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August 2014

WORKINGPAPER SERIES

Number 357

POLITICAL ECONOMY RESEARCH INSTITUTE

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August 13, 2014

Abstract

Agricultural marketing cooperatives are potentially important tools for rural development. However, many cooperatives experience significant outside sales to private intermediaries. This study analyzes the problem of outside sales in a coffee cooperative in northern Peru, and finds that the labor practices of cooperative members exert significant influence on their level of outside sales. I find that coffee growers who use more intensively cooperative labor networks known as *choba-choba*, as well as family household labor, engage in fewer outside sales and channel more sales through the cooperative. These results imply a symbiotic relationship between agrarian marketing cooperatives and non-market labor practices, and suggest an important role for robust community structures in building sustainable livelihoods in agrarian regions of the developing world.

Keywords: Latin America, Peru, fair trade, coffee, cooperatives, farm labor

JEL classification: J430; O130; Q120, Q130; Z130

1. INTRODUCTION

Agrarian marketing and service cooperatives have the potential to transform rural economies by providing small-scale cultivators with improved access to extension services, low-cost inputs, and high prices. Though some cooperatives have suffered from corruption, mismanagement and rent-seeking (Banerjee, Mookherjee, Munshi and Ray 2001, Mude 2006) their democratic structure and orientation towards knowledge and service provision makes them important organizations in the building of social, human and natural capital in rural regions (Attwood and Baviskar 1988, Getnet and Anullo 2012). In numerous developing countries and regions, cooperatives have met with notable successes in marketing tree crops such as coffee, cacao, dairy, sugarcane and other products (Attwood and Baviskar 1988, Tendler 1997, Chandra and Tirupati 2002, Wollni and Zeller 2006, Vasquez-Leon 2010). Many of these cooperatives benefit from integration into fair trade certified networks, which offer stabilized export prices and premiums (Bacon 2013).

Despite their benefits, agrarian marketing cooperatives are vulnerable to outside sales: members often sell their products to local private traders rather than through the cooperative Cooperative managers and economists have labelled outside sales (or "side-selling") a form of free-riding, since the grower benefits from access to the cooperative's low-cost inputs, services and infrastructure but does not reciprocate by marketing product through the cooperative (Vorlaufer, Wollni and Mithofer 2012, Wollni and Fischer 2012). Outside sales present serious problems for agrarian marketing cooperatives: such sales reduce revenue, increase supply uncertainty and make it more difficult to sign output contracts in advance of the harvest. Despite the serious implications of outside sales for the financial stability of cooperatives, the problem has not been extensively studied.

This study demonstrates a robust and potentially causal linkage between coffee cooperative members' outside sales to intermediaries and the members' choice of farm labor types. Empirical analysis of coffee growers belonging to a single cooperative in the Upper Amazon demonstrates that farm households that rely to a greater degree on traditional cooperative labor networks, known as *choba-choba*, exhibit a lower level of outside sales, marketing larger proportions of their coffee through cooperative. Households that rely on family labor to a greater degree also exhibit lower outside sales, implying a strong correlation between non-market labor and cooperative patronage. Households that rely to a greater extent on hired wage labor, by contrast, exhibit higher outside sales, selling a larger proportion of their coffee to private intermediaries that work for investor-owned export firms.

The coffee cooperative members studied in this chapter reported, in structured interview settings, two major reasons why they may choose outside sales over cooperative marketing. First, intermediaries tend to pay growers more promptly than the cooperative. Bacon (2005), in his study of Nicaraguan coffee cooperatives, found that on average, fair trade certified cooperatives tended to pay the grower in full after 41 days; local middlemen tended to pay within nine days. The literature on agricultural marketing indicates that this problem may be common across developing country cooperatives (*e.g.* Fischer and Qaim 2011). Hence, growers that discount the future heavily, for example due to the necessity imposed by poverty, will thus engage in outside sales. Second, while the private intermediaries accept coffee of any quality, the cooperative adheres to minimum quality standards to maintain its reputation as the producer of a differentiated commodity in quality-sensitive export markets. A grower whose product does not meet the cooperative's quality standards, whether due to insufficient labor supply, lack of expertise, or human error, will thus engage in more outside sales.

This paper focuses on a single coffee cooperative in the northern Peruvian Amazon, CAC Oro Verde.[1] Fair trade and organic certifications provide opportunities for Oro Verde to offer its members higher prices than those offered by private intermediaries. Fair trade certifications offer floor prices and per-pound premiums for social development; organic certifications offer per-pound premiums. For coffee growers, cooperatives have become a primary channel through which the benefits of these certifications are distributed. The leading global fair trade certification system, the Fairtrade Labelling Organizations (FLO), mandates that participating coffee growers be affiliated with cooperatives, and disburse coffee price premiums through cooperatives only.[2] The growth of fair trade and organic certifications has provided an important avenue for smallholder-led agrarian development through cooperatives.

This study documents a strong and potentially causal correlation between participation in informal local labor exchanges and patronage of regional cooperatives. In so doing, it provides hard empirical evidence to bolster existing theories of the mutually supporting relationship between well-functioning community institutions and favorable economic outcomes (e.g. Putnam 1993). The results presented below further elucidate the relationship between economic, social and cultural resources in traditional agrarian communities, explored in other recent studies such as Peredo (2012). This line of research offers an important corrective to the economics discipline's narrow focus on measurable, impersonal transactions based on monetary exchange. The narrow disciplinary focus of conventional neoclassical economics has obscured important non-market aspects of economic life, such as mutual aid, gift economies, care work, and common-property resource management institutions (e.g. Folbre and Nelson 2000, Marglin 2008, Ostrom 2010). By analyzing formally the broader economic impact of non-market labor practices, this study aims to increase the visibility of such institutions for economic analysis.

2. PERUVIAN COFFEE COOPERATIVES IN CONTEXT

(a) Quality and Prices

Coffee processing and marketing cooperatives in most coffee-growing countries, including Peru, face intense competition in export markets from large, investor-owned firms who contract with small-scale private intermediaries to collect coffee beans from growers. These intermediaries - known as *coyotes* in Central America and simply as *intermediarios* in Peru - purchase raw, partially processed coffee beans in all grower communities.[3] Cooperatives that benefit from stabilized export prices or premiums, such as those offered by fair trade or organic certifications, are able to compete successfully with intermediaries by setting growers' prices above the prevailing price paid by the intermediaries. However, cooperatives also tend to demand higher levels of product quality than intermediaries, in order to establish good reputations with buyers. This increased quality requirement entails additional labor from the grower.[4] Taking this higher labor requirement into account, the magnitude of the income benefit to the grower from participation in fair trade and organic certified transactions has been subject to debate. Recent evidence from Central American and Peru indicates that the net income benefits to growers from participation in fair trade and organic certification are minimal, and that participating growers benefit primarily through non-income channels such as access to credit, technical assistance, education and empowerment (Bacon *et al* 2008, Vasquez-Leon 2010, Ruben and Fort 2012).

