to the measure of trade opening used.

Control variables included the person's age measured in years, sex, maximum school attainment, body-mass index (BMI; weight in kg/height in m²), wealth (measured by the monetary value of a basket of traditional and modern physical assets owned by the person), and self-reported number of days confined to bed during the 2 weeks before the day of the interview. Besides serving as a control for acculturation, the variable for schooling proxies for access to information about markets and trade with outsiders since schooling contributes to skills (e.g., math, Spanish fluency, literacy) that ease transactions with Westerners (Godoy, Karlan, Rabindran, & Huanca, 2005; Godoy et al., 2007). We used the schooling variable to test hypothesis #2. We also included dummy variables for villages ($n = 14 - 1 = 13$), including the new settlement peopled by those who left the panel in 2005. Table 1 contains definition and summary statistics of the variables used in the regressions and Table 2 contains the main regression results.

4.4. Estimation strategy

Since dependent variables varied (e.g., ordered, censored), we used Tobits, ordered Logits, and ordinary least squares (OLS) regressions. For each of the five dimensions of the psyche, we put the dimension as an outcome and – as explanatory variables – we include one measure of trade opening, the controls, and the dummy variables for villages. Since we had four measures of trade opening, for each dimension of the psyche we ran four separate regressions, with a different measure of trade opening in each regression, but with the same control variables and with the same dummy variables for villages.

Three potential biases deserve attention. First, recall from the earlier discussion that the unseen propensity to want to trade with Westerners might bias estimates about trade opening's effect on the psyche. Since the sample included the

Table 1
Definition and summary statistics of variables used in regression analysis.

Definition	# Observations		Mean	SD
	Censored	Total		
<i>Dependent variables – aspects of the psyche</i>				
<i>Smile</i> : smiling during interview. 1 = somber (11.49%), 2 = smiled without laughter (24.89%), 3 = smiled and laughed often (35.05%), 4 = guffaw (28.57%)	NA	679	2.80	0.97
<i>Anger</i> : # times person felt angry last week	428	679	0.69	1.27
<i>Addiction</i> : principal component factor Z-score of use of coca leaves and commercial alcohol and cigarettes last week + # times person got drunk last month	NA	679	0	1.69
<i>Stress</i> : last month, how many times did you feel you could not solve your problems? 0 = never (46.83%), 1 = almost never (29.31%), 2 = sometimes (17.23%), 3 = frequently (5.45%), 4 = very frequently (1.18%)	NA	679	0.84	0.97
<i>Regret</i> : # of times person expressed regret at having bought a durable commercial good during last year.	175	677	2.58	2.53
<i>Explanatory variables – trade opening</i>				
<i>Monetary income last 2 weeks</i> : value of total monetary earnings from sale of goods and wage labor in bolivianos (1 US dollar = 8.01 bolivianos)	NA	679	106	179
<i>Monetary expenditures last 2 weeks</i> : in bolivianos; includes all expenditures in goods and services	NA	679	25	60
<i>Monetary value of durable goods obtained last year</i> : in bolivianos; includes only durable assets (e.g., commercial goods, domesticated animals)	NA	679	0.31	0.46
<i>Monetary credit</i> : 1 = person has outstanding monetary debts owed to him/her or he/she owes money to the rest of the world (31.95%); 0 otherwise (68.05%)	NA	679	0.31	0.46
<i>Explanatory variables – controls (not shown in regressions of Table 2)</i>				
<i>Sex</i> : male = 1, female = 0	NA	679	0.50	0.50
<i>Schooling</i> : maximum school attainment	NA	610	2.05	2.28
<i>Age</i> : Person's age in years	NA	679	36.95	19.06
<i>Body-mass index</i> : weight (kg)/height (meters) ²	NA	676	23.67	2.81
<i>Wealth</i> : total value in bolivianos of wealth in selected local (e.g., canoe) and commercial (e.g., metal tools) material assets owned by the person	NA	679	1163	1152
<i>Self perceived health</i> : self-reported # days confined to bed in the 14 days before the interview	NA	678	1.44	2.45

Notes: Under observations, “censored” refers to observations with values of zero. NA = not applicable.

complete population of the 13 villages of the panel, plus the seven households that attrited, our estimate should be relatively free from biases from self-selection and attrition. We say “relatively free” because if attrition happened before 2005, then the parameters we estimate might still be biased. Second, recall also from the earlier discussion that trade opening might affect the psyche through trade-induced village economic inequality. We control for this indirect effect by using dummy variables for villages. Besides sweeping away the role of trade-induced village economic inequality, dummy variables for villages also control for the role of village-level variables (e.g., village-level social capital and institutions) that might protect the psyche during trade opening (Kawachi, Kim, Coutts, & Subramanian, 2004). Third, we control for schooling, which allows us to untwine the effect of acculturation to national society from the effect of trade opening.

