

BREWING SUCCESS: AN INVESTIGATION OF THE EFFECTS OF BARLEY
CULTIVATION ON SMALL HOLDER FARMERS IN EASTERN UGANDA

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ABSTRACT

As Nile Breweries and Uganda Breweries have begun purchasing barley from Ugandan farmers, they have insisted that their sales support economic development in the country. While these breweries' competition for raw materials has the potential to provide smallholder barley farmers with increased income and access to credit, it may also encourage alcohol consumption and exacerbate environmental degradation. This paper explores whether and in what ways barley farmers in Kapchorwa, Bukwa, and Kween Districts, in eastern Uganda, benefit from selling their produce to Nile Breweries and Uganda Breweries. It pays particular attention to the breweries' intended effects on respondents' incomes, expenditures, and access to credit, as well as the potential unintended consequences of barley production on respondents' alcohol consumption and environmental stewardship. The author relies both on narratives and on econometric analysis to draw conclusions about the effect of breweries' demand for raw materials on domestic small-holders.

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CHAPTER 1

INTRODUCTION

In 2003 the Kapchorwa Commercial Farming Association (KaCoFA) and Uganda Breweries began buying barley, a non-traditional cash crop from farmers in Kapchorwa, Bukwa, and Kween Districts on Mount Elgon in eastern Uganda.¹ Nile Breweries, the other major Ugandan brewery, began purchasing barley from the same region in 2010.² By sourcing their barley locally, both breweries claim to be contributing to Uganda's development. To assess the truth of that claim, this paper examines the experience of smallholder farmers on Mount Elgon selling barley to each of these two breweries. It explores the effects of selling barley on smallholders' household incomes, access to credit, experience with environmental degradation on their farms, and their individual alcohol consumption.

Evidence about barley cultivation's effects on smallholders comes from semi-structured interviews conducted with 173 farmers in August 2010. From these interviews, this paper makes a statistical comparison of smallholders selling barley to each brewery to demonstrate barley cultivation's effects. It also relies on farmers' narratives for further evidence of barley's impacts on their lives and livelihoods.

The fact that this development project is undertaken by two private breweries makes it unique. It illustrates the ways in which the private sector can be involved in agricultural development. Often, countries' public sectors and international non-governmental organizations lead projects in developing countries. By reporting the

¹ Kissa, David. *Presentation to the German Embassy*. Kapchorwa Commercial Farmers Association, (2010).

² Nile Breweries, SABMiller, *Maltings Business Case: Malting Feasibility Case* (Jinja, Uganda: Nile Breweries, 2010).

experiences of smallholders on Mount Elgon, it is possible to find some of the advantages and disadvantages, as well as positive and perverse incentives that actors in the private sector might have compared to those in the public sector. Furthermore, finding how barley cultivation affects Mount Elgon households' incomes, credit, alcohol consumption, and experience with environmental degradation may give clues to how other private sector-led initiatives can be effective or why they should be avoided.

Given that barley is a cash crop, participation in its production ought to raise incomes. However, those most vulnerable to poverty might not be able to cultivate it, because of land constraints or costs associated with inputs or transport. Thus, rather than improving the welfare of the landless or cash-poor, it may exacerbate any existing inequalities amongst smallholders on Mount Elgon. Furthermore, as the breweries are seeking profits, they might not concern themselves with local realities that do not affect their profits directly, but would affect the way barley cultivation interacts with farmers' lives.

For a thorough investigation, this paper explores existing development literature for themes that apply to the breweries' barley development projects. Keeping theoretical and previously observed development issues in mind, it examines the responses from the 173 barley farmers. The analysis of those responses discusses the findings of the breweries' effects on farmers in the context of previous development literature and in the specific cultural context of Mount Elgon. Drawing conclusions from this analysis, it also points to areas for further investigation.

CHAPTER 2

REVIEW OF DEVELOPMENT LITERATURE

While one may be tempted to assume that increasing people's material wealth translates directly to development, Amartya Sen claims that the relationship between "opulence" and "achievements" may not be strong if it exists at all.³ Echoing Weber, Sen asserts that development is the fact of expanding people's ability to choose their own paths and gain the goods and positions they desire.⁴ Although he concedes that "income deprivations" are important for understanding freedom, so he says, are "capabilities deprivations." His examples of capabilities deprivations include premature mortality, illiteracy, and undernourishment.⁵

Sen claims that economics used to concern itself as much with such deprivations as with cash wealth and argues that it ought to return to such affairs.⁶ Pranab Bardhan makes a similar argument, asserting that once, *all* economics was development economics. In the 17th, 18th, and 19th centuries classical economics *was* development economics because it dealt mainly with one developing country: Great Britain.⁷

Money, Sen argues, cannot fix all the problems that poor people face. In addition to wealth they need the ability to participate in deciding their futures.⁸ If Uganda and Nile Breweries, by buying barley, are able to improve both capabilities and income, then their

³ Amartya Sen, *Development as Freedom* (New York: Alfred A. Knopf, 2000).

⁴ Max Weber, *Economy and Society*. Edited by Guenter Roth and Claus Wittich (Berkeley, CA: University of California Press, 1978).

⁵ Sen, 2000.

⁶ Ibid.

⁷ Bardhan, Pranab, "Globalization and Rural Poverty," *World Development* 34, no. 8 (2006).

⁸ Sen, 2000.

project is likely to effect development among the farmers involved. If, however, it only affects their income, the results might be superficial or short-lived.

Public versus Private Sector-Led Development

As stated in the introduction, the development interventions by Nile Breweries and Uganda Breweries are unique in that they are flowing through direct transactions between transnational corporations and smallholder farmers. There is little evidence in the literature of the direct and indirect effects of private sector-led microeconomic development projects on local non-cash deprivations. There are, however, theoretical papers about how public and private sector-led development might differ from each other and how domestic and foreign development priorities might interact.

Modernization and Dependency Theory

Debate about rich, foreign private actors controlling developing countries' assets harkens back to the modernization and dependency theory debates of the mid-20th century. While both modernization and dependency theorists perceive a country's control of its assets as its greatest goal, they disagree about the role that foreign entities should play in achieving this control. Modernization theorists like Adrian Leftwich and David McClelland see the individual achievement of dominance over nature and one's own circumstances as the end goal of development.⁹¹⁰ To arrive at such a state, argues Walter Rostow, a society must come in contact with more advanced foreign entities and shun

⁹ Adrian Leftwich. "Progress, Growth and Modernization: Antecedents of the Development Idea." in *States of Development: On the Primacy of Politics in Development* (Oxford: Polity Press, 2000).

¹⁰ David McClelland, "The Achievement Motive in Economic Growth," [original theorist], 1961.

traditional society.¹¹ Dependency theorists, on the other hand, view contact between poor states and richer ones as simply an opportunity for the rich to exploit the poor. Theotonio dos Santos believes, for example, that giving foreign entities access to means of production subjects those who live near natural resources, who he believes own them, to "backwardness, misery, and social marginalization."¹² Instead of alleviating the signs of underdevelopment, contact with rich societies, according to Andre Gunder Frank, can actually engender underdevelopment.¹³

However, developing countries, facing a lack of funds with which to take on projects, may have little choice other than to work with foreign entities. Uganda, for example, does not have excessive reserves of cash, so shunning rich countries' aid is an unrealistic option. The question, then, is which foreign actors should be involved in development projects, public- or private-sector actors, and in which ways.

International Private Sector-led Development

Regarding sub-Saharan Africa, South African scholar Greg Mills asserts, as Sen and Bardhan do, that a lack of income is not the only obstacle to development. Instead, he says, the principal barrier to African development comes from African leaders' reticence when faced with foreign businesses. He argues that they ought to welcome foreign businesses so that their populations can gain skills from outsiders. According to Mills, African public

¹¹ Walter Whitman Rostow. *The Stages of Economic Growth* (Cambridge: Cambridge University Press), reprinted in a reader for American University SIS 637 in Fall 2008. [original theorist], 1960.

¹² Theotonio Dos Santos, "The Structure of Dependence," *The American Economic Review*, vol. 60 (May 1970).

¹³ Andre Gunder Frank, "The Development of Underdevelopment," *Monthly Review* 60 (May 1970).

sectors must get out of the way of development to encourage robust private sectors.¹⁴

Furthermore, they should minimize the administrative barriers to trade in their countries.¹⁵

However, one of the characteristics of the private sector in developing countries that facilitates exploitative relationships between firms and private citizens is a lack of competition. Because some industries in developing countries or regions are dominated by one or two large firms, those firms feel no imperative to innovate or increase productivity. Moreover, in such situations it is often difficult for small and medium enterprises to muster the costs to enter markets, especially where finding financing is challenging. In places with weak rule of law and poor physical infrastructure, large firms have an easy time overpowering smaller potential competitors.¹⁶

Intercultural/International Public Sector Aid

At the same time, Kristen Ghodsee argues that foreign NGOs may fail to achieve local development goals because they tend to have foreign agendas. When ideas about development flow only one way—into a country or region from without—the chances of effecting development may not be high. Furthermore, important local development needs may go unnoticed by foreign NGOs.¹⁷ Locals who work for the NGOs may or may not

¹⁴ Greg Mills, *Why is Africa Poor?* (Washington, DC: CATO Institute Center for Global Liberty and Prosperity, December 6, 2010), Development Policy Briefing Paper No. 6.

¹⁵ Ibid.

¹⁶ United Nations Development Program, "Constraints on the Private Sector in Developing Countries," ch. 2 in *Unleashing Entrepreneurship: Making Business Work for the Poor*, (New York, 2004).

¹⁷ Kristen Ghodsee, "Nongovernmental Ogres? How Feminist NGOs Undermine Women in Post Socialist Eastern Europe," *The International Journal of Not-for-Profit Law* 8, no. 3 (2006).

support their missions. Instead, what may matter most to them is receiving regular NGO paychecks.

Similarly, contact between foreign NGOs and vulnerable groups in developing countries can be viewed as beneficial to the poor on one hand, or exploitative on the other. While foreign NGOs may impart skills and income to those in need of them, they may also be reluctant to solve the problems they exist to solve, as Ghodsee suggests. If they did so, they would no longer be needed. This conflict of interests may not be as great with private sector actors if their suppliers are also their customers, as in the breweries' case.

In a related argument, William F.S. Miles claims that intercultural aid necessitates the appearance of self-interest on the part of the provider. When people from one culture see their neediest members being helped by outsiders going out of their way, it often "makes little sense" to the people of the first culture.¹⁸ Furthermore, such aid absolves the rich members of a society of responsibility for their poor.¹⁹ Matthew Costello makes a similar case, claiming that political administrations, even when working on development, respond to the desires of the people on whose money they depend, whether or not they are the ones in need of development.²⁰ Thus, if a government is relying on foreign money to help its poor, its priorities might reflect the donor's rather than those of the poorest members of society. As Nile Breweries and Uganda Breweries are clearly self-interested, it is possible that the motivations for any benefits they provide to smallholders on Mount

¹⁸ William F.S. Miles, "The Rabbi's Well: A Case Study in the Micropolitics of Foreign Aid in Muslim West Africa," *African Studies Review* 51, no. 1 (2008).

¹⁹ Cleo Roberts, "Paper #2," for course Micropolitics of Development taught by David Hirschmann, Fall 2008.

²⁰ Matthew J. Costello, "Administration Triumphs over Politics: the Transformation of the Tanzanian State," *African Studies Review* 39, no. 1 (1996): p123-48.

Elgon makes more sense to the beneficiaries than an international NGO's might, even if suppliers are wary of them.

Indeed, according to David Hirschmann, an ideal bureaucracy would respond to the public's needs in the same way the private sector would respond to the needs of its clients. However, he says that movement toward responsive policy must come from demand, not supply. Thus, the governed must exert pressure on the government, because spontaneous self-reform by the government to respond to the needs and desires of the governed is unlikely.²¹ In the same way, the farmers are more likely to evoke responses to their needs from the breweries if they are customers in addition to suppliers.

Public/Private Sector Synergy

Joshua Greene and Delano Villanueva suggest that public and private investment complement each other. In fact, they claim that public investment supports private investment²², while political uncertainty affects private investment negatively. The effectiveness of public sector-led development projects depends on the degree of democracy or political freedom within the country.²³

Rural Development

No matter who is best placed to effect development in Uganda, it is clear that agriculture must be included in any development plan, as Uganda's population is largely

²¹ David Hirschmann, "Civil Society in South Africa: Learning from Gender Themes," *World Development* 26, no. 2 (1998); Roberts, 2008.

²² Joshua Greene and Delano Villanueva. Private Development in Developing Countries," *IMF Staff Papers* 38 (1991).

²³ Yi Feng, "Political Freedom, Political Instability, and Policy Uncertainty: a Study of Political Institutions and Private Investment in Developing Countries," *International Studies Quarterly* 45 (2001).

rural and many farmers are smallholders.²⁴ Because of the sheer number of farmers practicing smallholder agriculture, agriculture's growth presents a major opportunity for poverty reduction.²⁵ However, targeting development strategies to Ugandan smallholder farmers requires familiarity with the challenges they face. In the case of introducing a cash crop, such as barley, Ugandan smallholders, like many rural Africans, face many challenges, the most pressing of which are transaction costs, exacerbated by small harvests.

Cash Crops/Transaction Costs

Smallholders, unlike large landholders cannot produce large amounts of produce from their land.²⁶ Marcel Fafchamps argues that large farmers devote a greater share of their land to cash crops than small farmers do, because they need a smaller share of it for food.²⁷ This fact puts small farmers at a disadvantage when trying to market cash crops. Because they only produce small amounts, they are often unattractive to traders. The amount of processing and marketing that traders must invest in small amounts of crops may cost more than the traders can earn from such little produce.²⁸ If traders can market their produce, farmers must accept whatever the traders offer. Furthermore, even reaching traders may be costly for smallholders. Such transaction costs and uncertainty

²⁴ International Organic Inspectors Association, "Findings: Smallholder Working Group;" available from <http://www.ioia.net/images/pdf/CGGDefinition.pdf>; Internet; accessed 3 July 2011.

²⁵ Jonathan Kydd, Andrew Dorward, Jamie Morrison, and Georg Cadisch, "Agricultural Development and Pro Poor Economic Growth in Sub Saharan Africa: Potential and Policy," *ADU Working Paper*, Imperial College of Science, Technology and Medicine at Wye, 02/04, May 2002.

²⁶ Since "wealthier farmers...spend proportionally less on food" than poorer farmers, they must devote less of their attention to food crops (Fafchamps, 1992) .

²⁷ Marcel Fafchamps, "Cash Crop Production, Food Price Volatility, and Rural Market Integration in the Third World," *American Journal of Agricultural Economics* 74, no. 1 (1992).

²⁸ P. Robbins et al, *Advice Manual for the Organisation of Collective Marketing Activities by Small-Scale Farmers* (Baltimore: Catholic Relief Services, 2008).

about payments, according to Steven Were Omamo, determine how worthwhile households find various crops.²⁹ Due to difficulties in marketing crops, when food markets are present in rural areas in developing countries "only wealthier farmers are able and willing to grow cash crops,"³⁰ according to Fafchamps.³¹

Robert Kabumbuli and Jim Phelan take an example of the difficulty of reaching the poor with income-generating projects from Uganda's Ministry of Agriculture. The Ministry purchased donkeys from Kapchorwa District in eastern Uganda to give to dairy farmers in Mpigi District in central Uganda to ease their labor needs. As Fafchamps might have predicted, the farmers who benefited from the dairy cow scheme were already privileged compared those who were unable to use the program to their benefit. They were better educated, owned more land, and sent more of their children to school. Although Kabumbuli and Phelan suggest that the poorest farmers might have benefited indirectly, through increased employment opportunities and the availability of milk, an important source of nutrition, such spillover effects are uncertain.³²

Colin Poulton, Andrew Dorward, and Jonathan Kydd argue that the key to ensuring that smallholders benefit from cash crops is ensuring their financing for the crops. Often, they say, cash crops are the only crops for which smallholders use purchased inputs. As

²⁹ Steven Were Omamo, "Transport Costs and Smallholder Cropping Choices: An Application to Siaya District, Kenya," *American Journal of Agricultural Economics* 80, no. 1 (1998). It is possible that farmers only grow cash crops once their own consumption is assured (Fafchamps, 1992).