Given the competitiveness of the international coffee export market, quality upgrading is an imperative for many cooperatives. Though the fair trade certification standard does not mandate a quality premium, fair trade coffee importers and roasters tend to demand high quality from their suppliers in order to differentiate their products, and often pay quality premiums in

addition to fair trade premiums (Bacon 2013). In the effort to upgrade, many coffee cooperatives set minimum quality standards for their members; for instance, the cooperative discussed in this article requires that all coffee collected from its members pass the Specialty Coffee Association of America (SCAA) threshold point score of 80 for specialty coffee, which entails that the coffee is free of the most serious aroma, flavor or textural defects, known as "level 1 defects" (SCAA 2013).[5] Quality upgrading often occurs on the advice of the roaster or importer; some roasting or importing companies even provide direct technical assistance on product quality to cooperatives, as part of a long-term trading relationship (*e.g.* Bacon 2013, Cycon 2007, Sustainable Harvest 2013). Yet conventional, non-fair trade coffee buyers also increasingly demand such quality, and can often outbid their fair trade counterparts when world prices are high. The magnitude of effective (quality-adjusted) fair trade premiums has been shown to vary inversely with the world market price (De Janvry *et al* 2010). The *de facto* quality requirements for fair trade coffee disadvantage less-skilled producers and poorly capitalized cooperatives. The interplay of price premiums and quality requirements is a major factor determining cooperative member patronage: as higher quality requirements discourage patronage, higher premiums encourage it.[6]

Fair trade certification standards rely on a fixed floor price within a volatile world market; the variable and uncertain premiums offered by fair trade-participating cooperatives reflect this volatility. The price offers advanced by private intermediaries in coffee-growing communities reflect the fluctuating world coffee contract price, called the 'C' price. When world prices are low, the premium offered by fair trade certification is high. Cooperatives that enjoy a high percentage of sales through fair trade certified markets thus offer strong price incentives for growers to patronize them. When world prices are high, however, the magnitude of the fair trade certification premium shrinks as the world price approaches the fair trade minimum price, and

the opposite effect occurs: the price premium that such cooperatives can offer their members shrinks. The shrinking premium reduces members' incentives to patronize the cooperative, inducing outside sales. High world prices thus represent both a blessing and a curse: they raise the incomes of impoverished small-scale coffee growers, but weaken the cooperatives on which those growers depend for economic stability during difficult times when world prices are low.

This complex, ever-changing price dynamic is compounded further by uncertainty in the volume of coffee that cooperatives are able to sell on the certified market. All coffee cooperatives that belong to the FLO Registry are eligible to sell their entire output on the fair trade certified market; in reality, very few actually do. Due to rapid entry of certified coffee and limited demand for certified product, there is a global excess supply of fair trade coffee: current estimates suggest that the total supply of certified fair trade coffee is two to four times the total demand (De Janvry *et al* 2010). Most cooperatives thus sell a large portion - in some cases as much as 85% - of their coffee on the conventional market, despite its eligibility for the certified market (Levi and Linton 2003, Berndt 2007). Difficulty in securing fair trade certified sales thus suppresses the price offer that a cooperative can make to its members, as well as the magnitude of the benefits (such as technical assistance or education) funded by social premium revenues. These reduced purchase prices and benefits suppress growers' incentive to patronize the cooperative and induce outside sales to intermediaries.

(b) Farm Labor Practices

Coffee cooperative members in the Peruvian High Amazon exhibit diverse farm labor practices that span family household labor, hired wage labor, and cooperative labor networks known as *choba-choba*[7]. The practice of *choba-choba* consists of labor rotations of a day to a week in length during times of peak labor demand, such as the harvest. It consists of a group of

households who commit to sharing labor with one another on a rotation basis, moving from household to household within the group. The host household must provide the team members with daily meals, and may also offer traditional corn beer, called *chicha*. *Choba-choba* networks consist of fellow community members who may also be extended family. Labor exchanges of this kind are traditional, ancestral practices that predate Spanish colonization and are common throughout the Andean and Amazonian regions (Guillet 1977, Mayer 2005, Takasaki *et al* 2011). *Choba-choba* is only one of several common forms of labor exchange throughout the Peruvian Andes and Amazon. Other such practices include daylong work parties (*faena*), exchanges of single days between pairs of households (*waje-waje*), stable reciprocal relationships between pairs of households (*ayni*), and hierarchical systems of debts and reciprocal obligations across multiple households, known as *minka* (Mayer 2005). Labor exchange practices similar to the abovementioned types can be found in many other regions of the world, such as the Philippines (Francia 1988). Guillet (1977) calls such practices "associative production strategies."

The analysis in this paper begins from the hypothesis, based initially on my direct observations of coffee growers of the Oro Verde cooperative, that engaging in *choba-choba* supports growers' patronage to cooperatives. I hypothesize that *choba-choba* brings about higher patronage through higher labor productivity, giving rise to higher output quality, than hired wage labor. Attention to detail in coffee harvesting and processing brings about higher quality, without affecting yields significantly. Coffee berries ripen at different rates on the same branches of the same trees; indiscriminate picking of ripe and unripe berries produces near-identical yields to careful harvesting, though at lower output quality. Highly productive and detail-oriented laborers harvest berries carefully, leading to high output quality; they also monitor beans carefully after harvesting to ensure the optimal level of moisture. Given cooperatives' strict quality

requirements, low quality coffee beans will be sold to intermediaries. Supporting arguments to the *choba-choba* hypothesis can be divided into three groups: market failure, social and human capital, and social preferences.

(i) Market Failures

Choba-choba may play an important role in securing farm labor supply when labor and credit markets are missing or incomplete. For instance, if labor markets are incomplete or imperfectly functioning, the opportunity cost of family labor c can be measured as the market wage w, multiplied by the probability ρ of acquiring a job, which is equal to the proportion of the labor force employed (Harris and Todaro 1970). Hence $c = w\rho$. Rational farm households will allocate labor such that its marginal product equals c, not w. If $\rho < 1$, then $c < w$ and the shadow wage of family labor is less than the market wage for hired labor. It will thus be cheaper economically to repay a day's labor in kind than it will be in cash.

Choba-choba may also support farmers' ability to secure labor supply when credit markets are missing or imperfect. Existing research in the Peruvian Amazon documents strong household liquidity constraints due to low incomes and imperfectly functioning credit markets (Takasaki *et al* 2011). Credit rationing limits coffee growers' access to loans in advance of the harvest to hire laborers. Reliance on cooperative labor such as *choba-choba* decreases a grower's need for immediate cash, lessening the impact of these constraints and allowing growers access to a larger labor supply. Reducing growers' cash requirement also increases a grower's willingness to wait for cooperatives' delayed harvest payments.

(ii) Social and Human Capital

Choba-choba may be superior in productivity to hired labor insofar as it makes use of a community's stocks of social and human capital for the purpose of organized productive activity.

Social capital is a contested term with many definitions; in this context, it refers to "features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit." (Putnam 1995) As a voluntary, nonmarket institution comprised of exchanges of complex and time-consuming tasks between households, *choba-choba* must rely upon the primary features of social capital, including trust, cooperation, and reciprocity.

Reciprocity refers to individuals' voluntary cooperative behaviour in dyadic or group settings, conditional on the other member/s' cooperative behaviour. It is distinct from altruism in that the cooperation of each is contingent on that of the others. An important class of game theoretic models (for example, the Folk Theorem) and behavioral experiments have demonstrated that if there are mutual benefits from cooperation, such behavior can be sustained in a variety of settings.[8] If *choba-choba* provides an economic benefit, household members will engage in it voluntarily provided that their counterparts in other households reciprocate in a satisfactory manner. Shirking in *choba-choba* may lead to termination of the network, which would impose a cost on all households involved. Given stable reciprocal relationships among households, productivity advantages may emerge in *choba-choba* groups due to team production effects. These effects may arise due to mutual learning, peer pressure, complementary abilities across team members, and gains in wellbeing due to increased social interaction (e.g. Hamilton 2003).