5. Results

5.1. Main findings

The most notable finding of Table 2 has to do with the positive association between buyer's regret and each of the four measures of trade opening (column V). To facilitate the interpretation of results in column V, we added +1 to the score of regret and took the natural logarithm of the new measure. We did the same for the first three measures of trade opening (rows A–C). We then re-estimated the regressions of column V using OLS so we could read the coefficients of trade opening as elasticities (% Δ in outcome/1% Δ in measure of trade opening). The new estimates (not shown) suggest that doubling the monetary income (row A) during the 2 weeks before the day of the interview was associated with an increase in buyer's regret of 7.30% and doubling the monetary expenditures (row B) during the 2 weeks before the day of the interview was associated with an increase in buyer's regret of 8.27%. Doubling the value of durable assets acquired last year (row C) went with an increase in buyer's regret of 27.76%, and being in hock or having outstanding monetary debts owed to one (row D) was associated with a 30.31% increase in buyer's regret. All the estimates reported in this paragraph were statistically significant at 99% confidence level or higher.

The second noteworthy finding has to do with the positive association between trade opening and the addiction index (column III), but here results depend on how one measures trade opening. People with outstanding monetary debts owed to them or people who owed debts to the rest of the world (row D) scored 0.41 standard deviations higher in the addiction

Table 2

Results of multivariate regressions: association between dimensions of the psyche (dependent variables) and trade opening (explanatory variable) among Tsimane' adults, Bolivia, 2006.

Explanatory variable – trade openness measured with	Dependent variable				
	Smile I	Anger II	Addiction III	Stress IV	Regret V
A. Monetary income last 2 weeks	0.0004 (0.34)	–0.001 (0.21)	0.001 (0.002)	0.001 (0.017)	0.003 (0.001)
Schooling	–0.01 (0.77)	–0.02 (0.73)	–0.13 (0.001)	–0.05 (0.13)	0.03 (0.56)
<i>N</i>	607	607	607	607	605
<i>R</i> ²	0.14	0.02	0.32	0.11	0.09
B. Monetary expenditures last 2 weeks	0.002 (0.15)	–0.001 (0.60)	0.002 (0.25)	0.001 (0.14)	0.008 (0.001)
Schooling	–0.01 (0.65)	–0.03 (0.62)	–0.12 (0.001)	–0.038 (0.26)	0.03 (0.53)
<i>N</i>	607	607	607	607	605
<i>R</i> ²	0.14	0.02	0.31	0.11	0.09
C. Monetary value of durable goods obtained last year	0.00009 (0.65)	0.0002 (0.49)	–0.0001 (0.45)	0.0002 (0.16)	0.002 (0.001)
Schooling	–0.006 (0.86)	–0.04 (0.50)	–0.11 (0.001)	–0.03 (0.27)	–0.01 (0.82)
<i>N</i>	605	605	605	605	605
<i>R</i> ²	0.14	0.02	0.31	0.011	0.11
D. Monetary credit	0.241 (0.20)	0.121 (0.67)	0.41 (0.003)	0.118 (0.49)	1.302 (0.001)
Schooling	–0.006 (0.86)	–0.03 (0.54)	–0.11 (0.001)	–0.03 (0.35)	0.07 (0.15)
<i>N</i>	607	607	607	607	605
<i>R</i> ²	0.14	0.02	0.32	0.11	0.09
Regression type	Logit	Tobit	OLS	Logit	Tobit

Notes: Cells in rows A–D include coefficient and, in parenthesis, *p* value of variable for trade opening and schooling. OLS = ordinary least squares. Tobit = lowered-censored; Logit = ordered Logit. All regressions include clustering by household, all the controls variables of Table 1, and a full set of dummy variables for villages ($n = 14 - 1 = 13$); Tobits and OLS also include constant. For Tobit and ordered Logit, R^2 = pseudo R^2 .

index than people without such debts ($p = 0.003$). Doubling the value of monetary earnings during the 2 weeks before the day of the interview (row A) was associated with an increase of 0.11 standard deviations in the addiction index ($p = 0.001$).

Third, higher values of monetary earnings during the 2 weeks before the day of the interview (row A) and outstanding monetary debts owed to one or owed to the rest of the world (row D) were associated with more addiction (column III) and regret (column V).