³⁰ Fafchamps, 1992.

³¹ Barrett et al (2001) make a similar argument. They suggest that wealthy farmers are better able to specialize than poor farmers and are less bound to the farm than poor farmers. At the same time, they do not suggest that wealthy farmers leave farming. Rather, wealthy farmers have greater options for generating income than poor farmers.

³² Joseph Kabumbuli and Jim Phelan, "Heifer-in-Trust Schemes: The Uganda Experience," *Development in Practice* 13 no. 1 (2003): 103-110.

few smallholders have enough cash to purchase inputs, they require credit for this purpose.³³ Financing is especially difficult for smallholders because few have sufficient collateral to secure loans.³⁴ Because of these constraints, Jonathan Conning and Michael Kevane argue that "poor people are ... forced to cancel or forgo higher return activities that might have made better use of their talents and resources" when financial institutions are weak or missing, or when smallholders are excluded from them.³⁵ According to C.B. Barrett, T. Reardon, and P. Webb, households will employ the resources that they have in greatest numbers for the activities that they complete best, even when these resources might be more effective at completing other activities.³⁶ Furthermore, Anna Borkenhagen argues, ensuring their access to output markets may not be guaranteed.³⁷ When such access is difficult, smallholders forgo opportunities to reduce their vulnerability to negative income or consumption shocks.³⁸

Case Example: Financing Cash Crops in Ghana and Tanzania

Ghanaian and Tanzanian parastatal organizations with monopsonies in the cotton and cashew sectors, respectively, overcame the problem of seasonal credit for farmers by

³³ Colin Poulton, Andrew Dorward, and Jonathan Kydd, "The Revival of Smallholder Cash Crops in Africa: Public and Private Roles in the Provision of Finance," *Journal of International Development* 10, no. 1 (1998): 85-103.

³⁴ Poulton et al, 1998.

³⁵ Jonathan Conning and Michael Kevane, "Why is there not More Financial Intermediation in Developing Countries?" in *Insurance Against Poverty*, ed. Stefan Dercon (Oxford: Oxford University Press, 2005).

³⁶ C.B. Barrett, T. Reardon, P. Webb, "Nonfarm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics, and Policy Implications," *Food Policy* 26 (2001): 315-331.

³⁷ Anna Borkenhagen, "Private Sector Provision of Agricultural Services: Insights from a Case Study in Two Districts," Presentation at the International Food Policy Research Institute, 24 June 2010.

³⁸ Conning and Kevane, 2005.

providing loans as inputs in kind, according to Poulton et al. At harvest, they paid farmers for their produce less the cost of borrowed inputs. This process is called "interlocking." If the input suppliers had not provided in-kind loans, only the wealthiest farmers would have been able to afford inputs for cash crops. Thus, interlocking spread cash crop cultivation to a greater number of farmers than would have had access to them otherwise.³⁹

The parastatals in Ghana and Tanzania eventually confronted inefficiencies, which depressed the prices that farmers received for their produce. Furthermore, delayed payments discouraged farmers from producing their crops. The parastatals became too expensive and too difficult for Ghana and Tanzania to maintain and liberalization of the cotton sector in northern Ghana and cashew sector in Tanzania soon followed.⁴⁰

With the introduction of many private suppliers of inputs and buyers of produce came uncertainty. It became difficult for the suppliers of in-kind loans to ensure repayment. Since there was no longer a monopsony, farmers were free to sell to other traders, keeping the cash they made from their produce in addition to the value of the initial input loan from the first trader.⁴¹

Such behavior is most likely when the second trader offers higher prices than the first or when the first is late to deliver payment. Where the suppliers' need to recover loans conflicts with farmers' searches for best prices, their agreements become most tenuous and borrowers default purposefully. Strategic default is a great risk in sub-Saharan Africa because few lenders can guarantee renewed loans to borrowers for

³⁹ Poulton et al, 1998.

⁴⁰ Ibid.

⁴¹ Ibid.

consecutive seasons. This is especially true for traders of cash crops, of whom few have independent sources of capital in sub-Saharan Africa.⁴² Additionally, some borrowers view loans as gifts and when traders/lenders first confront this idea, they abandon their lending, leaving borrowers without financing for the next season. Furthermore, there is little legal recourse for lenders in sub-Saharan Africa.⁴³ This lending environment reinforces borrowers' reluctance to pay back loans, since they cannot be assured that they will have financing for the next season.

As the Ghanaian and Tanzanian parastatal example shows, one of the most important elements of financial intermediation between formal lending institutions and rural peasants is trust.⁴⁴ Because of information asymmetries, trust in some contexts is necessary for any exchange or transactions to occur.⁴⁵ In rural areas, peasants might be reluctant to entrust their assets to financial institutions that do not demonstrate long-term commitments to their areas, just as Poulton et al's interlocking example shows. On the institutional side, banks may be wary of placing intermediaries where they cannot be monitored closely. They might worry that intermediaries could cheat their employers out of solidarity with villagers or that they might not record accurate sums.⁴⁶

Furthermore, financial intermediation is information-intensive, while in a rural setting presenting accurate financial information is difficult. Rural residents may not be

⁴² Kydd et al, 2002.

⁴³ Poulton et al, 1998.

⁴⁴ Conning and Kevane, 2005.

⁴⁵ Kaushik Basu, "Identity, Trust, and Altruism: Sociological Clues to Economic Development," CAE Working Paper #06/05, May 2006.

⁴⁶ Conning and Kevane, 2005.

able to provide the identification credentials or asset verification that institutions desire. Pawn shops, for example, may not be able to ascertain that goods are not stolen. Lending or insurance establishments may doubt their ability to collect sufficient collateral or determine the risk that each borrower or claimant poses.⁴⁷

Farmers' Associations

One way to increase farmers' access to credit and ease financial institutions' administrative burden may be the organization of farmers into associations. Involving farmer groups or associations may decrease the chance that farmers will default on their in-kind loans, because of group pressures.⁴⁸ At the same time, collective marketing may improve farmers' access to credit. The costs associated with administering small loans to individual farmers are higher than those associated with administering one large loan to several farmers. Moreover, while one farmer might not have sufficient collateral to cover a loan, a group of farmers may have enough together.⁴⁹ Organized farm labor also makes it easier for farmers to obtain services. Instead of needing to visit several distant plots, extension officers and aid organizations can visit the organization headquarters. Even if they are inconvenient for some farmers to reach, individuals can spread the knowledge from trainings to others.⁵⁰ Successful farmers can serve as examples for others and possibly trainers in agricultural techniques.⁵¹

⁴⁷ Ibid.

⁴⁸ Poulton et al, 1998.

⁴⁹ Robbins et al, 2008.

⁵⁰ Ibid.

⁵¹ Kabumbuli and Phelan, 2003.

Additionally, pooling produce allows farmers to standardize its quality. In Uganda, smallholders generally sell their produce directly after harvesting it, only when they need cash. Because the produce has often not dried properly, it is of poor quality. Therefore, farmers offer traders low amounts of poor quality produce, and receive low prices in return.⁵² Working together allows them to improve the produce's quality together, so traders do not have different quality produce from every single farm. Furthermore, farmers can invest just once, together, in transport for the produce rather than many times for small, individual parcels.⁵³

The effectiveness of such organizations depends on their social structures. Barbara Harris-White asserts that understanding economic behavior necessitates understanding the social structure of the group performing the behavior, because people participate in economies socially, not individually.⁵⁴ In his collective marketing manual, P. Robbins claims that farmer organizations made of people who have a reason to interact with one another are most likely to be successful, especially if they have similar needs and resources.

⁵² Robbins et al, 2008.

⁵³ Ibid.

⁵⁴ Barbara Harris-White, "On Understanding Markets as Social and Political Institutions in Developing Economies," in *Rethinking Development Economics*, ed. Ha-Joon Chang (Anthem Press, 2003). In economic development, Robert Putnam (1993) says, social capital is extremely important, especially in rural areas. He claims that social capital, especially as expressed in community organizations, can be as important to rural development as physical and human capital. Portes and Landolt (1996) warn, however, that social capital can exclude those outside the group of reference. Moreover, in areas where economic stagnation is the norm, social capital may put pressures on individuals to continue harmful behaviors. The idea of social capital being important to decision-making opposes the notion of methodological individualism on which classical and neo-classical economics are based. Methodological individualism is the idea that interactions between individuals are the basis for economic behavior and that individuals take economic decisions on their own (Arrow, 1994).

Wealth differentials among them are not conducive to cooperative work and it is best if the group members live near each other.⁵⁵

Rural Development and the Environment

While increased agricultural production may help reduce hunger and poverty⁵⁶, it may also have negative effects through increased environmental pressures.⁵⁷

Environmental degradation is especially likely to occur in so-called "less-favored" lands, which include arid areas, forests, and sloped lands⁵⁸, which can erode without proper care.⁵⁹ Ellen Wilson cites former Director General of the International Food Policy Research Institute, Per Pinstrup-Andersen, as attributing environmental degradation to poor smallholders' decreased ability to interact with their land in a sustainable manner. They may face population pressures or poor productivity. Furthermore, in the face of extreme poverty, households may not be able to allow land to remain fallow between seasons, thereby exhausting it.⁶⁰

East Africa, in particular, is at increased risk for environmental degradation. Since the mid-1990s the region has experienced varying rainfall and changing growing seasons.

⁵⁵ Robbins, 2008.

⁵⁶ Kydd et al, 2002.

⁵⁷ Ellen Wilson, "Urbanization and Agriculture to the Year 2020," in *The Unfinished Agenda: Perspectives on Overcoming Hunger, Poverty, and Environmental Degradation*, eds. Per Pinstrup-Andersen and Rajul Pandya-Lorch (Washington, DC: International Food Policy Research Institute, 2001); Lincoln J. Young, "Agricultural Changes in Bhutan: Some Environmental Questions," *The Geographical Journal* 157, no. 2 (1991).

⁵⁸ John Pender, Peter Hazell, and James L. Garrett. "Reducing Poverty and Protecting the Environment: The Overlooked Potential of Less-favored Lands," in *The Unfinished Agenda: Perspectives on Overcoming Hunger, Poverty, and Environmental Degradation*, eds. Per Pinstrup-Andersen and Rajul Pandya-Lorch (Washington, DC: International Food Policy Research Institute, 2001).

⁵⁹ Wilson, 2001.

⁶⁰ Ibid.

The region has also experienced declining access to clean water. These changes have negative implications for the region's biodiversity and agricultural systems.⁶¹

Negative environmental effects from the overuse of land include soil nutrient depletion, salinization, agrochemical pollution, soil erosion, vegetative degradation, and deforestation.⁶² During the Green Revolution agricultural productivity was associated with water logging and excessive soil salinity through irrigation, as well as the contamination of groundwater. Chemically resistant varieties of weeds and animal pests developed and local plant varieties' numbers decreased through monoculture.⁶³ To reduce these dangers, Miguel A. Altieri, Peter Rosset, and Lori Ann Thrupp argue in favor of productivity increases from recycling nutrients through the soil, synergistic crop rotation, and other ecologically beneficial practices.⁶⁴

Although the poor in developing countries may know of the negative environmental effects of land overuse or other income-generating activities, they may not feel able to mitigate them.⁶⁵ Pranab Bardhan claims that the environmental impact of agriculture in

⁶¹ Rose Mwebaza and Louis J. Kotzé, *Environmental Governance and Climate Change in Africa: Legal Perspectives* (Institute for Security Studies, 2009).

⁶² Sara J. Scherr and Satya Yadav, "Land Degradation in the Developing World: Issues and Policy Options for 2020," in *The Unfinished Agenda: Perspectives on Overcoming Hunger, Poverty, and Environmental Degradation*, eds. Per Pinstrup-Andersen and Rajul Pandya-Lorch (Washington, DC: International Food Policy Research Institute, 2001).

⁶³ Wilson, 2001.

⁶⁴ Miguel A. Altieri, Peter Rosset, and Lori Ann Thrupp, "The Potential of Agroecology to Combat Hunger in the Developing World," in *The Unfinished Agenda: Perspectives on Overcoming Hunger, Poverty, and Environmental Degradation*, eds. Per Pinstrup-Andersen and Rajul Pandya-Lorch (Washington, DC: International Food Policy Research Institute, 2001); J.N. Pretty, J.L.L. Morison, and R.E. Hine, "Reducing Food Poverty by Increasing Agricultural Sustainability in Developing Countries," *Agriculture, Ecosystems, and Environment* 95 (2003).

⁶⁵ Anderson and Zeriffi (2011) find that knowledge about climate change among smallholders in Uganda is incomplete.

developing countries depends on government policies, market forces, and crop patterns.⁶⁶

In William Langewiesche's report of his interviews with Indian shipbreakers, he recounts their claim that the environment is a concern for privileged people. The poor, they said, must first concentrate on basic human needs like food and shelter.⁶⁷ Similarly, while Michael Painter and William Durham claim that protecting the environment should be as important in poor countries as in rich ones, they also argue that environmental degradation is sometimes the price of feeding a population.⁶⁸

Rural Household Decision-making Patterns

Although cultivating cash crops has the potential benefits of increased income and possibly access to credit, the effects on households of increased income and access to credit may depend on which household member receives them. One major mistake of development projects that Vicki Wilde identifies is the assumption that everyone within a household will benefit equally or fairly from them, even if only one member is involved.⁶⁹ If only one household member has access to such resources, there is no guarantee that others will benefit from them. Christopher Udry also differs with the notion that households act as single units. Rather, within households there are many individuals with different goals and who obtain and use resources differently and whose roles are

⁶⁶ Pranab Bardhan, "Globalization and Rural Poverty" *World Development* 34, no. 8 (2006). Bardhan argues that, in developing countries, "foreign plants are significantly more energy-efficient" than local ones. On the other hand, William Laurance (1999) writes of pollution and deforestation resulting from investment in China and Ecuador by foreign companies.

⁶⁷ William Langewiesche, "The Shipbreakers," *The Atlantic Monthly* 286, no. 2, 2000.

⁶⁸ Michael Painter and William H. Durham, *The Social Causes of Environmental Destruction in Latin America* (Ann Arbor: The University of Michigan Press, 1995); Roberts, 2008.

⁶⁹ Vicki Wilde, "Field Level Handbook," Socio-Economic and Gender Analysis Programme, Food and Agriculture Organization of the United Nations, 2001.

determined by social norms.⁷⁰ Household income is not necessarily pooled among members; at the same time, members' income-generating activities impact not just the total household income, but also their access to it.⁷¹ According to Bina Agarwal, the more resources a household member controls, the more able he or she is to make decisions in a

⁷⁰ Bina Agarwal, "Bargaining' and Gender Relations: Within and Beyond the Household," *Feminist Economics* 3, no.1 (1997); Christopher Udry, "Gender, Agricultural Production, and the Theory of the Household," in *Readings in Development Economics: Empirical Microeconomics, Volume 2*, eds. Pranab Bardhan and Christopher Udry, (MIT Press, 2000).

Neoclassical representations of the rural household often depict them as indivisible units that act as one. These models' assumptions do not allow for differences between household members' *potential* contributions to their households and their *expected* contributions to households. Their expected roles may be determined by gender, age, or other physically or culturally defined characteristics. Therefore, determining how households maximize their utility requires determining whose utility counts and how utilities are defined within the household. It is not completely clear that all members of households will experience the same effects from household allocation decisions (Katz, 1991).

Katz claims that neoclassical household models do not account for the effects that different earners might have on how income is spent. She argues that household welfare functions have social origins. Even when these neo-classical models account for differing preferences within those households, as in the Household Bargaining Model, they conclude that households maximize utility *as if* they acted as a unit, even if they do not actually behave as a unit (Katz, 1991). In other words, they hold that the outcomes of household decision-making processes need not reflect the processes themselves.