Choba-choba's potential benefits may also arise through the channeling and concentration of human capital. Human capital refers to the stock of education, skills and experience that allow a person to increase her income (Becker 1962). It is likely that coffee growing households in the Peruvian Upper Amazon possess greater stocks of sector-specific human capital (skills and knowledge) than hired laborers. The hired labor market in the region

spans multiple production zones and commodities, including rice, cacao, coffee and other crops; thus, a hired laborer may or may not be skilled or experienced in techniques of specialty coffee growing. A *choba-choba* group, however, is comprised of households whose primary productive occupation is the cultivation of specialty coffee for the export market. These households enjoy common membership in the cooperative, enjoy access to the same resources of technical assistance, and draw on a common body of experience and practice. A productivity advantage may thus emerge in the *choba-choba* group relative to a similar group of coffee growers that relies on a pool of less-skilled hired labor.

(iii) Social Preferences

Choba-choba may impact cooperative sales directly by influencing growers' to adopt social preferences. Social preferences refer to utility functions in which individual well-being depends on the well-being of others (Carpenter 2013). The grower would thus choose voluntarily to patronize the cooperative even in the absence of price incentives. This choice may stem from a sense of obligation akin to gift exchange: as the cooperative offers technical assistance, credit, processing and marketing services to the member, the member reciprocates by marketing voluntarily through the cooperative.

Modern institutional economics posits that preferences, rather than pre-determined as assumed in neoclassical theory, can be influenced by institutions such as markets, social norms, and/or non-market exchange practices (Bowles 1998). Engaging in *choba-choba*, a non-market exchange practice, may transform growers' preferences away from the isolated, self-seeking exchanges that characterize the private market and toward the mutual benefits generated by reciprocal, non-market exchanges in general. Such a grower may view a transaction with a cooperative as composed of a social, as well as economic, element, analogous to the social

exchange relationship of *choba-choba*. *Choba-choba* participants would thus be more active members of cooperatives than non-participants, and patronize cooperatives more intensively regardless of price advantages. These two institutions, *choba-choba* and cooperatives, may also be subject to mutual causation: membership in a cooperative may lead to intensification of *choba-choba* by reinforcing growers' preferences for reciprocal, cooperative economic relationships over isolated, self-seeking market exchange.

3. THE ROLE OF CERTIFICATIONS: FAIR TRADE AND ORGANIC

As noted in section 2(a) above, coffee cooperative patronage is influenced by constantly fluctuating price incentives that stem from volatility in world markets. Such incentives are shaped by certification schemes such as fair trade, which attempt to encourage cooperative participation by offering a floor price and social premiums. Organic certifications, such as International Federation of Organic Movements (IFOAM) and BioLatina, offer additional premiums for growers whose plots meet organic standards. At the time of research (2006), the fair trade (social) and organic premiums were $0.05 and $0.10 per pound, respectively. Since 2007, the social premium is $0.10 per pound and the organic premium is $0.20 per pound.

The two different premiums follow different rules for distribution within the cooperative. The FLO social premium must be spent on community development projects within the cooperative rather than distributed to individual growers. The organic premium may be distributed to growers who have already passed through the three-year organic transition period and are thus eligible to market organic certified product; not all cooperative members have reached this stage. As section 2(a) implies, both organic and FLO certifications are transaction-based, meaning that the floor price, premiums and other benefits are guaranteed, and the certification labels issued, transaction by transaction. Buyers may choose to purchase coffee

from cooperatives on organic, but not FLO certified, terms, and vice versa, even if all coffee from such cooperatives is eligible to be certified under both labeling schemes.

Coffee cooperatives such as Oro Verde pay growers in two installments, the *delivery payment* and the *dividend*.[9] The unit price paid in the first installment, the delivery payment, is called the *delivery price*. The cooperative pays the delivery payment when the grower delivers the coffee to the cooperative headquarters. The delivery price is fixed by the cooperative at the beginning of the season, but can be adjusted mid-season if necessary. The second payment or dividend is disbursed after the end of the growing season. The size of the dividend varies according to the export price the cooperative receives for its coffee on the international market. Delays in the dividend payment can induce economic hardship for growers.

Regional coffee cooperatives, such as the one studied in this paper, span multiple communities. In the Oro Verde cooperative, responsibility for collecting members' coffee and disbursing delivery payments belongs to the cooperative's *base committee*. Each base committee comprises all the cooperative members residing in a single community. Communities vary widely in the percentage of their members who belong to the committee; as of 2007, base committees of Oro Verde range in size from six to forty-four households. The base committee acts as a mediating institution between the individual grower and the cooperative; each committee elects one delegate per 10 active members to the general assembly. Committees also possess internal governance structures, which are responsible for writing and approving annual workplans, supporting the technical assistance process, and supervising the process of collecting and transporting coffee from the growers to the central cooperative warehouse. Base committees use local warehouses for the storage and weighing of coffee, transport the collected coffee from the local warehouse to the headquarters, and disburse delivery payments. The process of

collection, storage, transport and disbursement entails a delay, usually of 1-2 weeks, between harvest and delivery payment.

The farm surveys I conducted in 2007 asked growers to report farmgate prices and quantities received from both intermediaries and the cooperative during the 2006 harvest season. Table 1 compares these prices to the export prices reported to national data collection agencies by all cooperatives in 2006; it thus reveals the magnitude of deductions taken by the cooperative and intermediaries. Prices are measured in U.S. dollars ($) and Peruvian New Soles (S/) per 46-kilogram *quintal* (qq) of green coffee beans. The reported prices in lines 1, 2, and 3 are the average export prices paid to all private firms, all cooperatives in Peru, and the Oro Verde cooperative respectively. Comparing these three lines reveals the aggregate impact of fair trade certification, organic certification, and quality-related premiums paid to the cooperatives. Cooperatives in Peru received an average price advantage of $27.62 per *quintal*, or $0.28 per pound, over private export firms in 2006; the Oro Verde cooperative received a price advantage of $36.71 / *quintal*, or $0.36 per pound. Lines 4 and 5 are the world market price for the 'Other Milds' categories, into which Peruvian coffee falls, and the FLO minimum price respectively. Line 6 indicates the weighted sample average (from my data) of the farmgate price paid to the grower by the Oro Verde cooperative, which includes both delivery price and dividend; Line 7 indicates the average price offer to cooperative members from private intermediaries.

Table 1 indicates that both cooperatives and private firms or intermediaries take large deductions from the export price before they pay growers; in percentage terms, private firms' deductions are larger (32.4% vs. 24.7%). Cooperatives take deductions to finance general operations including inputs, equipment, staff salaries, and cost of capital. Data on the uses of private export firms' price deductions is not available; however, it is likely absorbed by similar

expenditures on inputs, equipment, salaries, and cost of capital. Private export firms, however, retain profits, which cooperatives do not, being owned by their members and thus returning profits from sales to members as dividends. Finally, cooperatives such as Oro Verde offer extensive technical assistance through a staff of full-time trained agronomists; private firms, generally speaking, do not offer such services.

Table 1. Prices Paid by Cooperatives and Intermediaries, Peru 2006

		$/qq[5]	S/qq
1	Average export price paid to all private, non-cooperative firms [a]	96.62	315.95
2	Average export price paid to all cooperatives [a]	124.23	406.23
3	Average export price paid to Oro Verde cooperative [a]	133.33	435.99
4	Yearly average ICO Indicator Price 'Other Milds' [b]	116.80	381.94
5	FLO minimum price, 2006 [c]	121	395.67
6	Average price paid to growers in sample by private intermediaries [d]	65.23	213.32
7	Average price paid to growers in sample by the cooperative [d]	91.29	298.52
8	Average intermediary discount (export minus farmgate price) [d]	31.39	102.64
9	Average co-op discount (export minus farmgate price) [d]	32.94	107.71

Sources: a. Junta Nacional del Café (2006) b. International Coffee Organization (2006) c. Fairtrade Labelling Organization (2006) d. Own survey. Conversions reflect an average 2006 monthly Peru-US exchange rate of 3.27 S/USD, calculated from data of Banco Central de la Reserva del Perú (2006).

