

# Do modern forms of human capital matter in primitive economies? Comparative evidence from Bolivia

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## Abstract

We examine the correlation between modern human capital and income among adult men in four foraging-horticultural societies of Bolivia. Despite their remote location, we find results similar to those found in developed nations. We find that: (a) education correlates with 4.5% higher overall income and with 5.9% higher wages and math skills correlates with 13.5% higher cash income, and (b) the positive correlation between education or math skills and income is higher among households closer to market towns. The high returns to modern human capital even in highly autarkic economies might explain why people in those societies reduce investments in the accumulation of traditional folk knowledge.

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## 1. Introduction

Although we know much about the benefits of modern human capital in developed and most developing economies (Foster & Rosenzweig, 1996; Angrist & Lavy, 1997; Chiswick, Patrinos, & Hurst, 2000), we know little about their effects in simple, highly autarkic, rural economies of hunters, gatherers, and horticulturalists. Economists rarely study such primitive economies, and cultural anthropologists rarely provide empirical estimates of how modern forms of human capital affect the income, consumption, or wages of

foragers and horticulturalists. This reflects the difficulty of measuring the outcomes and of doing formal surveys with such populations. As a result, we do not know whether findings from developed and formal economies about the benefits of modern human capital also hold up in these unique settings. We find that the relation does hold, that those with schooling and basic arithmetic skills earn more. Here, we contribute to the empirical study of how different forms of modern human capital correlate with cash income, wages, and farm production in four societies of foragers-horticulturalists in the Bolivian lowlands.

The information and approach we use is novel in three ways. First, we measure school attainment and skills associated with schooling, such as literacy, arithmetic skills, and Spanish-speaking proficiency. We measure

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skills because failure to control for skills when estimating returns to schooling can bias the estimate of schooling (Rivera-Batiz, 1990, 1996; Charette & Meng, 1994; Chiswick & Miller, 1992, 1999; Dustmann, 1994; Chiswick, 1991; Dustmann & van Soest, 2000; Dustmann & Fabbri, 2000; Angrist & Lavy, 1997; Chiswick & Repetto, 2000). Researchers who use public-use data sets to estimate the effect of schooling or language proficiency on economic outcomes generally cannot control for skills because most such data sets generally include only questions on formal schooling and on speaking proficiency in the dominant language or in the mother tongue of the immigrant (Chiswick & Miller, 1988; Lecker, 1997; Shapiro & Stelcner, 1997; McManus, 1985, 1998; Heum Park, 1999; Bloom & Grenier, 1996; Kossoudji, 1988). Second, we use observed rather than self-assessed measures of skills.<sup>1</sup> Since random errors from misclassification produce an attenuation bias, we believe this to be an important improvement. Last, we did the research among four ethnic groups to observe whether the findings hold across different cultures, albeit in similar economic settings.

## 2. The survey

During 1997–1998, two graduate students in anthropology carried out ethnographic fieldwork and a household survey among four ethnic groups of foragers-horticulturalists in the Bolivian lowlands: Tsimane', Yuracaré, and Mojeño of the river Sécure (department of Beni) and Chiquitano (department of Santa Cruz) (Huanca, 1999; MacDaniel, 2000). During June–July 1997, we tested the survey among the Tsimane' near the town of San Borja (population ~16,000) (department of Beni). Researchers carried out the survey at the end of fieldwork (in 1998) among 886 household heads evenly split between female and male heads, in 443 households of 42 villages. We surveyed between 2.79% and 11.80% of the households in each ethnic group, or 3.54% of all households in the total population of the four groups (Godoy & Contreras, 2001; Godoy, Wilkie, & Kirby, 2001). Only people from one village refused to take part in the survey.<sup>2</sup>

For each ethnic group we chose about 10 villages close and far from market towns, and villages between the extremes. Within a village, we surveyed as many households as we could. In the regressions discussed

later, we include village-to-town distance as a control. We applied the survey to the female and to the male household head, but limit the analysis to men since women rarely enter the market for wage labor.

Anecdotal evidence supports the intuition that skills in writing and in arithmetic (aside from education) could affect economic outcomes. Villagers view literate people with esteem because those who can read and write can decode official documents and the records kept by employers. They can also write messages for fellow villagers who cannot write. The ability to do simple arithmetic also confers advantages, not only when people go to market towns, but also when traders come to villages to barter, buy, and sell. The ability to speak Spanish allows villagers to better understand market transactions and economic news about the region transmitted through the radio, and deal with government officials and teachers. Some villagers acquire the skills on their own outside of school.

## 3. Variables and data

We estimate four earnings functions using different definitions of earnings. We use right-side variables that have become standard in studies of earnings functions with human-capital variables.

### 3.1. Dependent variables

We use four different dependent variables—total household cash income, total household imputed farm income, sum of total household imputed farm income and non-farm cash income, and daily wages. The different measures allow us to calculate the correlation of human capital with particular economic activities, not just with overall income. Note, however, that some dependent variables are measured with more accuracy than others. For example, subjects found it easier to remember their daily wage than to estimate the total imputed farm income of their household or the total cash earned by the household from the sale of goods and from wage labor.

To estimate the total cash income of the household, we asked about all the cash income earned from wage labor and from the sale of animals and farm, forest, and animal products during 1997—the year before the interview. About 10% of households reported receiving no cash income during 1997. The consumption of those households came from their own foraging and farm production; they got goods from the outside world through barter.

To estimate the total imputed farm income for the household, we asked about the annual production of the three principal annual crops—maize, rice, and peanuts—the year before the interview. These crops are the

<sup>1</sup>For example, we found only three studies that contained objective measures of skills when assessing the effects of language proficiency on earnings (Charette & Meng, 1994; Rivera-Batiz, 1990; Angrist & Lavy, 1997).

<sup>2</sup>The village that declined to be interviewed consisted of people undergoing a messianic movement. They did not want outsiders to question them about any aspect of their social life.

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