Household models in the New Home Economics tradition, on the other hand, recognize that households consider constraints other than income. They combine income, time and production of home goods into one "full income constraint." In addition, New Home Economics addresses the possibility of differing preferences within the household by assigning household members' preferences pre-determined weights. Thus, they address both the consumption and production behaviors of households. Katz calls this "the unique contribution of the model" (Katz, 1991).

Some neoclassical models also account for differing preferences within households. According to some of them, household members resolve these differences by bargaining for their preferences. They enter each bargain voluntarily and negotiate until the point at which they would choose to leave the household and live on their own. According to this logic, individuals' decisions and relative bargaining power within the household depend on their "fall back positions" (Katz, 1991).

Katz's main criticism of the Bargaining Model of households is that it ignores household members' differing abilities to choose their economic opportunities and the determinants of those abilities. She argues that while the Bargaining Model suggests that the economic value of household members' contributions to the household determines their abilities to assert their preferences, it ignores the different ways in which contributions are valued, depending on which household members make them. Gender or age, for example, may limit the valuation of household members' contributions and their access to outside resources. In other words, the value of the same contribution may differ based on the identity of the member who made it. Individual interests may be connected in different ways to household interests (Katz, 1991).

⁷¹ Elizabeth Katz, "Breaking the Myth of Harmony: Theoretical and Methodological Guidelines to the Study of Rural Third World Households," *Review of Radical Political Economics*, 23, Nos 3 and 4, (1991).

household. Agnes Quisumbing and John Maluccio also find that the level of assets that household members control affects the types of expenditures that households make.⁷²

In Mpigi, Uganda, Kabumbuli and Phelan find that women perform most farming tasks and have great decision-making power, especially regarding animals.⁷³ Among the Sabiny on Mount Elgon, Shiraishi finds that women perform most tasks, but have little de facto decision-making power, which any agricultural development project ought to take into account.⁷⁴ If a project affects one particular group by using their labor, without accruing benefits to them, the long-term prospects of the project are questionable.

For consumption, in particular, household composition matters.⁷⁵ In Brazil, Duncan Thomas finds that the greater a woman's unearned income is, the more likely it is that her children's heights and weights are healthy⁷⁶; Stefan Dercon and John Hoddinott find that when consumption shocks occur, women's consumption drops more than men's, and girls' more than boys'.⁷⁷ McPeak and Doss provide a contentious example of how household member roles can affect how they participate in income-generating activities from Kenyan pastoral women's marketing of milk. While the women were enthusiastic about marketing

⁷² Agnes Quisumbing and John Maluccio, "Resources at Marriage and Intrahousehold Allocation: Evidence from Bangladesh, Ethiopia, Indonesia and South Africa," *Oxford Bulletin of Economics* vol. 65, no. 3 (2003).

⁷³ Kabumbuli and Phelan, 2003.

⁷⁴ Walter Goldschmidt, *Culture and Behavior of the Sebei: A Study in Continuity and Adaptation* (Berkeley: University of California Press, 1972); S. Shiraishi, "From Beer to Money: Labor Exchange and Commercialization in Eastern Uganda," *African Studies Quarterly*, 9 (2006).

⁷⁵ Stefan Dercon and John Hoddinott, "Health, Shocks, and Poverty Persistence," Discussion Paper No. 2003/08, World Institute for Development Economics Research of the United Nations, January 2003.

⁷⁶ Duncan Thomas, "Intra-Household Resource Allocation: An Inferential Approach," In *Readings in Development Economics: Empirical Microeconomics, Volume 2*, eds. Pranab Bardhan and Christopher Udry (MIT Press, 2000). The amount of labor a woman contributed to cash crop production has had a strong, positive relationship with her access to its proceeds, in at least two studies: Jones (1986) and Wilk (1989; Katz, 1991). However, the fact of earning an income does not guarantee control over it (Katz, 1991).

⁷⁷ Dercon and Hoddinott, 2003.

milk, their husbands refused to facilitate their participation, keeping the household far from town.⁷⁸ It is possible that the men in this study wanted to control their households' cash or that they wanted to keep the milk within the household.⁷⁹ While some have found that increasing women's access to cash increases household expenditures on children, the sale of milk might take milk away from children to the market.⁸⁰ Similarly, while increased income from cash crops can result in improved nutrition, the opposite may also be true, especially if a non-food cash crop is crowding out natural resources needed for food crops.⁸¹

At the same time, participating in cash cropping, in particular, may alter household dynamics and members' access to resources. Tabitha Kiriti and Clem Tisdell find in Nyeri District, Kenya, that commercialization is associated with a decline in women's ability to control household resources. They also find that household food diversity is negatively associated with the cultivation of cash crops. As cash crops are often men's crops, the cash accrues to them and may not be spent on household food.⁸² Furthermore, cash cropping may encourage monoculture.

Christopher Udry provides another example of unequal intrahousehold distribution from the yields of various crops cultivated by men and women in Burkina Faso households.

⁷⁸ John McPeak and Cheryl Doss, "Are Household Production Decisions Cooperative? Evidence on Pastoral Migration and Milk Sales from Northern Kenya," *American Journal of Agricultural Economics* 88, no. 3 (2006): 525-541.

⁷⁹ McPeak and Doss, 2006.

⁸⁰ John Hoddinott and Lawrence Haddad, "Does Female Income Share Influence Household Expenditures? Evidence from Cote d'Ivoire," *Oxford Bulletin of Economics and Statistics* vol. 57, no. 1 (1995): 77-96; McPeak and Doss, 2006.

⁸¹ Tabitha Kiriti and Clem Tisdell, "Commercialisation (sic) of Agriculture in Kenya: Case Study of Policy Bias and Food Purchases by Farm Households," *Quarterly Journal of International Agriculture* 42, no. 4 (2003).

⁸² Kiriti and Tisdell, 2003.

While the women put more labor into their plots, the men had access to better quality land and almost all of the fertilizer and other chemical inputs. Thus, the men always had higher yields. However, he finds that if holding land quality constant, the gender differential disappears. The women's plots, despite their lack of chemical fertilizers, achieved yields as great or greater than the men's plots given similar land quality. Furthermore, as chemical fertilizers' marginal product decreases after a certain amount, the households in question could have used the fertilizer more efficiently by putting some on the women's plots.⁸³

Elizabeth Katz raises the point that access to assets like land might be restricted by gender or age.⁸⁴ According to Diana Deere and Magdalena León, women in Latin America tend to have little control over land and other productive household assets. They argue that inheritance laws imposed in many countries after the arrival of the Spanish preclude women's land acquisition.⁸⁵ Deere and Leon observe that although women's access to land in Latin America has increased, they remain in a weak position relative to men. Rather than a change in society's perception of women, a drop in land's value has taken place.⁸⁶ Among the Sabinos on Mount Elgon, women do not have land rights at all.⁸⁷

Roles within households can have a great impact on whether and to what extent agricultural development policies succeed. Naila Kabeer writes that extending credit to women will have varying results depending on their society, social class, and cultural

⁸³ Udry, 2000.

⁸⁴ Furthermore, it might confer privileges beyond simple ownership to the owner (Katz, 1991).

⁸⁵ C. Diane Deere and Magdalena Leon. "The Gender Asset Gap: Land in Latin America," *World Development* 31, no. 6 (2003).

⁸⁶ Deere and León, 2003.

⁸⁷ Goldschmidt, 1972.

considerations. She argues that despite the abundance of literature both supporting and attacking micro-credit, there are many general reasons to lend to women. For example, women are more likely than men to share their cash with the household.⁸⁸ While only men usually benefit from credit to men, both men and women (and children) benefit from credit delivered to women. Therefore, women's ability to participate in barley production is likely to boost its benefits to households.

Women in formerly pastoral societies that have become sedentary can be excluded from the cash economy if men take over their duties for cash. Otherwise, their access to the cash economy can increase through sedentarization, if their households settle near towns. Participation in the cash economy, though, does not mean that women's household responsibilities decline. Rather, there may be an additive effect of access to cash.⁸⁹

In sum, similar income allocation processes may result from different decision-making processes. If they want to have broad effects, those who seek to implement development strategies must take into account not only the outcomes of these processes, but the processes themselves.⁹⁰

Alcohol's Effects on Development

Chief among the potential negative effects of linking development to alcohol production is an increase in barley suppliers' access to and consumption of beer. The World Health Organization's 2004 Global Status Report on Alcohol reported that Uganda

⁸⁸ Naila Kabeer, "Conflicts over Credit: Re-evaluating the Empowerment Potential of Loans to Women in Rural Bangladesh," *World Development* vol. 29, no. 1 (2001).

⁸⁹ Elliot Fratkin and Kevin Smith, "Women's Changing Economic Roles with Pastoral Sedentarization: Varying Strategies in Alternate Rendille Communities," *Human Ecology* 23, 4 (1995).

⁹⁰ Elizabeth Katz, "Breaking the Myth of Harmony: Theoretical and Methodological Guidelines to the Study of Rural Third World Households," *Review of Radical Political Economics* 23, Nos. 3 and 4, (1991).

consumed more alcohol per capita than any other country in the world⁹¹ and almost five times as much as the rest of Africa by 2005, whereas the 2011 Report stated that Uganda consumed 12 liters of alcohol per capita in 2005, roughly twice the global average.⁹² While these figures vary greatly, they suggest a high degree of alcohol use among Ugandans. Although few Ugandans consume alcohol, the few who do consume to excess.⁹³ The predilection of some Ugandans for extreme alcohol consumption makes the breweries' development plan worrisome as it has the potential to exacerbate alcohol abuse in Uganda.

During the postcolonial period in East Africa bottled beer became a symbol of wealth and development, while traditional brews signified laziness and backwardness. Despite the ways in which traditional alcohol facilitated and manifested social ties, many were eager to abandon it.⁹⁴ Among the Nyakyusa in Tanzania, Justin Willis argues that traditional brews solidified the power of older men before beer ingredients were commercialized, at a time when drinking was a communal activity. In decoupling alcohol from community traditions, bottled beer is a symbol of alcohol's individualization in East Africa.⁹⁵

Alcohol-related problems are increasingly frequent in Africa and Latin America. Dependence on alcohol is linked to medical, social, and legal problems⁹⁶ and changes in a

⁹¹ World Health Organization (WHO), *Global Status Report on Alcohol and Health* (Geneva, Switzerland, 2004); (19 liters); SABMiller (2008) cites Plato Logic Limited's estimate of Ugandan per capita beer consumption at 8 liters per person per year.

⁹² WHO, *Global Status Report on Alcohol and Health* (Geneva, Switzerland, 2011).

⁹³ WHO, 2004; Joseph Miti, "Africa: Uganda Still Leads in Alcohol Consumption," *The Monitor*, 29 July 2010.

⁹⁴ W.O. Maloba, "Review: Alcohol and Social Power," *The Journal of African History* 44, no. 3 (2003).

⁹⁵ Justin Willis, "'Beer Used to Belong to Old Men': Beer and Authority among the Nyakyusa of Tanzania," *Africa: Journal of the International African Institute* 71, no. 3 (2001).

⁹⁶ WHO, 2004.

population's health can result from changes in even the availability of alcohol. Its consumption is a major risk factor for non-communicable diseases such as esophageal cancer, liver disease, and epilepsy. In 2000, it was responsible for two million global deaths, either directly, through disease, or through motor vehicle accidents.⁹⁷

Because alcohol consumption poses a number of health risks, any increase in per capita income or taxes that developing countries experience from the presence of alcohol-related corporations may be offset by their populations' accumulated health problems. This situation is especially grave for countries without the resources to address alcohol-related illnesses adequately.⁹⁸ At the individual level, commercial alcohol may require cash that individuals find scarce; plus, its consumption is associated with low wages, increased medical expenditures, and diminished employment opportunities.⁹⁹ It may also contribute to domestic violence.¹⁰⁰

Transnational corporations with little connection to local traditions, dominate in alcohol production; even domestic breweries are often owned or operated by transnationals¹⁰¹, as are Uganda Breweries and Nile Breweries. Traditional non-commercial production and consumption, though, may be significant. Therefore, a rise in alcohol consumption rates may simply reflect a switch from non-commercial to commercial

⁹⁷ Abdesslam Boutayeb and Saber Boutayeb, "The burden of non communicable diseases in developing countries," *International Journal for Equity in Health*, 4, 2 (2005).

⁹⁸ Raul Caetano and Ronaldo Laranjeiro. "A 'Perfect Storm' in Developing Countries: Economic Growth and the Alcohol Industry," *Addiction* 101 (2006).

⁹⁹ Chronic Poverty Research Center, "Drinking into deeper poverty: The new frontier for Chronic Poverty in Uganda," [Policy Brief No.1/2007, June 2007], Development Research and Training; available from www.drt-ug.org; Internet; accessed 3 July 2011.

¹⁰⁰ Chronic Poverty Research Center, 2007.

¹⁰¹ WHO, 2004.

alcohol. Increases in alcohol-related problems might actually be correlated with a de-linkage of alcohol from local customs.¹⁰² In fact, many of the problems that the WHO has observed with alcohol consumption are likely tied to commercial alcohol, making the fact of using commercial beer for development potentially troublesome.

¹⁰² Ibid.

CHAPTER 3

POLITICS, GEOGRAPHY, AND CULTURE OF THE SABINY

The National Context

Uganda, with a population of 33.4 million¹⁰³ and gross domestic product (GDP) of \$17.2 billion in 2010¹⁰⁴, is a logical setting for launching a development project. As a United Nations-designated Least Developed Country, it has a per capita purchasing power parity gross national income (GNI) of \$1190.¹⁰⁵ Its life expectancy at birth is just 53 years for men and 54 years for women.¹⁰⁶ Moreover, its under-5-years mortality rate is 135 deaths per 1000 live births¹⁰⁷ and 15 percent of the population is undernourished.¹⁰⁸ While Uganda is self-sufficient in food, in terms of the amount of food produced, hunger persists because food is unequally distributed.¹⁰⁹

¹⁰³ World Bank, *World Development Indicators*, multiple years. Available from <http://databank.worldbank.org>; Internet; accessed 11 July 2011.

¹⁰⁴ Ibid.

¹⁰⁵ Ibid; United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries, and Small Island Developing States (UN-OHRLS), multiple years; available from www.unohrlls.org; Internet; accessed 10 July 2011. Countries fall into the LDC category when they fit the three following criteria: Their per capita GNI is below \$905; their Human Asset index, composed of education, nutrition, literacy, and health, suggests a lack of development; and they have an elevated economic vulnerability, measured by their population size, remoteness, composition of their exports, the instability of their exports, and the share of agricultural exports in total exports. At a per capita GNI of \$1086 they can graduate from their LDC status, unless they have not met graduation levels from at least one of the other two criteria (UN-OHRLS, multiple years). Uganda's per capita GDP in current US\$ is \$490 (World Bank, multiple years).

¹⁰⁶ World Bank, multiple years.

¹⁰⁷ United Nations Development Programme (UNDP), *Human Development Reports*, multiple years; available from <http://hdr.undp.org/en/statistics>; Internet; accessed 12 July 2011.

¹⁰⁸ Ibid.

¹⁰⁹ Nicky Pouw, "Food Priorities and Poverty: The Case of Smallholder Farmers in Uganda," *Journal of African Economies* 18, 1 (2009).

At the same time, Uganda's human capital is high and rising; 76.4 percent of Ugandans over age 15 are literate.¹¹⁰ Although the mean number of adults' years of schooling is just 4.7, the expected number of children's years of schooling is 10.4.¹¹¹ Yet the ratio of women to men with at least secondary education lags at 0.437.¹¹²

The Importance of Rural Development in Uganda

Rural development is of particular interest in Uganda. According to Uganda's 2002 census, almost 88 percent of its population live in rural areas and Uganda's agricultural sector employs 81 percent of the rural labor force and 98 percent of its rural farmers are subsistence farmers¹¹³, with on average, 2.5 hectares of land.¹¹⁴ Therefore, the target group for Nile and Uganda Breweries' barley projects, smallholders, is ample. In addition, agriculture provides more than half of the income of the poorest 75 percent of the population.¹¹⁵ Furthermore, it contributes to more than 25 percent of Uganda's GDP.¹¹⁶

The need for viable livelihood options for Ugandans is growing. In 2002, more than one third of Uganda's population was under the age of 10 and more than half under the age of 20.¹¹⁷ In rural areas, more than half of the population is under the age of 15.¹¹⁸

¹¹⁰ UNDP, multiple years.