4. SURVEY DATA

The Oro Verde cooperative spans three watersheds of the San Martin department of northern Peru, known as Lamas, Alfonso Alvarado Roque, and San José de Sisa.[10] The San Martin department is located in the Upper Amazon rainforest, between the Andean escarpment and the Amazonian lowlands. Agriculture and forestry represent the largest single sector by value, with 27% of departmental product (INEI 2010). Within the agricultural sector, the top product by land area and revenue is rice, which occupies the valley bottomlands of the region's two major rivers, the Mayo and the Huallaga; coffee, the second most valuable crop by land area

and revenue, occupies the upper portion of the watersheds of these rivers between 800 and 1200 meters above sea level. During the period of my study in 2007, San Martin was the third-largest coffee producing department in Peru, with 15% of total national coffee production by volume in 2006 (Peru Ministry of Agriculture 2013). The poverty rate in San Martin in 2007 was 44.5%, ranking 13th out of 24 departments; the extreme poverty rate was 16.9% (INEI 2008).

The Oro Verde cooperative was formed in 1999 with the support of the United Nations, seeking an alternative development strategy in areas of the Upper Amazon that had been ravaged by the illegal coca trade. It achieved organic certification through Bio Latina in 2001, and gained admission to the FLO registry in 2003. From a small initial group of 56 members, the cooperative had blossomed to 450 active members (*socios habiles*) and 1,000 total members, including provisional members (*socios en acercamiento*), when the author first visited in January 2007. The organization now consists of 1,024 total members, who cultivate a total of 20,000 *quintals* (46 kg) of raw green coffee on 2,100 hectares and 5,000 *sacos* (60 kg) of cacao on 900 hectares, for a total of S/ 15,077,658 ($5,472,834) in gross sales (Aquino 2012).[11]

The cooperative was founded in the town of Lamas, population 16,871, the center of a Quechua-speaking region near the city of Tarapoto in the Mayo river watershed. While coffee has been cultivated in the Lamas region since the early 20th century, its importance to the region increased sharply in the aftermath of the cocaine boom of the 1980s, which brought about rapid deforestation and water contamination, as well as social ills including alcoholism, prostitution and violence. Coffee grows at roughly the same altitudes as coca, and has thus become a principal alternative crop for the region, supported through funding and technical assistance by national, multilateral, and private sector organizations as well as NGOs.

From its beginnings, Oro Verde has worked closely with indigenous communities, establishing long-term relationships with their members and working closely with their leaders to integrate high-quality organic coffee production into the life of the communities. The predominant indigenous group in the region is the Lamista, a Quechua-speaking Amazonian group believed to have migrated from the Andes sometime during the reign of the Inca (Schjellerup 1999). My data set indicates that residents of Lamista communities represent 25% of the cooperative; further, many residents of the surrounding mixed-ethnic (mestizo) communities also identify as indigenous. According to my sample, 40% of cooperative members speak Quechua as a native language.

The cooperative has cultivated a broad and deep network of relationships with organic and fair trade certified coffee and chocolate buyers and roasters, as well as international development agencies including USAID; it exports to ten countries in Europe and North America. From its origins in coffee, it has diversified into cacao, honey, organic sugar (panela), and a highly nutritious tropical nut called *sacha inchi*. It has also developed a line of products for the domestic market that includes roast and ground coffee, chocolate in bar and powder form, *sacha inchi* oil, sugar and honey. It owns and operates a retail outlet, lodge and conference center in Lamas, which hosts the cooperative's own assemblies and can be rented out to other organizations. Most recently, the cooperative has begun to enter ecosystem service markets through reforestation projects that generate salable carbon credits, with 700 hectares reforested in seven species as of 2012 (Aquino 2012). Members of the cooperative leadership and staff regularly attend international conferences devoted to coffee, such as the annual SCAA, as well as regional fair trade conferences such as the CLAC (Latin American and Caribbean Network of Small Fair Trade Producers). The cooperative also forms part of a second-tier credit and service

cooperative called Cooperativa de Ahorro y Credito (COOPAC) Norandino, which includes two other large agrarian cooperatives, Cepicafe and Cenfrocafe, located in the departments of Piura and Cajamarca (respectively) that lie along the *Carretera Marginal*, the paved route built in 1981 that extends from the northern Amazon through the Andes to the Pacific Coast.

I collected data on 150 coffee-growing household members of the Oro Verde coffee cooperative between March and July of 2007, through surveys administered directly to growers in either their homes or the meeting place for the cooperative's base committee. The surveys were designed to capture a broad picture of the farmer's living standards and livelihood strategies in order to identify the factors that influence members' patronage decisions. They contained modules on household demographics, dwelling characteristics, landholdings, farm labor usage, production, sales and output prices for all commercial crops, coffee varieties, subsistence crops and other sources of livelihood or income, credit, taxes, and participation in cooperatives including length of tenure, satisfaction, and present or past leadership position. In addition to these data, 100 of the 150 surveys contained a qualitative module that asked the grower to describe in words the benefits and drawbacks of the cooperative. Growers who side-sold to private intermediaries were asked to identify their reasons or motivations for doing so. The attitudes, perceptions and thought processes elicited on the qualitative module served to complement the quantitative data and clarify important aspects of the grower's relationship to the cooperative. I supplemented the survey with analysis of cooperative documents and participant observation. Participant observation activities included attendance at cooperative assemblies and base committee meetings, informal interviews with cooperative managers, agronomists, elected directors and members, and several working days in coffee fields alongside cooperative members.

(a) Sampling Strategy

The sampling strategy consisted of random stratified sampling from the cooperative's roster of 450 members. I selected half the member communities from each region by counting every other community listed on the cooperative roster in alphabetical order. The author then selected half of the cooperative members from each community by counting every other name on the cooperative roster in alphabetical order.[12] Along with research assistants, I visited each community in the sample to administer the survey. In the cases where the cooperative member listed on the interview sheet was unavailable, we interviewed the geographically closest neighbor who was also a cooperative member.

(b) Household Data

Table 2 below provides some key descriptive statistics on the cooperative member household. The table includes indicators of household demographics, landholdings, coffee production and income, subsistence production, participation in cooperatives, and labor usage. Median household size was 5 members, with the median number of adults (members over 18 years of age) equal to the number of children; median dependency ratio was 1.0. The median household cultivates two separate parcels of land; the median quantity of land owned or controlled by the growers in the sample was 9.125 hectares, and the median number of hectares cultivated in all crops by growers in the sample was 5.25. The median grower cultivated three hectares of land in coffee, which is estimated to be approximately the national median as well (USDA 2013). Median yield on coffee plots was 13.94 *quintals* per hectare.[13] Most growers exhibited some degree of self-sufficiency in household production, cultivating 1.73 hectares in subsistence crops on average. Subsistence plots tended to be planted in a traditional polyculture made up of plantains, yuca (manioc), and beans.