Last, we found insubstantial statistical associations between the four measures of trade opening and smiles (column I), anger (column II), or stress (column IV).

5.2. Hypotheses

We found weak support for the hypotheses. Hypothesis #1 says that there is a positive association between trade opening and negative emotions when buyers and sellers differ in culture and when they trade sporadically; we found support for the hypothesis only when using regret as an outcome. Trade opening did not bear a statistically significant or consistent negative association with the other four dimensions of the psyche (smiles, anger, addiction, stress).

Hypothesis #2 says that people with better access to information about markets and trade should be less likely to report negative emotions with trade opening. The results of Table 2 suggest that most of the coefficients for the schooling variable bore the negative sign predicted by hypothesis #2, but results were statistically insignificant at the $\geq 95\%$ confidence level, except when using the addiction index as an outcome. An additional year of schooling was associated with 0.11–0.13 lower standard deviations in the addiction index; the range of estimates reflects the different measures of trade opening used.

The results of Table 2 provide support for hypothesis #3 about the positive association between the consumption of commercial goods and regret. The coefficients of two variables for trade opening – the value of monetary expenditures during the 2 weeks before the day of the interview (row B) and the monetary value of durable goods acquired last year (row C) – provide the cleanest test of hypothesis #3 because they directly link monetary expenditures with buyer's regret. Both coefficients were positive and statistically significant: the coefficient for monetary expenditures during the last 2 weeks was 0.008 ($p = 0.001$) and the coefficient for the monetary value of durable assets acquired last year was 0.002 ($p = 0.001$). Transformed into elasticities (regressions not shown), the two coefficients imply that doubling monetary expenditure during the 2 weeks before the day of the interview was associated with 8.27% more buyers regret and doubling the value of durable assets

acquired last year was associated with 27.76% more buyers regret. Both elasticities were statistically significant at the $\geq 99\%$ confidence level.

5.3. Robustness

In Table 3 we report the results of sensitivity analysis for the four strongest findings from Table 2: the positive association between monetary income during the 2 weeks before the day of the interview and (1) addiction (row A, column III) and (2) regret (row A, column V) and the positive association between outstanding monetary credit and (3) addiction (row D, column III) and (4) regret (row D, column V).

To assess the robustness of the findings we introduced the following changes to the regressions of Table 2: (a) household fixed effects, (b) dummy variables for surveyors ($n = 3 - 1 = 2$), and (c) four variables related to individual (not village-level) social capital that could mediate the relation between trade opening and the psyche. The four variables for individual social capital included religion, leisure, visiting, and gossiping; the notes to Table 3 contain a description of how we defined and measured these variables. We introduced changes (a)–(c) one at a time (rows 1–3, Table 3) and together (row 4, Table 3). As the results of Table 3 suggest, the main findings stood up well to changes (a)–(c). The coefficients of trade opening measured with monetary income barely changed (columns I–II) from the coefficients of the baseline regressions. The coefficients of trade opening measured with outstanding monetary credit (columns III–IV) shrunk after introducing changes (a)–(c), but remained positive and, with one exception, statistically significant at the $\geq 95\%$ confidence level. In other analysis not shown we took out (c) and replaced it with five variables that reflect individual sociability (e.g., frequency of gift giving, helping others) and found essentially the same coefficients as in (c).

We did not have a direct measure for impulsivity or for the proclivity to seek novelty. In an earlier study among the Tsimane' we showed that private rates of time preference or patience – a reliable measure of impulsivity – was negatively associated with addiction (more patience, less addiction) and positively associated with monetary earnings (Godoy et al., 2004; Reyes-García, Godoy, Leonard, 2006; Reyes-García, Godoy, Vadez, Huanca, & Leonard, 2006). If so, then excluding impulsivity – and assuming that impulsivity was the only omitted variable introducing a bias – would produce a negative indirect effect, and larger coefficients for trade opening than the ones reported.

Could the main findings of a positive association between trade opening and (a) addiction and (b) regret reflect a self-selection bias? This could happen if before 2005 people with a penchant for trade with Westerners had left the sample and moved closer to market towns, or if people who disliked trading with Westerners had left the villages of the panel study to move farther away. Since we measured the seven households that attrited in 2005, we can estimate the likely sign of the indirect effect from omitting old attriters.