¹¹¹ Ibid.

¹¹² Ibid.

¹¹³ Uganda Bureau of Statistics, *Uganda National Household Survey 2002/3* (Entebbe, Uganda, 2003).

¹¹⁴ World Bank, multiple years.

¹¹⁵ Chris Balya, "Supporting Smallholder Farmers to Grow in Uganda: The Story of Eagle Lager," [Afro-Kai, Limited Presentation, not dated]; available from <http://www.value-chains.org/dyn/bds/docs/574/Balya.pdf>; Internet; accessed 21 June 2011.

¹¹⁶ World Bank, multiple years.

¹¹⁷ Uganda Bureau of Statistics, 2003.

¹¹⁸ Ibid.

Therefore, job creation in Uganda is and will continue to be important. Cash crops may provide the necessary employment opportunities.

As Figure 1 shows, Uganda's exports are mainly agricultural products, the largest of which, in dollar value, is coffee. Other major exports include cash crops such as tobacco, tea, beer, and hydrogenated oils.¹¹⁹ The value of Uganda's exports in 2009 was equal to 23 percent of its GDP, up from 12 percent in 2001.¹²⁰ The value of Uganda's imports rose to 35 percent of GDP in 2009 from 24 percent in 2001.¹²¹ Most of Uganda's cash crops are grown for export.¹²² Barley, sugar, rice, and maize, however, are cash crops destined for both domestic and foreign consumption.¹²³ Production for domestic consumption may decrease commodity price volatility.

Exports and Cash Crops

One challenge to cash crop farming in Uganda that Afro Kai, a seed supplier, notes comes from gender relations. Men and women's farming priorities may differ, but as men generally receive payment even when women perform the labor, their priorities win.¹²⁴ This arrangement may force women to work hard against their own interests. Another challenge that Afro Kai identifies comes from farmer-farmer association management

¹¹⁹ Food and Agriculture Organization of the United Nations (FAO), *FAOSTAT*, multiple years; available from <http://faostat.fao.org>; Internet; accessed 12 July 2011.

¹²⁰ World Bank, multiple years. From 1999 to 2009 the value of Uganda's exports rose from \$385,000,000 to \$1,508,000,000 (IMF, multiple years). During the same period, its exports to other countries in Africa rose from \$20,000,000 to \$715,000,000 (IMF, multiple years).

¹²¹ World Bank, multiple years.

¹²² Rita M. Byrnes, *Uganda: A Country Study* (Washington, DC: GPO for the Library of Congress, 1990).

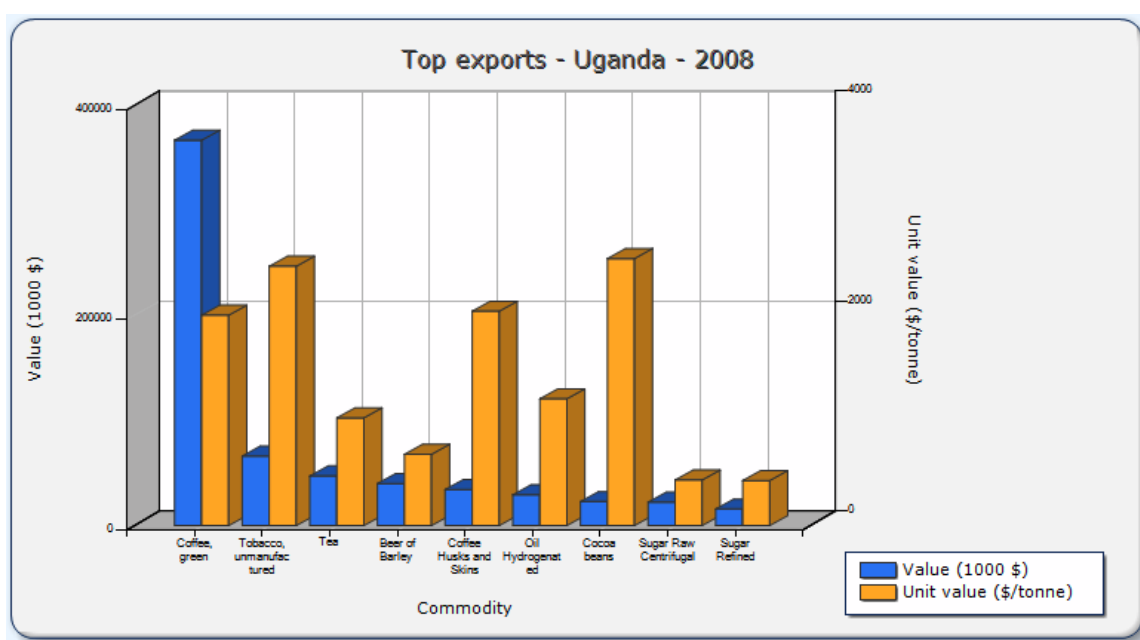
¹²³ FAO, multiple years; Devapriyo Das, "Traditional Cash Crops Face Stern Test from New Exports," *The Observer*, 20 January 2010.; Ware, 2009.

¹²⁴ Balya, n.d.

relations. Although management is concerned with just the cash crop, farmers must take care of all of their crops, including those for consumption.¹²⁵

Despite these challenges, the Ugandan government recognizes potential for an increase in financial gains from investments in agriculture, especially as its top exports are agricultural products (Figure 1). It provides at least partial tax exemptions to entities investing in new plants and machinery to process locally grown agricultural products for final consumption.¹²⁶

Figure 1: Uganda Exports



¹²⁵ Ibid.

¹²⁶ PricewaterhouseCoopers Kenya, Limited, *Doing Business: Know Your Taxes (East Africa Tax Guide 2010/2011)*, January 2011.

Uganda's Climate

Although Uganda is located on the equator, its climate is rather moderate because most of the country is situated between 900 and 1500 meters above sea level. Uganda's highlands (any land above 1500m) have temperate climates and make up about 7 percent of its total land.¹²⁷

Mount Elgon, where Kapchorwa, Bukwa, and Kween Districts are located, was formed by a volcano and rises 4,323 meters.¹²⁸ These districts are relatively isolated from the rest of Uganda because of their topography. Most of their land slopes steeply (more than 10 degrees), presenting marked challenges for agriculture.¹²⁹ However, Mount Elgon's environmental conditions include heavy rain, daily sunshine, and a low, temperate climate¹³⁰, perfect for barley.¹³¹

History of the Sabiny

The Sabiny, like most of the inhabitants of Uganda's mountainous regions, were driven there by combative plainsmen. Only some western highlands have been populated

¹²⁷ Festus Bagoora, "Soil Erosion and Mass Wasting Risk in the Highland Area of Uganda," *Mountain Research and Development* 8, no. 2/3 (1988).

¹²⁸ Richard J. Pike, "Volcanoes on the inner planets - Some preliminary comparisons of gross topography," *Proceedings of 9th Lunar and Planetary Science Conference*, Houston, Tex., March 13-17, 1978. Volume 3, p. 3239-3273 (A79-39253 16-91) New York: Pergamon Press, Inc., 1978.

¹²⁹ Bagoora, 1988.

¹³⁰ A. Knapen, M.G. Kitutu, J. Poesen, W. Breugelmans, J. Deckers, A. Muwanga, "Landslides in a Densely Populated County at the Footslopes of Mount Elgon (Uganda): Characteristics and Causal Factors," Joint Project between Katholieke Universiteit in Leuven, Belgium and Makerere University in Kampala, Uganda, 2005.

¹³¹ Nile Breweries, Limited, "Project 'Saidinia': East Africa Barley Development," Presentation Document, May 2008.

for multiple centuries.¹³² During the colonial period, Kapchorwa, Bukwo, and Kween were one county, called Sebei (another spelling of Sabiny). Sebei County became its own district in 1962, just prior to Uganda's independence from Great Britain.¹³³ During the 1960s the Sabiny, for whom the county was named, and Bagisu, their neighbors, fought violently over disputed border areas. These disputes have not yet been resolved.¹³⁴ Sebei District was split into Kapchorwa and Bukwo Districts in 2005.¹³⁵ Then, part of Kapchorwa District became Kween District in 2010.¹³⁶ The combined population of Kapchorwa, Bukwo, and Kween Districts comprised only 0.8 percent of the total population of Uganda in 2002.¹³⁷ More recent figures are unavailable.

The Sabiny are the dominant ethnic group on Mount Elgon. In 2003 roughly 181,000 Ugandans self-identified as Sabiny; 172,109 of them live in rural areas.¹³⁸ Like the rest of Uganda's population, more than half of Kapchorwa, Bukwo, and Kween's people are under the age of 18¹³⁹, meaning that the region's need for viable livelihoods is growing.

¹³² Bagoora, 1988; Walter Goldschmidt and Gale Goldschmidt, *Culture and Behavior of the Sebei: A Study in Continuity and Adaptation* (Berkeley, CA: University of California Press, 1976); S. Shiraishi, "From Beer to Money: Labor Exchange and Commercialization in Eastern Uganda," *African Studies Quarterly*, 9 (2006); available from <http://africa.ufl.edu>; Internet; accessed December 2010.

¹³³ Goldschmidt and Goldschmidt, 1976; Sebei County was part of Bugisu until 1962 (Womakuyu, 2010);

¹³⁴ *New Vision* (Kampala, Uganda), "300,000 Homeless after Landslides," 8 March 2010.

¹³⁵ *Independent* (Kampala, Uganda), "Evolution of Uganda's Districts," 30 June 2009.

¹³⁶ Florence Nakayi, "Uganda's Districts since Independence," *New Vision*, 27 August 2010; Uganda Ministry of Local Government (MOLG), *List of Districts, Municipalities, and Town Councils in Uganda as of July 2010*; available from <http://molg.go.ug>; Internet; accessed 21 July 2011.

¹³⁷ Uganda Bureau of Statistics, 2003.

¹³⁸ *Ibid.*

¹³⁹ *Ibid.*

Walter Goldschmidt claims that the Sabiny "are heirs to a cultural tradition dating back two millennia." At one time the Sabiny were a group comprised of three distinct tribes, the Sapiñ, the Mbai and the Sor. However, they are now so interconnected that their lineages are no longer separate. They inhabited all of the plains area surrounding Mount Elgon in both modern day Uganda and Kenya. However, the imposition of the Kenya-Uganda border forced many to remain in Uganda.¹⁴⁰

Due to conflicts with neighboring ethnic groups, they abandoned the Ugandan plains north of Mount Elgon and began living in the mountains. By the 1970s, Goldschmidt reported that most of the Sabiny lived at altitudes between 1500 and 2100 meters. Traditionally cattle herders, the Sabiny turned to agriculture because of livestock raiding by their Kalenjin, Nilote, and Bantu neighbors.¹⁴¹ Their conflict with the Karamojong and Pokot tribes, in particular, continues today.¹⁴² The Sabiny experience only a seasonal peace with the raider tribes, including the Pokot and Karamojong.¹⁴³ So-called "miss peaces" exist only when the raiding tribes are experiencing a period of environmental hardship.¹⁴⁴

¹⁴⁰ Walter Goldschmidt, *Culture and Behavior of the Sebei: A Study in Continuity and Adaptation* (Berkeley: University of California Press, 1972).

¹⁴¹ The early twentieth century saw a great disruption in the Sabiny's institutions due to continued pressure from their neighbors and the Baganda. As the conflict between the two groups intensified, the prophets who held the various Sabiny peoples together, declined in influence. The Sabiny saw the colonial British as protectors from their many neighboring enemies. In fact, many joined the King's African Rifles at the beginning of World War I (Goldschmidt, 1972).

¹⁴² Dave Eaton, "The Business of Peace: Raiding and Peace Work along the Kenya-Uganda Border (Part II)," *African Affairs* 107, no. 427 (2008).

¹⁴³ Ibid.

¹⁴⁴ Ibid.

Because of the Sabiny's continual insecurity due to conflict, they have learned to adapt quickly to changing agricultural and other challenges.¹⁴⁵

Agriculture, Alcohol, and the Economy

According to Soichiro Shiraishi, the Sabiny were mainly pastoralists until some time in the first half of the twentieth century, growing few crops, including sorghum, millet and yams. Shifts in the number and types of crops the Sabiny cultivate have been driven by their interactions with neighboring peoples.¹⁴⁶ By the time Goldschmidt arrived in the 1970s, the Sabiny had begun to cultivate "wheat, cassava, cabbage, tomatoes, and other vegetables," as well as coffee, an important cash crop for the area.¹⁴⁷ They began cultivating maize around 1950; as the Ugandan government has encouraged the cultivation of maize as a "non-traditional" commercial crop, Mount Elgon has become a major center for it.¹⁴⁸

Traditionally, Mount Elgon's population has practiced little environmental conservation.¹⁴⁹ As the population has increased, competition for land and land overuse have mounted, producing "...soil erosion and mass wasting at alarming rates..." according to Festus Bagoora.¹⁵⁰ The area at greatest erosion risk lies between 1,500 and 2,500 meters above sea level, because few humans, aside from mountaineers, venture above

¹⁴⁵ As Goldschmidt reported: "The old ex-saza chief Wandera once said to me, 'The Sebei are easy to convert to new fashions -- not like other tribes.'" Goldschmidt posits that these recorded inconsistencies were probably due to the fact that the Sabiny were already experiencing a period of transition (because of their conflicts) when the Europeans arrived (Goldschmidt, 1972).

¹⁴⁶ Eaton, 2008; Shiraishi, 2006; Goldschmidt, 1972.

¹⁴⁷ Goldschmidt, 1972.

¹⁴⁸ Shiraishi, 2006.

¹⁴⁹ Bagoora, 1988.

¹⁵⁰ Ibid.

2,500 meters.¹⁵¹ Despite the risk of degradation on Mount Elgon, its volcanic soils are "considered to be more stable and less prone to erosion hazard" than non-volcanic soils.¹⁵² However, Mount Elgon still experiences devastating landslides from time to time.¹⁵³

Sabiny agriculture, according to Goldschmidt, once depended on beer.¹⁵⁴ In the 1970s Goldschmidt observed Sabiny work parties with plentiful beer several times per year¹⁵⁵. These *moykets* served to accomplish whatever household and agricultural tasks the hostess needed accomplished. The hostess invited others to help with planting, clearing, weeding, harvesting, building houses, and other major works. To announce a *moyket* a woman would begin brewing a large pot of local beer, called a *komek*¹⁵⁶, made from honey, plantains or maize and wild-growing malting materials.¹⁵⁷ Someone would see the *komek* and ask the date of the *moyket*. Word would spread and neighbors would gather the morning of the *moyket*. After working through the morning and the beginning of the afternoon, neighbors would go home and freshen up before returning for beer later in the afternoon or in the early evening.¹⁵⁸ Those who needed work completed, but had no beer to share, could engage their neighbors to work, but must promise them both beer and meat

¹⁵¹ Ibid.

¹⁵² Ibid.

¹⁵³ *New Vision*, 8 March 2010.

¹⁵⁴ Animals, especially cows, are important to the Sabiny. They are used for food, agricultural labor, spiritual rituals, and economic exchanges and to maintain social ties (Goldschmidt, 1972).

¹⁵⁵ The Iteso also participate in beer parties to accomplish large tasks (Shiraishi, 2006).

¹⁵⁶ Shiraishi, 2006.

¹⁵⁷ Goldschmidt, 1972.