Table 2. Sample Descriptive Statistics					
Variable by Category	MEAN	MEDIAN	STDV	MAX	MIN
Household Demographics					
Number of household members	5.06	5.00	2.140	17	1
Number of adults over 18 years of age	2.7067	2.00	1.318	10	1
Number of minors under 18 years of age	2.34	2.00	1.446	7	0
Number of minors working full time in the fields	0.2333	0.00	0.639	2	0
Dependency ratio	0.9279	1.00	0.744	3	0
Landholdings					
Number of agricultural parcels owned or controlled by household	1.9133	2.00	0.881	6	1
Total land owned / controlled by household, in hectares (1 ha = 2.2 acres)	14.7067	9.125	20.29	202	1.25
Total land under cultivation, in ha	7.0948	5.25	6.810	58	1.1
Total land in coffee, in ha	3.8440	3.00	3.001	24	0.7
Average altitude of coffee plot, in meters above sea level	1165.733	1173.40	290.0	1800	110
Total land in cacao production, in ha	0.2875	0.00	1.222	14	0
Total land in other cash crops, in ha	0.0508	0.00	0.218	2	0
Total land in timber, in ha	0.0433	0.00	0.227	2	0
Total land in pasture, in ha	1.1208	0.00	3.402	30	0
Total land in subsistence crops, in ha	1.7307	1.00	2.371	17	0
Total land left as forest, in ha	7.2542	3.00	17.63	195	0
Coffee Production					
Quantity of coffee produced in 2006, in qq (1 qq = 46 kg)	63.78	40.00	63.94	400	5
Yield per hectare, in qq	16.68	13.94	10.16	60	2.11
Subsistence Production					
Number of subsistence crop species grown by household	3.23	3.00	1.255	6	0
Number of animal species raised by household	2.05	2.00	1.159	6	0
Participation in Cooperatives					
Household's length of tenure in cooperative, in years	4.48	3	2.41	8	1
Quantity of coffee marketed through the cooperative, in qq	34.26	25.00	33.86	180	0
Quantity of coffee sold to intermediaries, in qq	29.79	15.00	50.04	348	0
Labor Use on Coffee Farms					
Annual days of hired labor per hectare	238.7	189	222.9	1295	0
Annual days of family labor per hectare	331.8	255.6	289.4	1915	25
Annual days of cooperative labor per hectare	38.55	15	62.35	345	0
Total annual days of labor per hectare	609	486.3	448	3410	29.2

(c) Community Types

The members of Oro Verde live in communities of three types. A *comunidad* is an indigenous Lamista community, in which the community owns all land collectively and grants

usufruct rights to individual households. A *caserío* is a village in which residents hold private property. Caseríos may be one of two types, *mestizo* or *colono*. *Caseríos mestizos* are long-standing villages containing predominantly people of mixed-ethnic descent (*mestizos*), with some purely indigenous residents as well. *Caseríos colonos* contain primarily recent migrants from another province or department. Usually the majority of the *colonos*, or migrants, in a single *caserío* come from the same province of origin, such as the nearby department of Cajamarca. A *centro poblado*, literally a 'population centre,' is a local town surrounded by smaller villages. *Centros poblados* often lie at the centre of small watersheds and serve as the central point for agricultural commerce in that region. Residents of *comunidades, caserios mestizos, caserios colonos and centros poblados* comprised 17%, 22%, 46% and 15% of my sample respectively.

(d) Side-Selling Behavior

My survey instrument contained a qualitative module for 100 of the 150 observations. This module consisted of a short series of structured interview questions in which I asked growers to identify the benefits and drawbacks of the cooperative. If growers had undertaken any side-selling to private intermediaries, I asked them to state their reasons for doing so.[14] Before the survey began, we informed each respondent of the anonymity of the survey, ensuring a reasonable degree of confidence in the respondents' truthfulness and candor. Growers were allowed to give more than one reason for side-selling and were, in general, quite vocal about the motivations behind their marketing decisions. With a research assistant, I grouped the 127 total responses into themes, which included poor quality coffee, need for immediate cash, issues with the timing of the collection process (called *acopio*), and others. For instance, a response

indicating that coffee had spoiled ("*malogró*") or that the grower had sold rejected beans ("*descartes*") to the intermediary was classified as "coffee of poor quality."

We then classified themes into three categories: quality, financial and organizational problems. Answers that mentioned low quality coffee, excessive moisture of beans, lack of time to select beans carefully, or lack of organic certified coffee, were classified as quality problems. This category contained the largest number of responses (56). Answers that mentioned the timing or magnitude of payments from the cooperative, or intermediaries' superior price offers, were classified as financial problems; this category contained the second-largest number of responses (51). Answers that mentioned general problems with the cooperative, lack of experience with the cooperative, or lack of information from the cooperative, were classified as organizational problems. This category contained the smallest number of responses (20). Response themes and their associated categories are indicated in Table 3 below.

Table 3. Cooperative Members' Stated Reasons for Side-Selling

Response	Number of Responses	Type of Response
Coffee of poor quality	38	Quality
Needed quick money	38	Financial
Coffee beans did not meet cooperative's moisture requirements	14	Quality
Badly timed collection process (*acopio*)	14	Organization
Cooperative failed to disburse funds	9	Financial
Intermediary offered superior price	4	Financial
Insufficient time / lack of desire to select beans	2	Quality
Lack of organic certification	2	Quality
Was not a member of cooperative in 2006	2	Organization
Cooperative "wasn't going well"	1	Organization
Disagreement with the cooperative	1	Organization
Lack of information from the cooperative	1	Organization
Recently started producing	1	Organization

5. ECONOMETRIC ANALYSIS

This section estimates the relationship between *choba-choba* usage and cooperative patronage. Generating consistent and unbiased estimates of this relationship depends on whether

or not the key regressor, degree of *choba-choba* usage, is exogenous or endogenous. *Choba-choba* is a traditional institution based on stable, long-term relationships within extended families and between families; its usage is thus arguably exogenous to cooperative participation and patronage. Yet the variable of interest is the *degree* or *intensity* of *choba-choba* usage, which may vary across households dependent upon their characteristics, including family size, community type, and ethnicity. It may also vary within households over time, raising the question of reverse causality from patronage to *choba-choba*. If participation in *choba-choba* does facilitate cooperative patronage and thus allow growers to realize higher output prices, then cooperatives may create, intentionally or not, a positive incentive to use the practice. In this case, past patronage would influence present intensity of *choba-choba* usage. Cross-sectional data cannot detect this reverse causal effect directly; however, the hypothesis implies that length of tenure in the cooperative, which is a variable in my data set, would be associated with increased *choba-choba*. Finally, as the discussion in Section 2 (above) implies, a third factor such as social preferences may determine both cooperative patronage and *choba-choba* usage. Given the complexity of grower behavior, I employ two separate specifications for estimation: a general linear model (GLM) assuming *choba-choba* is exogenous, and an instrumental variables (IV) probit regression, assuming it is endogenous.

If *choba-choba* is exogenous, then the general linear model (GLM), with the logit transformation, provides an adequate functional form for the regression. This choice of functional form follows the work of Papke and Wooldridge (1996) on efficient and unbiased estimation of fractional response variables, and reflects the fact that the dependent variable, cooperative patronage, is a percentage. In equation (1) below, the dependent variable P_i refers to the percentage of the i^{th} grower's harvested coffee that the grower markets through the

cooperative. The percentage of outside sales is $(1 - P_i)$. The GLM is used to estimate the impact of *choba-choba* usage, measured with variable MA_i, on the dependent variable P_i, with a vector of exogenous controls X_i. The model is specified in general form as:

$$(1)\ P_i = f(MA_i, X_i)$$

To take into account the fact that the dependent variable P_i is a proportional variable, the regression employs the logit link function associated with the GLM in STATA®, applying the following transformation:

$$(2)\ G(P_i) = ln\ (P_i / [1- P_i])$$

The logit transformation assumes a linear relationship between the independent variables and the log odds ratio given in equation (2) above. This model requires the predicted values to fall within the [0, 1] interval to reflect the distribution of the dependent variable, which is a percentage and thus lies entirely on the [0, 1] interval. Also following Papke and Wooldridge (1996), the binomial distribution associated with the GLM in STATA® is employed. This option applies the method of quasi-maximum likelihood estimation (QMLE) to the Bernoulli log-likelihood function given in equation (3) below. This procedure results in estimators that are consistent.

$$(3)\ l_i(\mathbf{b}) = y_i\ ln\ [G(x_i\boldsymbol{b})] + (1- y_i\ )ln\ [1 - G(x_i\boldsymbol{b})]$$

In (3) above, y_i refers to the dependent variable, G the logit link function, $\boldsymbol{b}$ the vector of parameters and $\boldsymbol{x_i}$ the vector of regressors. Standard errors are heteroskedasticity-robust.