To do so, we ran four bivariate regressions of (a) addiction or regret (outcome variables) on a dummy variable for attrition and (b) attrition (outcome variable) on each measure of trade opening. The dummy variable for attrition took the value of one if the person had left in 2005 and zero if the person was still in the panel study. We found that attrition was negatively associated with addiction, regret, and each of the four measures of trade opening. Thus, the likely sign of the indirect effect from excluding old attriters is positive, suggesting that the estimates of Tables 2 and 3 probably overstate the impact of trade opening on addiction and regret. Since the bias from omitting impulsivity and attriters have opposite signs, omitting both variables produces a net effect of unknown size and sign.

Table 3

Robustness analysis of Table 2: coefficients of variable for trade opening and, in parenthesis, *p* value.

Outcome	Measure of trade opening			
	Monetary income last 2 weeks		Monetary credit	
	Addiction I	Regret II	Addiction III	Regret IV
Coefficients of variable for trade opening from Table 2	0.001 (0.002)	0.003 (0.001)	0.41 (0.003)	1.302 (0.001)
Change to regressions of Table 2	New parameter estimates			
1. Household fixed effects with clustering by household	0.001 (0.006)	0.002 (0.003)	0.37 (0.046)	0.76 (0.015)
2. Dummy variables to control for coders	0.001 (0.003)	0.003 (0.001)	0.39 (0.004)	1.34 (0.001)
3. Control for leisure, religion, visiting, and gossip	0.001 (0.004)	0.002 (0.001)	0.37 (0.007)	1.19 (0.001)
4. 1–3 included at the same time	0.001 (0.008)	0.002 (0.001)	0.28 (0.14)	0.74 (0.021)

Notes: Same as in Table 2. For row 3: (a) religion measured with a dummy variable for self-reported religion (1 = Evangelical; 0 = other); (b) leisure measured with question "In the last week, how many times have you had free time?" 0 = many times, 1 = sometimes, 2 = never; (c) visiting captured with the question "In the last month, how many Tsimane' have visited you?" 0 = nobody, 1 = some, 2 = many people; (d) gossip captured with the question "In the last seven days, how often have Tsimane' said bad things about you?"

6. Discussion and conclusions

6.1. Reasons for main findings

Two findings stood out. First, we found no statistically significant associations between (a) smiles, anger, or stress and (b) trade opening. Second, we found a positive association between (i) addiction or regret and (ii) two measures of trade opening.

Why might trade opening bear a wisp of an effect on smiles, anger, or stress? Among the Tsimane', trade opening is intermittent, recent, and largely voluntary – taking place only when Tsimane' want to buy, sell, or swap goods with Westerners. Perhaps for trade opening to alter the psyche, trade opening has to be recurrent, intense, and involuntary – involuntary because people have lost their ability to produce selected goods and so must trade with Westerners out of necessity to get what they cannot produce. Because Tsimane' retain a high degree of autarky and have managed to keep intact their cultural core, particularly their ubiquitous sociality (Godoy et al. 2005; Reyes-García et al., 2006; Reyes-García et al., 2006), they trade with Westerners from a position of strength and voluntarily. They have not been deracinated and pushed to trade with Westerners out of abject need, as has happened with other native Amazonian societies (Godoy et al. 2005; Gross et al., 1979).

Two interacting forces might explain the positive association between trade opening and regret: choice and impulsivity. If one accepts the argument that Tsimane' deal with Western traders at arm's length, then the goods Tsimane' acquire by trading with Westerners will reflect the choices and preferences of Tsimane'. Consistent with the theory of international trade, we would expect that as trade expands, Tsimane' would have more choice on what goods to obtain from Westerners, and with more choice will come more possibilities of regret, which is what we found. More choice need not beget more regret, unless people are impulsive. In earlier studies among the Tsimane' (Godoy et al., 2004; Kirby et al., 2002) we documented their high rate of private time preference. Using the same methods to elicit rates of private time preference as the ones used in studies with Western populations, we found that Tsimane' had rates of private time preference 6–7 times higher than rates of private time preference of heroin addicts in the USA (Godoy et al., 2004). Impulsivity interacting with greater choice from trade opening would partly explain why we found a positive association between trade opening and regret.

The positive association between trade opening and addiction resists easy explanations. We can rule out the idea that alcohol consumption reflects the subterfuge of traders who use alcohol to indebted Tsimane'. This explanation assumes that Tsimane' bend supinely to traders' wiles. It does not explain why Tsimane' would obey traders but ignore missionaries' reviling comments about drinking alcoholic beverages. Most Tsimane' prefer and demand to be paid in cash when they buy or sell, and alcohol rarely appears as part of a payment received by Tsimane'. For example, the 2006 survey shows that none of the sales by Tsimane' went to repay a debt, and in none of their sales did Tsimane' accept a pledge for future payment. Among all goods Tsimane' obtained in barter, alcoholic beverages accounted for <0.5% of the goods obtained.