¹⁵⁸ Ibid.

at some later date. A designated person oversaw the arrangement to ensure that the workers received their due.¹⁵⁹

Beer was even used to assure land rights.¹⁶⁰ Goldschmidt found that land was freely lent among men into the 1940s, without promise of payment. Indefinite borrowing was still practiced in the 1970s, but only between men who had strong relationships. In lieu of cash payment, the borrower killed a chicken and brewed a pot of beer to reassure the owner that he recognized the debt.¹⁶¹ *Moykets* and other beer or food parties served to support long-term reciprocity among neighbors. Describing her life without cash an old woman said to Shiraishi, "We can neither eat nor drink money. Who could do anything for it?"¹⁶² In addition to *moykets* there were also small labor exchanges called *yemdoy* and *kworishet*. *Yemdoy* were labor exchanges practiced only among women and *kworishet* were small versions of *moykets* in which beer was replaced by meat and sour milk.¹⁶³

There were also Christmas beer parties, which were generally more convivial than work parties. Although children received clothes, the ritual was mainly for adults. Goldschmidt observed, "The result is that adults have a quiet good time, but the children stand along the road, and at such other places where they congregate, with nothing to do."¹⁶⁴

¹⁵⁹ Ibid.

¹⁶⁰ Sabiny law recognizes private rights to cultivated land, but communal rights to pastoral land. Sabiny law considered natural products such as wild animals, water, and grass communal property unless humans acted upon them. For example, cultivated land belongs to the person (man) who spent his energy cultivating it (Goldschmidt, 1972).

¹⁶¹ Goldschmidt, 1972.

¹⁶² Shiraishi, 2006.

¹⁶³ Ibid.

¹⁶⁴ Goldschmidt, 1972.

Stephano Ponte and Georg Simmel's studies have found that beer parties in various parts of the world have been declining, replaced by hired labor as economic markets have been liberalized.¹⁶⁵ These studies suggest that the cash economy erodes social networks in rural settings.¹⁶⁶ As early as the 1970s, Goldschmidt found that where farm implements were mechanized, as in Bukwa, *moykets* were less common than in others.¹⁶⁷

Changing Attitudes toward Alcohol

"Not to participate in *moykets* is not to be Sebei," Goldschmidt remarked 40 years ago.¹⁶⁸ These gatherings were where friendships, new loves and old animosities were solidified. However, in 2006 Shiraishi found that the spread of Islam and Pentecostalism had discouraged *moykets*.¹⁶⁹ Both religions opposed alcohol consumption, so their devotees did not join *moykets*. By the 1980s some Muslims had replaced *moykets* with *kworishet*, which were not universally accepted among their neighbors. After all, refusing to participate in a *moyket* did not encourage others to help a household. However, only twenty percent of the population consumed alcohol by the 1990s.¹⁷⁰ Alcoholism, though

¹⁶⁵ Shiraishi, 2006; Stephano Ponte, "From Social Negotiation to Contract: Shifting Strategies of Farm Labor Recruitment in Tanzania under Market Liberalization," *World Development* 28, no. 6 (2000).

¹⁶⁶ Shiraishi, 2006; Ponte, 2000; Georg Simmel, *The Philosophy of Money*, 2nd ed. (Routledge & Kegan, 1990).

¹⁶⁷ Goldschmidt, 1972.

¹⁶⁸ Goldschmidt, 1972.

¹⁶⁹ As of 2002, Kapchorwa, Bukwa, and Kween had become heavily Christian districts, with 50,245 Catholics, 75,640 Anglicans, 1,150 Seventh Day Adventists, and 34,311 Pentecostal Christians (Uganda Bureau of Statistics, 2003).

¹⁷⁰ Shiraishi, 2006.

not moderate consumption of alcohol, is now viewed as a symbol of poverty, both in rural and urban areas on Mount Elgon.¹⁷¹

The brewing of beer has all but ceased to be a social endeavor. Now, most (older) women who brew beer do so to earn cash from local bars or from those who still participate in *moykets*.¹⁷² Shiraishi claims that not a single woman organized a *moyket* in Kapchorwa in 2002. Instead of *moykets*, women's credit associations organized *fakiyets*, rotating labor exchange groups whose members are fixed for each season.¹⁷³ Although the *moykets* are barely still in existence, women can solicit their neighbors' labor through *fakiyets*.¹⁷⁴

Sabiny Households

According to Goldschmidt's work, the husband is the head of the Sabiny household. Other members include his wife or wives, their children, other relatives and, sometimes, non-relatives. As the head, the man owns the household assets. All family members including the wives are subordinate to the head, but the wives are "fundamentally independent of one another."¹⁷⁵

Definitions and Evidence of Household Insecurity

In a participatory survey undertaken by the Ugandan government, Sabiny men and women described poverty as the inability to meet one's basic needs and make one's own

¹⁷¹ Uganda Ministry of Finance, Planning and Economic Development, *Uganda Participatory Poverty Assessment Process: Kapchorwa District Report* (Kampala, Uganda, 2000).

¹⁷² Shiraishi, 2006.

¹⁷³ Ibid.

¹⁷⁴ Ibid.

¹⁷⁵ Goldschmidt, 1972.

choices. Land, livestock, farm inputs, education, food, social support, moral behavior (the absence of sorcery and alcoholism, as well as helping those in need), being married, and good health are all markers of one's ability to meet one's basic needs and make one's own choices.¹⁷⁶ In urban areas on Mount Elgon, participants found that insecurity was decreasing, whereas in rural ones they found that the rich were becoming richer and the poor poorer. Urban participants cited improved access to markets and the road between Kapchorwa and Bukwa¹⁷⁷ towns as evidence of improving security. Rural participants mentioned cattle raiding, the inability to find oxen for ploughing, insufficient funds to buy essential items, poor roads, and a lack of land as severely exacerbating poverty. They also complained, vaguely, that the Ugandan government's liberal economic policies discriminated against the poor.¹⁷⁸

Despite the fact that smallholder farmers grow almost all of the agricultural produce in Uganda, many of them still face food insecurity. The Sabiny are not immune to this problem. In a survey about food security conducted on Mount Elgon in 2000, Nicky Pouw writes that 65 percent of responding households reported facing food shortages in that year.¹⁷⁹

Major barriers to cultivating cash crops that the Sabiny face include little access to finance, poor infrastructure and transport, and the difficulty reaching market information. Although 50 percent of farmers in a survey by Anna Borkenhagen said obtaining loans was

¹⁷⁶ Uganda Ministry of Finance, Planning, and Economic Development, 2000.

¹⁷⁷ Note that Bukwa town is spelled and pronounced slightly differently than Bukwo District, in which it is situated.

¹⁷⁸ Ibid.

¹⁷⁹ Pouw, 2004.

easy, 25 percent called them somewhat difficult, and 25 percent very difficult. Only 53 percent said they had access to transport, and 38 percent to markets.¹⁸⁰

Gender in Agriculture

According to Goldschmidt, household and most farming chores are performed by women¹⁸¹, though men do some agricultural and livestock work.¹⁸² Men plow with oxen; women do the weeding and almost all the milking. Women do not use animals to plow and married men never weed, though women rely on their unmarried children for farm help.¹⁸³ "When men do such work [soil preparation, sowing, weeding, harvesting] they think of themselves as helping the women."¹⁸⁴ Goldschmidt reported that "men always clear the land" and use the plow and take charge of coffee production. They also graze animals.¹⁸⁵ The *shambas* or gardens belong to the women, though they are owned by men. Thus, the woman may market and sell the produce, and keep proceeds, but not if she obtains a significant amount. "The cash crops of coffee and maize are always marketed by men."¹⁸⁶

Among the Sabiny, women do not own land, though the land they cultivate is considered to belong to them. Cultural norms exclude them from land ownership and inheritance. However, they can own livestock and their decision-making power within

¹⁸⁰ Borkenhagen, 2010.

¹⁸¹ Peter Cherwaru, Series of interviews by Cleo Roberts between 1 July and 7 September 2010.

¹⁸² Goldschmidt, 1972.

¹⁸³ Shiraishi, 2006.

¹⁸⁴ Goldschmidt, 1972.

¹⁸⁵ Uganda Ministry of Finance, Planning and Economic Development, 2000.

¹⁸⁶ Goldschmidt, 1972.

households is considerable despite ownership issues.¹⁸⁷ Goldschmidt notes that land transfers are actually between women, even though they are enacted by men. While men own the land, women cultivate it. Therefore, when land passes from a man to his son in title, it actually passes from the man's wife to her daughter-in-law in deed.¹⁸⁸ Unlike Deere and León's example of Latin American women using their sons to retain control over land¹⁸⁹, Sabiny women lose all claim to land once it is transferred to their sons.

But, as in Deere and León's study in Latin America, women rarely inherit land, much less purchase it. Rather, they acquire land through their husbands, who may reclaim it later. Sometimes men give cattle to their wives. If a woman owns cattle, her husband cannot trade them without her permission, and she has the right to refuse, according to Sabiny law. However, men often ignore Sabiny law and trade their wives' cattle against their wishes, as they do land. Furthermore, wives cannot take their cattle in the case of divorce. Goldschmidt surmised that the purpose of married women's cattle holding is actually in trust for their sons.¹⁹⁰

Although men and women share some agricultural work, their complementary activities end there. In addition to weeding and harvesting crops, women look after children, clean their houses, and prepare food, while men relax in the afternoons and evenings.¹⁹¹

¹⁸⁷ Ibid.

¹⁸⁸ Ibid.

¹⁸⁹ C. Diane Deere and Magdalena León, "The Gender Asset Gap: Land in Latin America," *World Development* 31, no. 6 (2003).

¹⁹⁰ Goldschmidt, 1972.

¹⁹¹ Uganda Ministry of Finance, Planning and Economic Development, 2000.

CHAPTER 4

BARLEY AND BREWING IN UGANDA

Barley is a key ingredient in beer, but can also be used for animal feed or to make bread. In beer, it is generally only used in its half-germinated form¹⁹² to make malt¹⁹³. Breweries vary types of barley and cooking times to produce different flavors. Other beer ingredients include maize, water, hops, and yeast.¹⁹⁴

Barley in Uganda

Barley production in Uganda started in 1991 when the Uganda Development Corporation and Uganda Breweries, Ltd. introduced it as a non-traditional cash crop. The project was suspended shortly thereafter, and restarted in 2003 by Uganda Breweries¹⁹⁵. Barley is an ideal crop for marginal areas because it can grow in poorer soils and in lower temperatures than wheat¹⁹⁶. As of 2009 only a quarter of the barley-suitable land on the Ugandan side of Mount Elgon was being cultivated¹⁹⁷.

Encouraging the local production of beer, the Ugandan government charges lower excise taxes on the production of beer from local materials than it does on beer from imported materials. If beer is composed of 75 percent domestic materials, excluding water, it is taxed at a rate of 20 percent. If, on the other hand, more than 25 percent of its content

¹⁹² Moses Musisi, Interview with author, 8 July 2010.

¹⁹³ FAO, 2011.

¹⁹⁴ Moses Musisi, Interview with author, 8 July 2010.

¹⁹⁵ Dorothy Nakaweesi, "Barley gives hope to Ugandan farmers," *Monitor*, 14 December 2010.

¹⁹⁶ FAO, 2011.

¹⁹⁷ *East African*, "Kapchorwa sprouts as new barley growing field," 24 August 2009.

is imported, it is taxed at a rate of 60 percent.¹⁹⁸ These Ugandan tax benefits, combined with fluctuations in global barley production between 2000 and 2007 have led breweries in East Africa to turn to locally produced barley.¹⁹⁹

Uganda Breweries, Limited

Uganda Breweries, Limited, buying barley from the farming association KaCoFA, is a subsidiary of East African Breweries, Limited.²⁰⁰ Uganda Breweries opened in 1946 with its flagship beer Bell Lager²⁰¹, named for its headquarters in Port Bell Pier, just outside Uganda's capital, Kampala. East African Breweries, Limited, operating since 1923 and controlling 98.2 percent of Uganda Breweries' stock²⁰², is composed of five subsidiary companies: Kenya Breweries, Uganda Breweries, Central Glass Industries, East African Maltings, and UDV Kenya²⁰³. It is based in Ruaraka, Kenya, a suburb of Nairobi. In 2010 it earned 38.0 billion Kenya shillings, yielding a 12.6 billion Kenya shilling profit before taxes.²⁰⁴

¹⁹⁸ Uganda Revenue Authority, *Local Excise Duty*, not dated.

¹⁹⁹ Ian L Ward, "Global Malting Barley Report," Brewers Supply Group Presentation, October 2007.

²⁰⁰ David Kissa, "Presentation to the German Embassy" (Kapchorwa Commercial Farmers Association, 2010); M. Kapchanga, "Kapchorwa Sprouts as New Barley Growing Field," *The East African*, 24 August 2009; East African Breweries, *East African Breweries* [homepage on-line]; available from <http://www.eabl.com>; Internet; accessed 26 October 2010.

²⁰¹ *East African Breweries* Homepage.

²⁰² Diageo, "Diageo's East African Subsidiary, East African Breweries Limited, Completes Acquisition of Serengeti Breweries Limited in Tanzania," [RNS announcement]; available from <http://www.diageo.com/en-row/investor/Pages/pressreleases.aspx>; Internet; accessed 26 October 2010.

²⁰³ Ibid.

²⁰⁴ East African Breweries, *2010 Annual Report and Financial Statements*, 2010.

Diageo, a London-based company²⁰⁵, owns 50 percent of East African Breweries²⁰⁶. Diageo is the result of a number of acquisitions and mergers over the years. Its forebrewers began producing beer in the 18th century. Justerini and Brooks formed in 1749 and Guinness' St. James Gate opened in 1759. Over the years the companies merged with and acquired various breweries and other businesses and in 1997 the merger of Grand Metropolitan Public Limited Company and Guinness PLC created Diageo.²⁰⁷

Diageo Africa employs over 4500 people in Africa. Africa provides almost one third of Diageo's net beer sales²⁰⁸. Its subsidiary East African Breweries' export markets outside Africa include the United Kingdom, the United States, Australia, Japan, and Canada.²⁰⁹ It alone employs more than 1000 people in Africa.²¹⁰ East African Breweries credits the lowering of Uganda's excise tax on beer produced with local materials for its ability to launch its barley-growing initiative on Mount Elgon. It uses this barley to produce Senator Lager²¹¹, the first beer to be composed of only barley²¹².

At the beginning of its barley initiative Uganda Breweries provided barley seed, fertilizers, and pesticides to its first barley farmers without interest²¹³, providing them

²⁰⁵ Nairobi Stock Exchange, [homepage online], available from <http://mystocks.co.ke>; Internet; accessed 26 October 2010.

²⁰⁶ Diageo Homepage, n.d.

²⁰⁷ Diageo, [homepage online]; available from <http://diageo.com>; Internet; accessed 26 October 2010.

²⁰⁸ Ibid.

²⁰⁹ East African Breweries Homepage, n.d.

²¹⁰ Ibid.

²¹¹ East African Breweries. "Kapchorwa." Available from <http://www.eablfoundation.com/kapchorwa.htm>; Internet; accessed 26 October 2010.

²¹² Diageo Homepage, n.d.

²¹³ East African Breweries Foundation Homepage, n.d.

access to credit. East African Maltings, another East African Breweries subsidiary, took over that function in 2006²¹⁴, continuing to supply smallholders with seed through KaCoFA, then buying the harvested barley from them after KaCoFA collects it. With this produce, Uganda Breweries manufactures Senator.²¹⁵ By 2009, East African Breweries was spending an estimated \$128,000 per year on research and extension services for farmers on Mount Elgon.²¹⁶ Through Kenya Maltings, another subsidiary, East African Breweries introduced a barley seed variety called "nguzo," which boasts higher yields and greater resistance to pests than other regional varieties.²¹⁷ During the period from 2002 to 2009 Kenyan barley yields peaked at 33,785 hectograms per hectare in 2006, similar to North American yields and about 75 percent of European Union yields.²¹⁸ Ugandan barley yields are expected to reach similar values in the next several years.²¹⁹

Nile Breweries, Limited

Nile Breweries, Uganda Breweries' main competitor in Uganda for both customers and barley supply, has existed in Uganda almost as long as Uganda Breweries. Like Uganda Breweries, it began as a solely Ugandan company, but is now a subsidiary of a major

²¹⁴ East African Breweries Homepage, n.d.; Greg Metcalf and Geoffrey Ngobi, "Uganda Barley Project: Report on Field Visit [for Nile Breweries] June 2008," PowerPoint Presentation, 3 July 2008.