If *choba-choba* is endogenous, however, than the GLM will result in inconsistent estimates of cooperative patronage, since *choba-choba* usage will be correlated with unexplained variation in the dependent variable. To take into account this possibility, I use an instrumental variables probit estimation with two instruments for *choba-choba* usage: a dummy variable for indigenous community (*comunidad)* residence, and cooperative tenure measured in number of years. While probit estimation was developed to model the probability of discrete events, it can also be used to estimate fractional responses such as market shares, vote shares, or participation rates (Gardeazabal 2010).

A detailed description of all explanatory variables, along with their means, medians, standard deviations, maxima and minima, is given in Table 4 below. These variables include those from the base specification and all alternative specifications. Before estimation, the sample was truncated to remove observations that contain values of any of the above regressors more than two standard deviations above the sample mean. This procedure eliminates the possibility of extreme values influencing the results. Table 4 reflects the original sample before the removal of the outliers; all subsequent reported results reflect the truncated sample after removing the outliers.

Table 4. Description of Variables						
Dependent Variable						
Label	Description	MEAN	MED	STDV	MAX	MIN
P	Proportion of total harvested coffee marketed through the cooperative by the grower (between 0 and 1)	0.59	0.65	0.31	1	0
Continuous Explanatory Variables						
Label	Description	MEAN	MED	STDV	MAX	MIN
MA	Percentage of total labor applied to the grower's plot that takes the form of *choba-choba*	0.09	0	0.16	0.9	0
FAM	Percentage of total labor applied to the grower's plot that takes the form of family labor	0.49	0.5	0.22	1	0
PR	Difference between co-op delivery price and average price paid to grower by all intermediaries, in S/qq	33.6	30	36.7	190	-60
DR	Size of the co-op's per-quintal dividend paid to the grower, in S/qq	48.4	51.9	23.8	190	0
PCOOP	Price paid to the grower by the cooperative, in S/qq	248.6	250	26.3	313	196
APINT	Weighted average of all prices paid to grower by all intermediaries, in S/qq	214.9	211.9	31.4	295	84
HA	Total number of hectares under coffee cultivation possessed by the grower	3.8	3	3	24	0.7
ED	Number of years of education of most educated member of grower's household	6.2	6	2.9	14	0
TN	Number of years that grower's household has been a member of the cooperative	4.48	3	2.4	8	1
Dummy Explanatory Variables						
		% VALUE = 1		% VALUE = 0		
OR	Dummy variable that takes the value of 1 if the grower is certified organic	70%		30%		
HC	Dummy variable that takes the value of 1 if the grower's home possesses cement or wooden floors, brick or wooden walls, or tiled roof	51.33%		48.67%		
RC	Dummy variable that takes the value of 1 if the grower received credit	15.33%		84.67%		
CL	Dummy variable that takes the value of 1 if the family has at least one child under the age of 18 working full-time in the fields	15.33%		84.67%		
LD	Dummy variable that takes the value of 1 if the grower has served any position of leadership within the cooperative	15.33%		84.67%		
IC	Dummy variable that takes the value of 1 if the grower resides in an indigenous community	16.67%		83.33%		
Note: the identical distribution of *RC*, *CL and LD* dummy variables is purely a coincidence.						

(a) Base Specification

The first exogenous regressor, PR_i, measures the difference between the delivery price paid by the cooperative to the i^{th} grower and the price paid by the intermediaries. This regressor is predicted to enter the equation with a positive coefficient: a larger price premium offered by the cooperative will induce more patronage to the cooperative. The next regressor in the base specification, DR_i, measures the dividend paid by the cooperative to the i^{th} grower. The cooperative pays dividends that vary based on the quality of the grower's coffee as well as organic certification premiums. All else equal, a grower who has harvested lower-quality coffee should anticipate a smaller dividend and sell a larger proportion of output to the intermediaries. Hence, I predict that a larger dividend DR_i will be associated with a larger portion of coffee marketed through the cooperative: the coefficient will be positive.

The next set of controls represents the characteristics of the coffee grower household. Five variables perform this function. FAM_i refers to the percentage of total on-farm labor performed by full-time members of the i^{th} grower's household. The coefficient on the *FAM* variable is likely to be positive. Family labor is subject to fewer incentive problems than hired labor (Sen 1981), and requires substantially less cash. Hence, growers that are relatively more dependent on family labor will have greater ability both to produce at the higher quality levels demanded by the cooperative, and to wait for the delayed cash payment. HA_i is the number of hectares of coffee the i^{th} grower's household cultivates. The coefficient on the *HA* variable may be of either sign. *HA* can be viewed as a measure of the grower household's wealth. Growers with larger landholdings tend to possess larger cash holdings, making them less susceptible to short-term price offers from the intermediary. Thus, a higher value of *HA* may be correlated with a higher level of patronage. However, growers with larger amounts of land may also possess a

wider range of options for the commercialization of their coffee. They may be able to negotiate higher prices with intermediaries, or transport their coffee to the nearest market town and sell directly to exporters; these superior outside options may decrease patronage.

OR_i is a dummy variable that takes the value of one if the i^{th} grower's plot is certified organic.[15] Since the cooperative always pays organic premiums and the intermediaries did not generally do so in 2006, the coefficient on the *OR* term will likely be positive.[16] Organic certified growers will have a strong incentive to patronize the cooperative in order to earn organic premiums. ED_i measures the number of years of schooling attained by the most educated member of the head couple of the i^{th} grower household. TN_i represents the length in years of the i^{th} grower household's tenure in the cooperative at the time of surveying, and ranges from 0 (joined in 2006) to 7 (an original member from the cooperative's founding in 1999). Higher values of these two variables afford the grower a greater capacity for knowledge of cooperative practices, the international market, and the process of specialty coffee growing. Growers with more experience in the cooperative and more education should not only produce higher-quality coffee, but also understand more firmly the role of the cooperative in assisting growers and providing economic stability. Hence, the coefficient on each variable is expected to be positive. However, in my instrumental variables probit regression, I model cooperative tenure as an instrument, assuming it affects cooperative patronage only through its impact on *choba-choba* usage, as discussed above.

HC_i is a dummy variable that measures the overall quality of the i^{th} grower's dwelling, taking the value of one if the i^{th} grower has cement or wooden floors, brick or wooden walls, a tiled roof, or some combination thereof. Growers with cement or wooden floors, brick or wooden walls, or tiled roofs tend to be more economically secure than growers with mud floors, mud or

cane walls, and thatched roofs. Hence *HC* is a measure of economic security. I expect *HC* to appear in the regression with a positive coefficient. Growers that are more economically secure are likely to discount the future to a lesser extent, and hence patronize the cooperative to a greater extent given their willingness to wait for delayed payment.

RC_i is a dummy variable that takes the value of one if the i^{th} grower received credit at any time during the calendar year 2006. The *RC* variable may appear in the regression with a coefficient of either sign. Growers who receive credit enjoy greater liquidity during the harvest than growers who do not, allowing them a greater ability to hire laborers to produce coffee at higher quality, which can be sold to the cooperative. Credit also provides a temporary cushion to absorb the cooperative's slower payment schedule. However, growers who are indebted to the cooperative may face higher deductions, thus lower net prices, than growers who are not; deductions for debt service weaken incentives to patronize the cooperative.