A more useful explanation focuses on why addictive substances (particularly alcoholic beverages) track monetary income, and here we argue that consumption of alcoholic beverages tracks monetary income because it buys both individual satisfaction and social status. Using USA data, Heffetz (2004) found that the cultural visibility of goods and services – how fast neighbors noticed one's expenditures on a good or service – explained 20% of the variation in consumer expenditures. In an earlier study among the Tsimane', we found that total monetary expenditures bore a positive association with the share of expenditures allocated to highly visible goods. Building on these earlier studies, in a pilot study in 2006 we asked Tsimane': "How long would it take you before you noticed whether someone in the community who lives far/near from your household consumed _ [X]_?" and we then listed a good. Among the goods listed, alcoholic beverages ranked at the top in visibility or in how fast people would notice its consumption by others.

Tsimane' quickly notice when others drink traditional or commercial alcoholic beverages. Both represent culturally-accepted forms of displaying generosity in public. Tsimane' reserve the word *äräjete* – roughly, esteem, respect, appreciation – for people who share valued goods such as wild game, home-brewed beer (*chicha*), and – more and more – commercial alcoholic beverages. Because it brings esteem, the consumption of *chicha* and commercial alcoholic beverages is advertised and noticed even before it takes place. Men will announce in advance the time and day for drinking alcoholic beverages, as might happen before a birthday. People will notice and notify each other of households that start to harvest manioc to prepare *chicha*. For village festivities, all households pay a fee so selected villagers can buy alcoholic beverages for all to share. These explicit advertisements and preparations alert villagers of future consumption of alcoholic beverages.

When consumption of alcoholic beverages actually takes place, people notice it almost immediately for at least two reasons. First, alcoholic beverages lower inhibition so people speak and laugh louder and sometimes engage in preternaturally noticeable behavior (e.g., fighting). Both make it easier for others to notice that drinking is taking place. Second, people who sponsor a drinking get-together will ask their children to invite the rest of the village. With commercial alcoholic beverages, as with *chicha*, any person who comes to a drinking get-together can expect to be served because the host expects to be served in the future as part of a broader pact of unwritten reciprocal exchange relations that extends through time. Even the most traditional, low-income Tsimane' will drink on the street, in a group, and in some of the most public places when they come to town because they expect other Tsimane' who are passing by to notice them and join them. In doing so, the host, however impecunious and traditional, gains esteem from the guests.

6.2. Links to other studies

The absence of a strong statistical association between trade opening and smiles, anger, and stress meshes with several studies (Diener & Seligman, 2004; Frey & Stutzer, 2002; Kahneman, Krueger, Schkade, Schwartz, & Stone, 2006). Kahneman et al. (2006) recently found that in the USA, income bore a tenuous link with happiness, a finding broadly consistent with our own. We say “broadly consistent” because in a highly autarkic economy, monetary income or monetary expenditures proxy imperfectly for true income since they exclude the value of consumption from own production. That caveat aside, we too found a weak association between that part of total income reflected in monetary earnings or monetary expenditures and mirth or anger. The positive association between trade opening and regret fits with findings from laboratory and field experiments showing that more choice reduces well-being (Irons & Hepburn, 2007). Last, the positive association between trade opening and addiction that we found parallels some of the literature from social epidemiology reviewed earlier showing greater consumption of alcoholic beverages among native Amazonians from prolonged exposure to Westerners.

6.3. Future directions

Our findings point to two possible lines of future research. The first line has to do with the psychological dimensions of micro-credit. Micro-credit has expanded in low-income nations (Armendariz & Morduch, 2005), but we know little about its psychological effects. Our findings suggest that at least during the early stages of trade opening, informal monetary credit might contribute to addiction and regret. Possible paths might include usurious interest rates, impulsivity, and lack of management skills by borrowers or lenders. The second line of research has to do with obtaining a firmer empirical handle at the possible links between impulsivity, trade opening, and the forms and severity of regret (Frederick, Loewenstein & O'Donoghue, 2002).

In closing, we return to Freud's query about why “so many people have come to take up this strange attitude of hostility to civilization”? Freud thought that the development of societies, markets, and trade produced more regulations, which fettered impulses. With trammels, he thought, came more discontent. We turn Freud's insight on its head. Trade opening and development produces more choice and freedom (Sen, 1999), but with more choice and freedom among impulsive people also comes more addiction and regret. There then might hang another reason for civilization's discontent.

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