²¹⁵ East African Breweries Foundation, *East African Breweries Foundation* [homepage online]; available from <http://www.eablfoundation.com>; Internet; accessed 26 October 2010.

²¹⁶ Kapchanga, 2009.

²¹⁷ East African Breweries Homepage, n.d.; Kapchanga, 2009.

²¹⁸ FAO, multiple years.

²¹⁹ Nakaweesi, 2010.

transnational corporation. Muljibhai Madhvani commissioned Nile Breweries in 1950²²⁰ and it opened in 1952 in Jinja, Uganda.²²¹ In 1997 the Madhvani Group transferred a 40 percent²²² minority stake of the company to South African Breweries (SAB). Then in 2001, the Madhvani Group divested the rest of its shares to SAB.²²³

South Africa Breweries began in 1895 in Johannesburg. In 2002 it acquired 100 percent of Miller Brewing Company, changing its name to SABMiller. Through this sale it became the largest brewer by volume in the world.²²⁴ During fiscal year 2011 SABMiller sold 15.3 million hectoliters of lager, 12.4 million hectoliters of soft drinks, and 5.1 million hectoliters of non-beer alcoholic beverages.²²⁵ Headquartered in London, it has 70,000 employees spread across six continents. Along with its 200 beer brands, it manufactures other beverages and bottles Coca-Cola. Its 2010 revenue totaled \$26.4 billion.²²⁶ From 2010 to 2011 SABMiller's revenue grew 7 percent.²²⁷

²²⁰ Madhvani Group of Companies, "Madhvani Group in Uganda: 75 Years of Quality Products," [2008 Brochure]; available from <http://www.madhvanifoundation.com/downloads/mgbrochure-08.pdf>; Internet; accessed 20 July 2011.

²²¹ Ethan Kapstein, René Kim, and Willem Ruster, *The Socio-Economic Impact of Nile Breweries in Uganda*. INSEAD and Triple Value Report, December 2008.

²²² SABMiller, [homepage online]; available from <http://sabmiller.com>; Internet; accessed 20 July 2011.

²²³ Madhvani Group of Companies, 2008.

²²⁴ SABMiller Homepage, n.d.

²²⁵ Ibid.

²²⁶ SABMiller, *Company Snapshot 2011*; available from http://www.sabmiller.com/files/companysnapshot/SABMiller_company_snapshot.pdf; Internet; accessed 20 July 2011.

²²⁷ SABMiller Homepage, n.d.

Africa provides just 7 percent of the volume of SABMiller's sales, but 12 percent of its revenue and 13 percent of its earnings before interest, taxes, and amortization.²²⁸ In 2011 its Africa sales totaled \$647 million. It has 31 subsidiary breweries on the continent and the average number of workers it employs per country is 13,481.²²⁹

SABMiller has just one brewery in Uganda, Nile Breweries, but two bottling plants, one for Nile and the other for Rwenzori bottled water²³⁰. From its various barley-growing areas in Uganda Nile Breweries buys approximately 6,000 metric tons of barley per year. Its malting plant requires 20,000 metric tons, so the brewery plans to continue to try to increase the domestic barley supply until it reaches that point.²³¹

In order to minimize their costs and assure long-term barley availability, Uganda and Nile Breweries buy their barley not from individual farmers, but from farming associations. Uganda Breweries sources its barley through KaCoFA, and Nile Breweries through MEVACA.

KaCoFA

The Kapchorwa Commercial Farmers Association (KaCoFA) began with just 27 members in 1999, as part of the Idea Project. As of August 2010, KaCoFA boasted more than 3000 members.²³² Since 2003, KaCoFA has supplied barley and sorghum to Uganda

²²⁸ Ibid.

²²⁹ SABMiller, 2011.

²³⁰ SABMiller Homepage, n.d.

²³¹ Nakaweesi, 2010.

²³² Kissa Presentation, 2010.

Breweries. Its barley production from 2003 to 2008 rose from 20 metric tons to 1500 metric tons.²³³

KaCoFA's leadership describes its vision as commercializing regional agriculture to provide sustainable income to local farmers.²³⁴ To do so, KaCoFA provides trainings to its members²³⁵ and has financing partnerships with Stanbic Bank and Cerudeb.²³⁶ It promotes barley, sorghum, rice and maize on Mount Elgon.²³⁷ Its farmers participate in contract farming with the World Food Programme, Uganda Breweries, Ltd, and East African Maltings.²³⁸

Some of the cash crop challenges that KaCoFA finds include local attitudes about agriculture and transaction costs. While KaCoFA promotes commercial farming, many farmers in the area are see farming only as a means of providing food to their families.²³⁹ In addition, poor infrastructure, especially roads, makes it difficult to transport produce. Poor transport and poor communication infrastructure render information dissemination difficult.²⁴⁰ Furthermore, because conditions on Mount Elgon are so wet, farmers often experience post-harvest losses due to rotting.²⁴¹ Because of all these difficulties, seed

²³³ Ibid.

²³⁴ Ibid.

²³⁵ Ibid.

²³⁶ Ibid.

²³⁷ United States Agency for International Development (USAID), "Agro-dealers in Northern Uganda Districts," *SPRING: Stability, Peace, and Reconciliation in Northern Uganda* Report, 2009; Kissa Presentation, 2010; Kissa Interviews, 2010.

²³⁸ Kissa Presentation, 2010; Kissa Interviews, 2010.

²³⁹ Ibid.

²⁴⁰ Ibid.

²⁴¹ Ibid.

supplier Afro Kai insists that "empirical evidence is crucial" to convincing farmers that contract farming is a good idea.²⁴²

MEVACA

In 2007, frustrated by changes, including delayed payments, that came with the introduction of East African Maltings' into East African Breweries' barley initiative, a group of KaCoFA farmers broke away to form the Mount Elgon Value Addition Crop Association (MEVACA).²⁴³ This association currently boasts 573 members and markets its barley to Nile Breweries.²⁴⁴ It provides inputs, including seeds, fertilizers, and pesticides on loan to farmers. As it buys back the produce, it also recovers its loans.²⁴⁵ In the future it plans to begin promoting Irish potatoes (for chips or French fries) as a cash crop to rotate with barley.²⁴⁶

Uganda Barley Prospects

Buying barley in Uganda has the potential to be less expensive for both Nile and Uganda Breweries than importing it from European sources.²⁴⁷ By September 2007, European and North American barley prices were almost three times their 2005 levels.²⁴⁸ From 2006 to 2008, the cost of malt imported from Europe rose by 87 percent, which Nile

²⁴² Balya, 2011.

²⁴³ USAID, 2009.

²⁴⁴ Ibid.

²⁴⁵ Ibid.

²⁴⁶ Ibid.

²⁴⁷ Kapchanga, 2009.

²⁴⁸ Ward, 2007.

Breweries experienced as a negative shock. This price spike was due to reduced production from drought and the fact that many European farmers had begun to produce bio-fuels rather than food crops.²⁴⁹ It also affected Uganda Breweries, which was forced to increase its prices in 2009 after a 5 percent drop in its profits. At the same time, Kenya increased its tax rates on non-malted beers and spirits, which had negative consequences for East African Breweries.²⁵⁰ In 2010, another barley shock occurred, due in part to reduced European and North American barley production and high demand for grain feeds for animals.²⁵¹

In 2008, at the same time as European barley prices experienced a period of volatility²⁵², the Ugandan government lowered excise taxes. As Uganda Breweries already marketed beer from local barley, Nile Breweries began examining its own capacity for local barley sourcing.²⁵³ In 2010 it began purchasing barley from Mount Elgon smallholders through MEVACA, traveling to farms to pick up produce and paying farmers on the spot. This rapid payment set it apart from Uganda Breweries. In fact, Afro Kai cites predictability as one of the main positive attributes of working with Nile Breweries. It says that working with Nile Breweries gives farmers an advance idea of their earning potential in a given season.²⁵⁴

²⁴⁹ Nile Breweries, 2008.

²⁵⁰ Joseph Were, "31% Drop in Profits Marks Bad Year for Uganda Breweries, Ltd." *The Independent* (Kampala, Uganda), 8 September 2009.

²⁵¹ Javier Blas and Jack Farchy, "Drought Doubles Price of Barley in Six Weeks," *Financial Times*, 8 August 2010; available from <http://www.ft.com/cms/s/0/443d72ee-a316-11df-8cf4-00144feabdc0.html#ixzz1SWBiiWbO>; Internet; accessed 18 July 2011.; Ward, 2007.

²⁵² Ward, 2007

²⁵³ SABMiller Homepage, n.d.

²⁵⁴ Balya, n.d.

Corporate Social Responsibility

Both Nile and Uganda Breweries have been using their local sourcing as a development strategy for smallholders in the region. East African Breweries conducts development projects through its charitable organization, the EABL Foundation. It concentrates on projects improving access to and quality of water, education, environmental conservation, and emergency relief.²⁵⁵ Nile Breweries conducts development projects through its Corporate Social Responsibility office.²⁵⁶

Through their charitable arms, both SABMiller and East African Breweries have campaigns to discourage reckless drinking. East African Breweries has relationships with music stars and other celebrities who advocate responsible drinking. SABMiller uses

²⁵⁵ East African Breweries Foundation Homepage, n.d.

²⁵⁶ One consequence of Nile Breweries' focus on social responsibility is a long supply chain. Were NB's focus on quick profits, it would buy its barley and *epuripur*, a variety of white sorghum, directly from farmers, using its own trucks to move the product from farms to the NB plant for processing into beer. Instead, Nile Breweries pursues long-term profits, only buying barley through farmers' associations, not from individual farmers (Mbogo, 2010), which encourages farmers to pool resources and knowledge. Nile Breweries claims that these benefits spill over into the general community, rather than staying only with the farmers who sell sorghum to Nile Breweries (Mbogo, 2010; Kalule, 2010). Thus, it focuses on crops that grow well in the region in which it operates, according to George Mbogo. This focus privileges local farmers and helps keep costs for the brewery low (Mbogo, 2010).

In sourcing its inputs locally, one of Nile Breweries' stated goals is to improve quality as much as possible at the lowest cost. Nile Breweries aims to be one of the top twenty breweries in the world (Musisi, 2010). Decreasing costs will help it do so by insulating them from uncontrollable and possibly unforeseeable shocks like sudden increases in fuel prices (Musisi, 2010). Its other stated objective is corporate social responsibility. It conducts development projects in order to forge strong relations with communities, whose members are potential beer consumers (Okiror, 2010). According to its parent company, SABMiller: "Beer is a local product: brewed, sold and consumed locally. So for us, a healthy, growing economic environment in the communities where we operate is the key to achieving business success. It is therefore in our interests to invest capital in local economies, to use small enterprises to supply and distribute our products, and to create jobs for local people and develop their skills" (SABMiller, 2009).

advertising materials that double as public service announcements.²⁵⁷ Additionally, Nile Breweries launched its Eagle brand as a development initiative.²⁵⁸

Before Nile Breweries started purchasing barley it began another local development scheme called the Eagle Lager Project²⁵⁹, similar to Uganda Breweries' Senator Lager initiative. Nile Breweries' Eagle Lager is an affordable beer²⁶⁰ made from epuripur, a variety of sorghum that National Agricultural Research Organization (NARO) introduced to Uganda in 1994.²⁶¹ Epuripur is resistant to drought and disease and, like barley, can be grown in marginal areas.²⁶² Although epuripur is not a popular food variety of sorghum, it is ideal for brewing beer. Nile Breweries created its Eagle brand as a market alternative to traditional homemade brews.²⁶³

²⁵⁷ East African Breweries, n.d.; SABMiller, n.d.; East African Breweries, 2010.

²⁵⁸ Musisi, 2010.

²⁵⁹ Nile Breweries was the first brewery in the SABMiller family to produce beer using industrial sorghum, though Nigerian brewers did so before NBL (Musisi, 2010; Koleoso and Olatunji, 1988). This project's aim was to use a locally abundant, non-traditional brewing crop to manufacture beer for domestic consumption. In doing so, it was to provide a market for a readily cultivated agricultural product²⁵⁹. Therefore, the technology to produce it existed even before NBL began using it to produce beer (Musisi, 2010). Furthermore, it was a surer source of raw materials than imported barley.

²⁶⁰ Balya, n.d.

²⁶¹ Ibid.

²⁶² Musisi, 2010; Inspiris, 2006.

²⁶³ Nile Breweries, n.d.; Inspiris, 2006; The more Eagle Lager is produced, the more people buy it and the more epuripur NBL requires and buys, putting money into local producers' pockets (Musisi, 2010). There will likely be a point at which benefits to local communities from selling epuripur will plateau, but Moses Musisi, NBL's brew master, believes that point is at least 10 years away, because NBL's capacity to produce Eagle remains lower than the demand for it. In fact, in August 2010 Nile Breweries faced a shortage of epuripur, so it used red sorghum in its place (Musisi, 2010). Red sorghum is tarter and less sweet than epuripur, which has a white color (Musisi, 2010).

Competition Between Nile and Uganda Breweries

Diageo and SABMiller have been embroiled in a financial battle of wills in East Africa since 2009. In 2002 they swapped shares of their subsidiaries to foster an atmosphere of friendly competition. In exchange for 20 percent of Kenya Breweries, East African Breweries acquired shares of Tanzania Breweries from SABMiller. This deal allowed the two transnationals to market and profit from each other's products. However, the deal turned sour in 2009 over a dispute about Tanzanian company Serengeti Breweries.²⁶⁴

This competition between Nile and Uganda Breweries has the potential to provide smallholder barley farmers in Uganda with ample demand for their produce, which may result in increased income and access to credit, which in turn may improve their standards of living. Moreover, while at present Ugandan barley is grown mostly for domestic purposes, if and when the breweries reach their required amount of barley, they may consider exporting barley.²⁶⁵

²⁶⁴ Mark Wembridge and Louise Lucas, "Diageo in \$225 Million Kenya Deal with SAB," *Financial Times*, 6 June 2011.

²⁶⁵ Nakaweesi, 2010.

CHAPTER 5

DATA COLLECTION, EMPIRICAL METHODS AND RESULTS

This section provides empirical evidence of the relationship between selling barley to the two major Ugandan breweries and farmers' social and economic outcomes, including incomes, access to credit, alcohol consumption, and experience with environmental degradation. A rigorous econometric analysis of a development program is useful because it offers broad evidence about how effective the program is. Rather than simply reporting the levels of indicators of well-being that respondents in different situations experience, it uses statistical tools to establish a relationship between some explanatory variables and those indicators. Establishing a relationship between a program and indicators of well-being can give clues to whether that program was the cause of any observed changes or if factors outside the program led to them. Furthermore, a supporting qualitative account of participants' experiences may expose the mechanisms through which the program works. It can show why the program succeeded or failed for specific participants²⁶⁶ and whether the results can be replicated in other contexts.²⁶⁷

In the case of the barley farmers on Mount Elgon, qualitative and quantitative evidence about the breweries' effects is useful because without it, the breweries' claims are the only way to measure the initiatives' success or failure. Whereas the breweries might claim that selling barley is a lucrative and positive experience for farmers, it might actually be an activity of last resort. It also might have unintended consequences that the breweries

²⁶⁶ Qualitative evidence can support the internal validity of the cause-effect relationship between a program and the indicators of success.

²⁶⁷ It can also provide evidence about the program's external validity.

could be reluctant to report. The ideal analysis would give clear answers to whether or not the breweries are affecting farmers in the ways they have claimed they would. Such an analysis would rely on a large sample of farmers²⁶⁸, representative of the population of Mount Elgon, selected randomly either to sell barley to Uganda Breweries, sell it to Nile Breweries, or not to sell barley at all. Perfectly random assignment would ensure that each group could easily be compared to the others and that the only differences among them would be due entirely to whether or not they sold barley and to whom they sold it.