(b) Alternative Specifications

The control variables specified above, using the GLM estimation framework, represent the base specification for the analysis. I now outline a number of alternative specifications to consider alternative possible patterns of grower behavior. These specifications are labeled in Table 5 below *A* through *C*. I explain these alternate specifications in this section.

Alternate A: GLM, Cooperative Leadership Variable Replaces Education and Tenure Variables. The correlation matrix (Table A1) indicates that the leadership variable is positively correlated with the education (*ED)* and tenure (*TN)* variables at the 5% level of significance or below. This alternative specification tests whether the leadership variable is a better determinant of cooperative patronage than the other variables that proxy for growers' personal characteristics.

Cooperative leaders may feel stronger internal compulsion to patronize the cooperative than non-leaders. Their behavior may also be under increased scrutiny from members and managers.

Alternate B: GLM, Organic Dummy Variable Omitted. The correlation matrix (Table A1) indicates that the organic dummy variable *OR* is positively correlated with five of the other regressors at the 5% level of statistical significance or below: *PR, DR, HA, TN,* and *HC*. I omit the organic dummy variable to test whether or not its omission affects the magnitude and significance of the other coefficients.

Alternate C: Instrumental Variables Probit, Organic and Dividend Dummy Variables Omitted. This alternate uses cooperative tenure and indigenous community residence status as exogenous instruments for the presumed endogenous regressor, *choba-choba* usage. The second-stage regression uses all of the exogenous independent variables from the base specification, excluding the organic and dividend dummy variables. In preliminary regressions, these variables were found to be perfect predictors of cooperative patronage. Observations of all growers who received dividends or organic premiums would therefore be dropped automatically, decreasing the number of observations from 114 to 12 and thus reducing the statistical power of the regression.

Alternate D: Instrumental Variables Probit, Leadership Variable Replaces Education, and Tenure Variables. This alternate specification replaces cooperative tenure with leadership status in the first-stage regression, and omits education from the second-stage regression, following alternate specification A.

7. RESULTS

Results are listed in Table 5 below. Standard errors are reported below each coefficient. Asterisks indicate levels of statistical significance, according to the key at the bottom of the

table. In the GLM specifications, only four variables carry statistically significant coefficients: the farm labor variables, the price premium and the dividend. All variables carry coefficients of the expected sign. These coefficients remain positive and statistically significant throughout all four specifications. In the instrumental variables probit specifications, the farm labor variables, price premium, education, cooperative tenure, indigenous community residence, and leadership status variables are all significant, and all but the education level variable carry coefficients of the expected sign.

The coefficient on the *MA* variable is significant at or below the 5% level in all three GLM specifications. In the base specification, the coefficient is approximately 2.97. A movement from zero *choba-choba* use to the median of 8.8% reliance on *choba-choba* would thus entail an increase in cooperative member patronage of exp (0.088 * 2.97) = 1.298, or an approximate 30% increase (1.298-fold increase). If the initial patronage level was at its mean level of 59% with zero *choba-choba*, then increasing to 8.8% *choba-choba* usage would cause the patronage level to rise to approximately 77%. The effect of *choba-choba* participation on cooperative patronage thus appears to be quite strong. The coefficient on the family labor variable (*FAM*) is significant at or below the 1% level in all three specifications; in the base specification, its coefficient is 1.47. Moving from zero family labor to the median of 0.49 would give rise to an increase in cooperative patronage of exp (0.49 * 1.47) = 2.055, or a slightly more than twofold increase.

Probit estimation yields qualitatively similar results to GLM. The sign of the coefficient on the *MA* variable remains positive and significant at the 1% level or below in both specifications. Wald tests for the endogeneity of the instrumented variable are significant below the 5% level in the base specification, and significant below the 10% level in the second

alternative specification. The coefficients on both instruments are the expected sign and statistically significant, the tenure variable at the 5% level and the indigenous community dummy at the 1% level. Replacing the cooperative tenure, education and household characteristics variables with the leader variable in specification D reduces the joint significance of the coefficients (Wald chi-squared); the coefficient on the leadership status instrument carries the expected sign and is significant at the 10% level.

Table 5. Results					
Variable	Base	A	B	C	D
ma	2.974**	2.577**	2.981**	6.116***	5.64***
	1.266	1.289	1.274	1.73	1.99
fam	1.466***	1.455***	1.457***	0.787**	0.797**
	0.54	0.54	0.536	0.338	0.353
pr	0.014***	0.014***	0.015***	0.006**	0.006**
	0.004	0.004	0.004	0.003	.0029
dr	0.025***	0.025***	0.026***		
	0.005	0.005	0.005		
ha	-0.074	-0.088	-0.067	0.035	0.019
	0.057	0.057	0.057	-0.038	-0.039
or	0.261	0.257			
	0.324	0.262			
ed	-0.066		-0.064	-0.086**	
	0.043		0.043	0.036	
tn	-0.006		0.017		
	0.06		0.049		
hc	-0.234	-0.239	-0.213	0.0163	0.016
	0.227	0.232	0.22	0.154	0.168
ld		-0.069			
		0.237			
rc	-0.027	-0.013	-0.049	-0.01	-0.002
	0.223	0.225	0.217	0.146	0.148
_cons	-1.351***	-1.689***	-1.397***	-0.263	-0.737***
	0.431	0.377	0.437	0.037	0.240
Instruments from First-Stage Regression (IV Probit)					
isnc				0.087***	0.086***
				0.028	0.031
cooptenure				0.008**	
				0.004	
leader					0.031*
					0.017
Deviance	35.88	36.46	36.05		
Pearson	31.05	31.45	31.15		
Log pseudo-likelihood	-50.56	-50.86	-50.65	56.36	49.36
AIC	1.08	1.07	1.06		
BIC	-451.9512	-456.1	-456.5		
Wald (joint significance)				44.88	40.95
Wald (instrument exogeneity)				4.9**	2.93*
*=0.1, **=0.05, ***=0.01					

Average marginal effects (AMEs) are reported in Table 6. The AME for the *choba-choba* variable in specification C is 2.06, indicating that a one-unit (percentage-point) change in the

degree of *choba-choba* usage is associated, on average, with an approximately two-unit change in the degree of cooperative patronage. The coefficient is slightly smaller in specification D (1.95). The AME for the family labor variable is 0.27, indicating that a one-unit change in the degree of family labor is associated, on average with a 0.27-unit change in the degree of patronage.

These results imply a robust positive correlation between use of non-market forms of labor by coffee growers and cooperative patronage. Reliance on *choba-choba* appears to have a larger absolute impact on cooperative patronage than reliance on family labor, as indicated by the magnitude of the coefficient on the *choba-choba* variable. The impact varies widely, as indicated by the relatively large standard error of the coefficient. Reliance on family labor appears to have a relatively smaller but more consistently positive unit impact on cooperative patronage, as indicated by the smaller magnitude of the coefficient and the much smaller standard error. These results are robust to alternative specifications. The negative and statistically significant coefficient on the education level variable presents a puzzle that awaits further research.

These results provide support for my initial hypothesis that participation in *choba-choba* causes increased patronage. The channels of causation, however, remain unclear. *Choba-choba* may be subject to selection bias: highly productive coffee growers may self-select into *choba-choba* groups with knowledge of the other growers' productivity. *Choba-choba* would thus be correlated with high labor productivity, but not cause it. My dataset does not contain sufficient information on the determinants of growers' productivity to develop a plausible selection model. Further, growers' pre-existing social preferences may be a "third factor" that determines both

choba-choba participation and patronage. Testing for such preferences would require the use of experimental methods.