Furthermore, every respondent would represent his or her household accurately when being interviewed. They would not only know the answers to all of the survey questions, they would be willing to respond to all of them. There would be no outside influences on respondents' well-being, besides selling barley and to confirm this fact, there would be multiple cross sections of data. Analyzing the data over time would show the long-term effects on farmers of being assigned to sell barley.

Unfortunately, the actual data available is not ideal. It is constrained by resources, time, farmers' choices, the ignorance of the investigator, and likely many other unknown factors.

Household Barley Survey

When I began this investigation in June 2010, I was hoping to conduct face-to-face interviews with farmers selling sorghum in many areas in Uganda and barley on several of Uganda's highlands; I was not focused solely on Mount Elgon. Only after having begun the survey on Mount Elgon, as my time and cash constraints became increasingly apparent, did

²⁶⁸ Seymour Sudman, *Applied Sampling*, ed. by Peter H. Ross, New York: Academic Press, 1976.

I decide to limit the survey to that area. I believed, wrongly, that Nile Breweries was the only buyer of barley in the region, as it was the first to introduce barley to many other highland areas of the country.

In order to find the effects of selling barley to Nile Breweries, I composed a survey with a target population of regionally representative smallholders on Mount Elgon in mind. It included both closed and open-ended questions²⁶⁹ about individual and household characteristics, the area's agricultural atmosphere, and the effects of selling barley. At first there were many open-ended questions because I hoped to administer the same survey in several areas with which I was not intimately familiar. The frame²⁷⁰ I had in mind was a door-to-door or farm-to-farm survey. However, the farms were so spread out and the topography so prohibitive to transport that such a survey would be impossible by myself. Instead, I decided to ask the MEVACA, the farming association through which farmers sold barley to Nile Breweries, to identify barley sellers and non-sellers who lived in the area where they operate. But before I could conduct the survey, I needed to finish composing it.

At first, the questionnaire began with individual characteristics, then it moved to household characteristics and then agricultural habits. In July, I had administered it to several farmers, including a focus group of four farmers, who found the questionnaire time-consuming, poorly worded, and tedious. It was during this series of interviews that I decided to omit all questions about durable goods from the household portion of the questionnaire. The responses varied wildly among the farmers about the assets they had at

²⁶⁹ Arlene Fink, *How to Ask Survey Questions*, 2nd ed. (Thousand Oaks, CA: Sage Publications, 2003): standardized format and unstandardized format

²⁷⁰ Paul P. Biemer and Lars E. Lyberg, *Introduction to Survey Quality*, eds. Robert M. Groves, Graham Kalton, J.N.K. Rao, Norbert Schwarz, Christopher Skinner (Hoboken, NJ: Wiley-Interscience, 2003).

home. Some had televisions and tap water in their houses; others had no electricity and had to travel to collect water. Instead, I chose to ask, simply, whether there was access to water and electricity in each household. For other clues to what durable goods households of different welfare levels had, I asked open-ended questions about what characteristics were associated with poverty and which with wealth. Still, the survey seemed awkward and incomplete.

Therefore, I turned to MEVACA for help with the survey. Caroline Yesho and David Labu, two MEVACA employees, helped me edit the survey to make it more likely that farmers would finish it. As I explained what I wanted to know, they helped me use terms that were familiar in the region and that I could understand.²⁷¹ For example, they advised me to use the term "hire" rather than "rent" to refer to the temporary exchange of land for cash (or, potentially, a commodity). They also provided the agricultural terms that were appropriate for the context, suggested closing some of the unnecessarily open-ended questions, and helped me decide the question order. Together, we decided to start with questions about the general agricultural environment on Mount Elgon, then ask about individual characteristics, then household characteristics, then household-specific agricultural habits and finally drinking habits. The final survey includes 79 questions, many of which have secondary questions. I tested the new survey on one farmer and the interview was very smooth and short (only 30 minutes!) relative to my laborious attempts with the previous incarnations of the survey. Time constraints prohibited a more thorough pilot.

²⁷¹ Priscilla Glasgow, *Fundamentals of Survey Research Methodology* (McLean, Virginia: MITRE, April 2005).

Knowing that at the beginning of August many farmers had just finished harvesting and selling their barley, I wanted to begin to organize the survey. In order to obtain as many responses as possible, I hired all six of the MEVACA field officers to administer the survey to a total of 60 farmers. Each field officer was in charge of a MEVACA-designated zone on Mount Elgon. I trained each one individually, explaining what I was trying to find out by asking each question. This way, when they needed to translate questions orally into Kupsabiny for respondents who did not speak English, they could retain as much meaning as possible.

After discovering that I lacked the resources to administer the survey in multiple other highland regions, I returned to Mount Elgon. Upon collecting the surveys and discussing the interviewers' experiences with them, I realized that Nile Breweries was not the only brewery purchasing barley from Mount Elgon and certainly not the first. Uganda Breweries had been purchasing barley from Mount Elgon farmers through KaCoFA even before Nile Breweries.

With this knowledge I approached KaCoFA so that I could conduct surveys with their suppliers. I used the same survey as MEVACA used, but I repeated questions about Nile Breweries using Uganda Breweries instead. Ten of the twenty-five field officers agreed to interview a total of 100 farmers and I trained them as a group. As with MEVACA employees, KaCoFA field officers were each in charge of a particular zone on Mount Elgon. At the same time, I requested 40 more surveys from MEVACA, this time with questions about both breweries, so that I would have 100 from each association.

Of the 200 surveys I requested, the MEVACA and KaCoFA interviewers completed 173 over a period of just two weeks. And of those 173 surveys, 167 were complete, although 4 surveys were duplicates for the same two households. Thus, the response rate was 96.5 percent including all returned questionnaires and 95.4 percent including only the useful questionnaires. As the duplicated questionnaires were indeed exact replicas of the others in the household, I simply dropped one observation from each of the two households--both from male respondents, as female respondents are underrepresented in the sample.

Sample Size

Despite the fact that the sample size was determined without taking the population size into account, it is possible to define the target population and frame²⁷², as well as a precision level. In order to assess the sample size, it is first necessary to determine the size of the total population. As Uganda's last census was in 2002 and the 2012 census was postponed until late 2013²⁷³, finding the population of Kapchorwa, Bukwa, and Kween Districts necessitates some calculations.

According to Uganda's 2005/2006 household survey²⁷⁴, the population of Kapchorwa District (before it was broken into Kapchorwa, Bukwa, and Kween Districts) was 190,391 in 2005. Using the World Development Indicators'²⁷⁵ estimates of Uganda's

²⁷² Biemer and Lyberg, 2003.

²⁷³ Uganda Bureau of Statistics, "The 2012 Uganda Population and Housing Census," [homepage online]; available from <http://www.ubos.org/UgCensus2012/>; Internet; accessed 15 March 2013.

²⁷⁴ Uganda Bureau of Statistics, 2003.

²⁷⁵ World Development Indicators, multiple years.

population growth rates over that period and assuming they are valid for the three Ugandan districts on Mount Elgon gives an estimated combined population of 223,580 in Kapchorwa, Bukwa, and Kween Districts in 2010. In 2002 the average household on Mount Elgon was composed of 4.8 persons.²⁷⁶ If that number has remained the same, then the population of Mount Elgon included an estimated 46,579 households in August 2010. Therefore, the possible level of precision given the sample size and target population is can be determined using Yamane's method²⁷⁷:

$$(Eq. 1) \text{ sample size} = \text{total population} / (1 + \text{total population} * \text{square of precision level})$$

Given that the sample size is fixed at 167 respondents, each of whom represents his or her household, only the precision level can be varied. With a sample of 167 out of 46,579 total households, it is possible to report results at a maximum 7 percent precision level. It is important to note, however, that the sample is composed of two clusters identified through two farming associations.

Potential Sources of Bias

This survey administration was far from perfect; it introduced many potential sources of bias in addition to the ones that already existed. Even before the survey was administered the population of barley sellers self-selected to grow barley or not and most self-selected into joining farming associations, through which they accessed the barley seed. Those for whom access to the farming associations for seed was difficult or

²⁷⁶ Uganda Bureau of Statistics, 2003.

²⁷⁷ Taro Yamane, *Statistics: An Introductory Analysis*, 2nd ed. (New York: Harper and Row, 1967).

impossible because of transport and other constraints were likely left out of selling barley. They were also likely left out of this survey.

Most of the biases are due to the survey design. Because of resource constraints, the sample is small and includes only one cross section. Its size is based on the number of surveys I could afford to print and its composition likely due to the interviewers' convenience.

While the fact that the interviewers were familiar to many of the respondents probably made them comfortable²⁷⁸, it might also point to interviewer bias.²⁷⁹ The interviewers chose whom to ask the survey questions and might have selected interviewees who were easy to reach or avoided farmers whom they might not like. Moreover, although the training was meant to standardize the interviewers²⁸⁰, it is possible that they posed the questions in different manners once alone with the respondents. Furthermore, some of the questions seeking specific answers, i.e. income and expenditures, asked for monthly or annual values rather than for the last month or the last year. These non-concrete questions might have affected the accuracy (or at least the precision) of the responses.²⁸¹

The interviewers reported to me that some of the people they approached did not want to participate in the survey because it seemed like a waste of their time. Others began the survey, then decided not to answer some questions. This fact may be due to

²⁷⁸ Biemer and Lyberg, 2003.

²⁷⁹ Sudman, 1976.

²⁸⁰ Fink, 2003.

²⁸¹ Ibid.

respondents' indifference or to the fact that some household members might not know the answers to certain questions. It may also be due to the double translation of the survey questions. Interviewers read the questions aloud in Kupsabiny, even though they were written in English, then farmers gave their responses in Kupsabiny, which the interviewers transcribed in English. The more translating an interviewer did, in general, the longer the interview lasted, so some lasted 30 minutes and others multiple hours. The nonresponse error manifested itself in both unit nonresponse, 6 farmers answered no more than the first of ten pages, and item nonresponse.²⁸² Many of the respondents omitted items for undisclosed reasons.

Other sources of bias may exist completely outside the survey design. The prices of other agricultural commodities, the amount of rain, and telecommunications interruptions, among other factors, could have influenced the results my team and I observed. If the survey included more than one cross section, it might be possible to separate the effects of the respondents' selling decisions from generalized trends that the total population would experience simultaneously such as an increase in fuel costs or a drought.

²⁸² Biemer and Lyberg, 2003.

Limits to Internal and External Validity

Even before beginning to sell barley, the farmers who cultivate and sell barley may have been privileged compared to those who do not. Although this investigation takes into account many sources of privilege, including livestock and household water access, the source of that pre-existing privilege may still be obscured. And members of the Mount Elgon communities who are hard to reach might be ignored. Moreover, as Uganda Breweries has been buying barley from farmers on Mount Elgon since 2003, selling barley to Uganda Breweries might be both the cause and effect of improvements in indicators of well-being in some farmers.

Moreover, using the farming associations to identify farmers likely limits the validity of the findings to farmers who have the means, both cash and transport, to participate in farming associations. Although the interviewers traveled to seek out farmers, they only traveled to an area if they knew there were barley sellers present in it. Therefore, they might have missed farmers who lived far from barley sellers. Thus, the frame may not be adequate to reach the target population.²⁸³

Outside Mount Elgon, the results of this investigation can give clues to how similar programs can work only if the areas in which they are implemented have similar climatic and geographic attributes. Even within Uganda, Mount Elgon's growing conditions are unique. The best comparisons would likely be other highland regions of the country. The long-term physical and asset insecurity that Mount Elgon inhabitants have faced might also affect their experience's replicability.

²⁸³ Ibid.

Indicators of Well-being

This investigation's indicators of Mount Elgon household well-being include **household income**, which the breweries claim they will affect and which may provide households with increased access to food, education, and medical care, but which is difficult to recall as rural households may have a variety of income sources; **household expenditures**²⁸⁴, which may be easier for households to recall than income, and which are considered more stable over time than income²⁸⁵; **individual access to credit**, which the breweries claim to affect and which is necessary to value chain development; whether the household has **experience with environmental degradation**, which may be an unintended consequence of cultivating barley; **household use of inorganic fertilizer**, which may be evidence of improved farming methods, but may affect soil fertility negatively in the long term; **household use of organic fertilizer**, which may be superior to inorganic fertilizer for maintaining long-term soil fertility; and **individual alcohol consumption**, which may be another consequence (intended or unintended) of selling barley to breweries.

For the population parameters²⁸⁶, I rely on the World Development Indicators and Ugandan government documents, some of which reflect values that were five years old at the time of the survey. Few values are specific to Kapchorwa, Bukwa, and Kween Districts.

²⁸⁴ Angus Deaton claims that per capita expenditures understate the welfare of large households compared to small ones because there are so many shared goods across families. He claims that raising household welfare by purchasing a shared good is less costly per person in large households than in small ones.

²⁸⁵ Angus Deaton and Salman Zaidi, "Guidelines for Constructing Consumption Aggregates for Welfare Analysis," Policy Research Working Paper 4815 (Washington, DC: World Bank, 1999); Furthermore, Angus Deaton and others claim that during a single cross section all income is consumed, meaning income and expenditures are equal.

²⁸⁶ Biemer and Lyberg, 2003.

The estimators come from the information provided by households. Therefore, some of the bias observed in the estimators may be due to the difference in the size and composition of this sample's frames and large organizations' frames.

As Table 1 shows, farmers who do not grow barley report average monthly per capita incomes equal to only 40 percent of the full sample average. At the same time the number of observations is small. Nile Breweries barley sellers' median incomes (\$7.65) are greater than the full sample median (\$7.35), while Uganda Breweries sellers' incomes are slightly below the total sample median (\$6.12). Non-sellers' median monthly per capita expenditures (\$2.62) are less than half those of the full sample (\$5.17). While Uganda Breweries' sellers' median expenditures (\$4.31) are below those of the full sample, Nile Breweries' sellers' median expenditures (\$5.36) are above those of the full sample. Farmers who sell barley to both breweries have median incomes (\$6.12) and expenditures (\$3.75) that are lower than the full sample median.

Table 1: Per Capita Monthly Household Income

	Non-sellers	Barley Sellers				Total Sample	Uganda
		NBL	UBL	Both Breweries	All		
Mean	\$7.57	\$12.18	\$10.67	\$7.40	\$12.76	\$12.20	
Minimum	\$1.31	\$0.06	\$0.71	\$0.77	\$0.06	\$0.06	
Median	\$4.00	\$7.65	\$6.12	\$6.12	\$7.65	\$7.35	\$12.49
Maximum	\$26.79	\$82.66	\$91.85	\$36.36	\$91.85	\$91.85	
Standard Deviation	\$7.15	\$14.66	\$14.63	\$6.80	\$16.10	\$15.48	

US\$1 = 2177.56 UGX (Source: WDI, multiple years)

Table 2: Per Capita Monthly Household Expenditures

	Non-sellers	Barley Sellers				Total Sample	Rural Eastern Uganda	Rural Uganda	Uganda
		UBL	NBL	Both Breweries	All Sellers				
Mean	\$4.68	\$9.81	\$13.05	\$4.68	\$11.97	\$11.24	\$9.61	\$14.96	\$18.29
Minimum	\$0.11	\$0.66	\$7.65	\$0.77	\$0.66	\$0.11			
Median	\$2.62	\$4.31	\$5.36	\$3.75	\$5.43	\$5.17			
Maximum	\$29.00	\$255.13	\$255.13	\$18.37	\$255.13	\$255.13			
Standard Deviation	\$75.06	\$28.32	\$30.40	\$3.21	\$26.45	\$25.22			

The percentage of non-sellers who report having access to credit (47 percent) is lower than that of the full sample (66 percent, Table 3). Slightly fewer Uganda Breweries sellers (61 percent) report having access than the full sample, and the proportion of Nile Breweries sellers reporting access (66 percent) is very close to the same as that of the full sample. Farmers who sell barley to both breweries (46 percent) report having access to credit at almost the same rate as respondents who do not sell barley at all.