Table 6. Average Marginal Effects (AME)

	Specification	
Variable	C	D
ma	2.06***	1.95***
	0.52	0.65
fam	0.27**	0.28**
	0.12	0.12
pr	0.002**	0.002**
	0.001	0.001
ha	0.01	0.01
	0.01	0.01
ed	-0.03*	
	0.01	
hc	0.006	0.006
	0.05	0.06
rc	-0.003	-0.001
	0.05	0.05
*=0.1, **=0.05, ***=0.01		

8. CONCLUDING REMARKS

The results of this study suggest that there exists a symbiosis between agrarian marketing cooperatives and non-market labor practices. Growers that rely to a greater extent on *choba-choba* and/or family household labor engage in fewer outside sales and more cooperative patronage per volume of product. These results also confirm the hypothesis of a symbiotic relationship between family-based farming and regional cooperation, and raise further questions on the role of non-market forms of labor in developing-country smallholder agriculture. More broadly, they suggest a strong role for robust community structures in the process of building sustainable livelihoods in agrarian regions of the developing world. Apffel-Marglin (2010) notes the importance of resolving basic livelihood issues in the process of pursuing the regeneration of peasant communities. Fair trade relationships and related institutions such as cooperatives may

provide a bulwark of support for this regeneration. This study suggests that the process of forming such carefully structured market relationships and institutions may be more successful in communities with strong pre-existing local structures of cooperation and reciprocity.

This study also points out a key limitation of conventional economic theory. The results indicate that growers that work together through non-market labor exchange relationships attain more favorable market outcomes than growers who employ workers through relatively anonymous seasonal labor markets. These successful market outcomes arise in the form of higher prices and dividends paid by the cooperative, and bring a related suite of non-market benefits that include technical assistance, education, and opportunities for empowerment through participation in a successful export organization. Successful individual market outcomes thus depend on successful group non-market behaviors. This proposition contradicts the assumption of isolated, self-seeking individual behavior that underlies the conventional economic analysis of market behavior. It suggests, rather, that complex patterns of social exchange occurring outside the sphere of markets influence outcomes that occur within and through market relationships. Echoes of this argument can be found in contemporary accounts of community-based enterprises in the Andes (Peredo 2010) as well as earlier accounts of Andean production relations (Guillet 1977). The argument implies, as well, that collectivist theories that assume markets necessarily erode social ties may also be mistaken or oversimplified. It suggests, rather, that market institutions can be carefully structured to foster cooperative social ties commonly thought to be inimical to market pressures. The complex relationship between market outcomes and non-market exchange relationships lies at a key interdisciplinary nexus that future generations of scholars may find fruitful to explore.

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Endnotes

[1] The *CAC* acronym stands for *Cooperativa Agraria Cafetalera*, or Agrarian Coffee Cooperative. I will drop the acronym from now on and refer to the cooperative in question as Oro Verde.

[2] FLO is the largest of a number of fair trade certification initiatives that include the Fairtrade Federation and IMO Fair for Life. In 2011, the primary United States fair trade initiative, Fair Trade USA (formerly TransFair USA) broke away from FLO, developing its own certification system in collaboration with nonprofit Scientific Certification Systems (SCS). Cooperative membership is not required for FLO certification of all crops, but only for a select few including coffee, cacao, honey, nuts, oilseeds, cane sugar and cereals. Other crops, including tea, fresh fruits and vegetables, herbs and spices, flowers and nursery plants, may be certified by FLO at the plantation level. In addition, not all fair trade certifications besides FLO require cooperative membership; Fair Trade USA, for example, certifies plantations as well as cooperatives.

[3] Coffee beans may be processed through either wet or dry methods. If coffee is processed through the wet method, the grower removes the 'bean' (or seed) from the red berry (or 'cherry') that encases it, using a small-scale machine called a *depulper*, which can be operated either by hand or with a motor. This process, called *depulping*, leaves a thin husk around the coffee called *parchment*. Cooperatives and private intermediaries purchase coffee in this form. If coffee is processed through the dry method, the cherries are left in the sun to dry, and then threshed to remove the outer layers, leaving the green bean.

[4] Mexican agronomist Eduardo Martinez Torres describes the additional labor required to produce coffee for specialty markets as follows: 'choosing the right time for harvesting; harvesting only mature berries; not allowing harvested berries to heat up; sorting berries on intake; making sure the beans don't crack during the depulping process; double sorting after depulping; making sure fermentation lasts the right length of time, i.e., between 24 and 48 hours, depending on the altitude and average temperature; thoroughly washing the berries; grading; properly drying, preferably both in the sun as well as in a drier in order to avoid mildewing.' (quoted in Bray et al., 2007)

[5] For details on the process of specialty coffee point scoring, see Lingle (2008).

[6] Marketing through the cooperative is known as *patronising* the cooperative, similar to the way a customer 'patronises' a business. All sales through the cooperative are referred to as *patronage*.

[7] In this paper, I use the terms *choba-choba* and cooperative labor interchangeably.

[8] See Fehr and Gaechter (2000) for a review.

[9] The dividend is sometimes called the *patronage refund* or *rebate* in the cooperative literature.

[10] A *departamento* (department) plays the role analogous to a state in the United States, or a province in Canada. Departments send delegates to the national Congress and are presided over by a governor and assembly. A *provincia* (province) plays a role analogous to a county in the United States, with a local government but no representation in Lima.

[11] The dollar figure is based on an average (2011) Peru-U.S. exchange rate of S/ 2.775 per $1.00 USD (Banco Central de la Reserva Del Peru 2013)

[12] My sample is more than one-quarter than the total population of active members, because the population of the committees I selected added up to more than one-half of the total active membership of the cooperative.

[13] This yield figure compares very favorably with the coffee growers surveyed by Jaffee (2007) from Oaxaca, in which cooperative member growers' plots yielded an average of only 213.21 kg/ha, or 4.635 qq/ha. It also compares favorably to the yield figures reported by Martinez-Torres (2006) from Chiapas, which averaged 9.85 qq/ha for organic and 10.32 for chemically grown coffee.

[14] The exact wording of the question was: "Why didn't you sell all your production to the cooperative last year?" (In Spanish, it was: "¿Por qué no vendió toda su producción a la cooperativa el año pasado?")

[15] In cases where the grower did not specify whether or not the plot was certified organic, I considered the plot not to be organic (the dummy variable took the value zero).

[16] Increasingly, private intermediaries have begun paying premium prices for organically grown coffee that is certifiable under one of the accredited organic labels.

APPENDIX

Table A1. Correlation Matrix of Regressors

	MA	FAM	PA	PR	DR	HA	OR	ED	TN	LD	HC	RC
MA	1											
FAM	0.154+	1										
PA	0.012	0.044	1									
PR	0.118	0.121	-0.116	1								
DR	0.117	0.101	-0.233**+	0.039	1							
HA	-0.054	-0.225**	-0.067	0.128	0.21**	1						
OR	0.128	0.146	-0.087	0.301***	0.503***	0.306***	1					
ED	0.254***	-0.023	0.205**	-0.004	-0.024	0.126	0.0073	1				
TN	0.196	0.248***	-0.051	0.208**	0.248***	0.242***	0.5532***	-0.062	1			
LD	0.158*	0.019	0.068	0.041	0.068	0.08	0.0395	0.310***	0.216**	1		
HC	-0.112	0.012	-0.017	0.159*	0.09	0.239**+	0.1975**	0.009	0.115	0.019	1	
RC	-0.008	-0.0003	0.111	-0.038	0.004	-0.066	-0.0072	-0.023	0.173	0.236**+	-0.04	1
	*=0.1%, **=0.05%, ***=0.01%											
	+ indicates that the variable is on the margin of the next level of significance. For instance, a + with no stars indicates that the variable is on the margin of the 0.1 level of significance. The cutoff is 0.005 percentage points distance.											