Table 3: Individual Access to Credit

Access to Credit	Non-sellers	Barley Sellers			All Sellers	Total Sample
		UBL	NBL	Both Breweries		
Has Access	7	56	73	23	106	114
%	47%	61%	66%	46%	70%	66%
No Access	6	34	35	26	43	52
%	40%	37%	32%	52%	28%	30%
No Response	2	2	2	1	3	7
%	13%	2%	2%	2%	2%	4%
Total	15	92	110	50	152	173
%	100%	100%	100%	100%	100%	100%

As Table 4 shows, 80 percent of all households surveyed report having experienced environmental degradation of some sort. Barley suppliers report a similar rate (82 percent) of experience with environmental degradation. While 90 percent of Nile Breweries suppliers report experiencing environmental degradation, 76 percent of Uganda Breweries sellers do. Eighty-eight percent of farmers who sell barley to both breweries report experiencing environmental degradation on their farms. The group with the smallest percentage of farmers reporting experience with environmental degradation (73 percent) are non-sellers.

Table 4: Household Experience with Environmental Degradation

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
Have Experienced	11	70	99	44	125	139
%	73%	76%	90%	88%	82%	80%
Have Not Experienced	1	18	8	3	23	25
%	7%	20%	7%	6%	15%	15%
No Response	3	4	3	3	4	9
%	20%	4%	3%	6%	3%	5%

Tables 5 and 6 demonstrate reported use of inorganic and organic fertilizer. More than 60 percent of respondents reported using inorganic fertilizer. While Nile Breweries' suppliers and barley non-sellers reported using inorganic fertilizer at similar rates, 64 percent and 67 percent, respectively, almost 72 percent of Uganda Breweries' suppliers reported using inorganic fertilizer. Among farmers who sell barley to both breweries 78 percent use inorganic fertilizer.

In general, reported household use of organic fertilizer is lower than inorganic fertilizer. Households that do not sell barley reported the greatest uptake of organic fertilizer (67 percent), reporting using it at the same rate as inorganic fertilizer. Otherwise, 61 percent of the total sample used it and only 55 percent of Nile Breweries' suppliers reported using organic fertilizer and 62 percent of Uganda Breweries sellers report using it. Just 44 percent of farmers who sell barley to both breweries reported using organic fertilizer.

Table 5: Household Use of Inorganic Fertilizer

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
Use Inorganic Fertilizer	10	66	70	39	97	108
%	67%	72%	64%	78%	64%	62%
Do Not Use Inorganic Fertilizer	3	9	19	5	23	27
%	20%	10%	17%	10%	15%	16%
No Response	2	17	21	6	32	38
%	13%	19%	19%	12%	21%	22%

Table 6: Household Use of Organic Fertilizer

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
Use Organic Fertilizer	10	57	60	22	95	106
%	67%	62%	55%	44%	63%	61%
Do Not Use Organic Fertilizer	2	9	15	6	18	20
%	13%	10%	14%	12%	12%	12%
No Response	3	26	35	22	39	47
%	20%	28%	32%	44%	26%	27%

Greater percentages of Uganda Breweries (59 percent) and Nile Breweries sellers (54 percent) report consuming alcohol than of full sample (51 percent) and non-sellers (33 percent). A greater percentage of farmers who sell barley to both breweries (60 percent) report consuming alcohol than any other group. While it may seem that selling barley to breweries increases alcohol consumption, it may be that the drinkers are the ones most likely to sell barley to the breweries.

Table 7: Individual Alcohol Consumption

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
Consume Alcohol	5	54	59	30	83	89
%	33%	59%	54%	60%	55%	51%
Do Not Consume Alcohol	10	34	46	16	64	78
%	67%	37%	42%	32%	42%	45%
No Response	0	4	5	4	5	6
%	0%	4%	5%	8%	3%	4%

Methodology

The data presented in this analysis are from and about respondents who chose whether or not to grow barley. As there was nothing random about who grew barley, this investigation will rely on quasi-experimental methods to explore the effects of selling barley to each brewery on farmers' lives.

Comparison Groups

Barley sellers have greater incomes, expenditures, and access to credit than non-sellers. Within the group of farmers selling barley, Nile Breweries sellers have greater incomes, expenditures, and access to credit than Uganda Breweries sellers do, while farmers who sell barley to both breweries have lower incomes and expenditures than

farmers who sell to only one or the other. While these figures suggest that Nile Breweries is affecting these indicators more positively than Uganda Breweries is doing, they do not take into account the various reasons besides selling barley that they might differ. In order to compare similar sellers and non-sellers it is necessary to explore the inherent differences between them.

The empirical portion of this paper uses five comparisons of farmers in different selling situations. In each case, the goal of the comparisons is to provide as close an approximation as possible of how farmers would have fared had they taken a different course of action. In other words, each comparison group provides a counterfactual for the others.

First, this analysis compares barley sellers to non-sellers to expose effects on indicators that are due to the fact of selling barley. But, as the number of farmers who do not sell barley is only around 10 percent of the sample, the results will likely only give qualitative clues for further research. Furthermore, differences in indicators of well-being may be due to selling barley to one brewery or the other or those effects may be more pronounced from one brewery or the other.

Therefore, the second comparison is between farmers who sell barley to Nile Breweries and all those who do not. Because not all farmers who responded about Nile Breweries were asked about Uganda Breweries, some of the farmers who are categorized as not selling barley at all, may actually sell barley to Uganda Breweries. Even if this is not the case, farmers who sell barley to Uganda Breweries or not at all may approximate what

Nile Breweries sellers might have experienced had they not chosen to sell barley to Nile Breweries.

Then, the empirical section restricts the sample to only those who were asked and who responded to questions about both Nile Breweries and Uganda Breweries. Within that smaller sample, it compares farmers who sell barley to Uganda Breweries to all those who do not. As Uganda Breweries has been purchasing barley from Mount Elgon farmers since 2003, there is probably something inherently different about them from non-sellers and Nile Breweries sellers, who could only have started selling barley in 2009. Until one year prior to this investigation all the farmers who sell barley only to Nile Breweries would have been categorized as non-sellers. Therefore, finding farmers who best approximate Uganda Breweries sellers had they not sold barley to Uganda Breweries will likely be easiest if all non-Uganda Breweries sellers are included in the comparison group.

Next, within this restricted sample, the empirical section compares farmers who sell barley only to Uganda Breweries and those who sell barley only to Nile Breweries. It is important to note that despite the exclusive selling relationship each farmer is supposed to have with one brewery or the other, 50 farmers in the sample sell barley to both breweries, so those observations must be dropped for this comparison, which may demonstrate how each brewery affects indicators of well-being relative to the other.

Finally, the empirical section compares farmers who sell barley to both breweries to farmers who sell barley to just one brewery. Although the barley farmers ostensibly signed contracts limiting their barley relationships to just one brewery, many have chosen to sell barley to both breweries. Given the potential legal consequences of violating their contract

and the possibility of losing a source of income if the breweries find out about double selling, it is likely that there is a compelling reason for double selling barley to both breweries. This comparison serves to expose which advantages or disadvantages selling barley to both breweries may have over selling barley to just one brewery.

Explanatory Variables

The explanatory variables (those which explain differences in indicators) in this investigation are whether and to which h brewery/ies farmers sell barley. Of the 165 farmers who described their selling decisions, 152 reported selling barley, 110 reported selling barley to Nile Breweries, 92 reported selling barley to Uganda Breweries, 50 to both, and just 15 reported not selling barley at all.

Empirical Methodology

To determine the effects of selling barley to each of the breweries on farmers statistically, it is necessary to find first what differences exist between farmers who sell barley to Uganda Breweries and Nile Breweries and between barley sellers and non-sellers. Doing so will help separate the effects of selling barley from those of activities that have nothing to do with barley production, but may occur at the same time. Also, comparing similar sellers and non-sellers will mitigate the potential sources of bias. If participation in barley were assigned randomly, then differences between the groups would be due simply to the barley growing decision. However, growing barley is not decided randomly. Breweries do not give out seed indiscriminately. Instead, they work with farming associations whose members have joined voluntarily and who self-select to grow barley.

If one assumes that more farmers would like to be part of associations (and grow barley) than currently are, then the only difference between barley growers and non-growers is their material ability to do so. Nile Breweries is not yet able to purchase enough barley to fulfill its customer demand for beer.²⁸⁷ Plus, many farmers contracted by Uganda Breweries sell their barley to Nile Breweries. Therefore, the breweries are buying less barley than they desire in Kapchorwa, Bukwa, and Kween.

If, on the other hand, religious concerns are preventing some farmers from growing barley or selling it to either brewery, then growers and non-growers differ in more than simply their *ability* to grow barley. They also differ in their *willingness* to grow it. It is necessary, therefore, to examine as many determinants of selling barley as possible to separate its effects from others.

It is possible to observe certain characteristics of individuals who have chosen to grow barley as well as those of individuals who have chosen not to grow barley.²⁸⁸ It is not, however, possible to observe those same individuals *at the same time* in an alternate reality in which they both have and have not taken the decision to grow barley.²⁸⁹ In other words, it is not possible to observe the same people having taken two mutually exclusive actions simultaneously. If it were, it would be possible to compare directly an individual's income or access to credit with and without the barley growing decision.²⁹⁰ The difference

²⁸⁷ Moses Musisi, Interview with author, 8 July 2010.

²⁸⁸ The decision to grow barley can be represented by the term D_i . $D_i = 1$ if individual i grows barley and 0 if he or she does not.

²⁸⁹ $D_i = 1$ and $D_i = 0$ cannot coexist for the same individual i .

between the two cases would be attributable only to selling barley and it would be possible to measure precisely the effects of selling barley.

As it is impossible to compare the same individuals at the same time having taken different decisions, investigators can rely on several other methods, including: 1) reflexive comparison: comparing the same individuals before and after selling barley²⁹¹, 2) first difference: comparing different individuals at the same time (those who have sold barley to those who have not)²⁹², or 3) difference-in-difference: comparing different individuals at two or more time periods.²⁹³ As the data available only include one time period, the first and third options are not available to this investigation because the farmers' responses come from only one time period. Moreover, as the decision to grow barley is not random, they must be altered in order to account for the decision to grow barley.²⁹⁴

In this analysis, we use a quasi-experimental method: propensity score matching. Constructing a propensity score, which represents an individual's likelihood to grow and

²⁹⁰ Each outcome is represented by Y_i and can, therefore, be represented as $Y_i(D_i)$. Thus, the effect of growing barley, T_i , is the difference between the two possible outcomes for the same individual i : $T_i = Y_i(1) - Y_i(0)$. This can also be expressed through the equation for the average treatment effect on the treated (ATT), which takes the difference between the expected values for outcomes of growing barley and not growing for the same individual i : $ATT = E(T_i|D_i = 1) = E[Y_i(1)|D_i = 1] - E[Y_i(0)|D_i = 1]$.

²⁹¹ $Y_i = \beta_0 + \beta_1 t_i + \mu_i$, where t_i represents time in years, β_0 is a constant, β_1 is the effect of time on outcome Y_i and μ_i is the error term. This equation relies on the assumption that the initial time for individual i is represented by $t_i = 0$ and time after the growing decision is measured is $t_i = 1$. β_1 gives the difference in a given outcome for individual i between given time periods.

²⁹² $Y_i = \beta_0 + \beta_1 D_i + \mu_i$, β_1 gives the difference in a given outcome based on whether or not individual i has grown barley.

²⁹³ $Y_i = \beta_0 + \beta_1 D_i + \beta_2 t_i + \beta_3 D_i \times t_i + \mu_i$, where β_1 gives initial difference between outcomes based on the fact of growing barley, β_2 gives effects of time experienced by both growers and non-growers, and β_3 gives the effect of growing barley on the outcome over time.

²⁹⁴ $E[Y(0)|D = 1] \neq E[Y(0)|D = 0]$. Non-experimental methods find the average treatment effect (ATE). $ATE = E[Y(1) - Y(0)]$. Finding $Y(1)$ and $Y(0)$ requires constructing *both* $E[Y(1)|D = 0]$ and $E[Y(0)|D = 1]$.

sell barley²⁹⁵, is determined by predicting an individual's likelihood of selling barley based on a set of their characteristics. Propensity scores are constructed so that the non-growers matched with growers represent the growers had they not grown barley. At the same time, growers represent their matched non-growers had they decided to grow barley. Matching growers to non-growers based on their propensity scores allows us to compare growers to the non-growers most like them. In this way, propensity score matching helps us counter the self-selection bias in this sample. Barley sellers are matched to non-sellers who, based on their propensity scores, could just as easily have taken the same growing decision. Similarly, Nile Breweries sellers and Uganda Breweries sellers are each compared to other farmers who could differ little except for taking their respective growing decisions. Taking the difference in income or other indicator of impact between growers and the non-growers most like them approximates the effect of participation on that indicator. Thus, the difference in income between a grower and the matched non-grower is considered entirely due to growing barley if the matching is done perfectly.

To construct a propensity score for selling barley, it is necessary to predict the likelihood that an individual will sell barley. As selling barley or not is an either/or choice, this propensity score can be expressed as a probability, using a probit function.²⁹⁶ Once this propensity score has been constructed, respondents from one group can be matched to respondents most like them in the comparison group. For example, someone who sells barley to Uganda Breweries can be matched to someone very much like himself or herself

²⁹⁵ Investigators use propensity scores to minimize selection bias (Caliendo and Koepf).

²⁹⁶ This probit function takes the form $p(X) = \Pr(\text{sellbrew}) = \Phi(\beta_0 + \beta_1 x_1 + \dots + \beta_n x_n)$.

who does not sell barley to Uganda Breweries. The visual representation of the propensity score matching is the region or area of common support. This area is a scatterplot of observations, for which the x-axis represents the propensity score, between 0 and 1 and the y-axis represents the density of observations.

This paper will use three methods of propensity score matching: 1) nearest neighbor matching with replacement; 2) nearest five neighbors matching with replacement; and 3) kernel matching. The nearest neighbor method matches respondents from one group to the nearest respondent in the other group. The nearest five neighbors method matches a respondent from one group to up to five respondents in the comparison group. As it is possible for the nearest neighbor or five to be very far from the respondent of interest, this paper imposes a radius limit on the nearest neighbor and nearest five neighbor estimates.²⁹⁷ A third matching method, the kernel method, matches a respondent to all of the respondents in the other group within a specified bandwidth, weighting the closer comparison respondents as greater matches than the farther ones.

Because an observation from one group can be a nearest neighbor or one of the nearest five neighbors for more than one other observation, we allow them to be matched multiple times (replaced). That way, it is not necessary to settle for a more distant match. Matching with replacement assures that the order in which observations are matched does not affect the strength of the estimation.

²⁹⁷ The caliper width is 0.01

Individual and Household Characteristics

Propensity scores, in this case, should be constructed using variables that would facilitate barley cultivation, such as education levels, belonging to a farming association, land size (assuming none has been purchased since beginning to sell barley), and others.²⁹⁸ These variables *must not* be affected by the selling decision.

In addition to the explanatory variables, there are likely other factors that affect the levels of the indicators of well-being. Furthermore, they are likely to affect the selling decision. Tables 8-20 demonstrate variables that are taken to affect farmers' well-being through the selling decision and therefore, are used to construct the propensity scores.

Gender

Respondents' gender might impact their access to resources and ability to participate in agricultural associations. As Table 8 shows, while women account for almost half of Uganda's total population and labor force, only 23 percent of respondents are female. Of the respondents who reported selling barley to Nile Breweries, less than 18 percent were female. On the other hand, 73 percent of non-sellers were female.

As marriage bears on land rights, it likely also bears on whether farmers sell barley or not. Almost 90 percent of all the respondents reported being married (Table 9). Similar numbers of barley sellers in general and Nile Breweries suppliers in particular reported being married. However, almost 95 percent of Uganda Breweries sellers reported being married and only 80 percent of non-sellers reported being married.

²⁹⁸ These given variables taken together make up X. The resulting propensity score is a function of X, given as $p(X)$.

Table 8: Gender Among Respondents, on Mount Elgon, and in Uganda

	Non-sellers	Barley Sellers				Total Sample	Uganda Labor Force	Uganda
		UBL	NBL	Both Breweries	All Sellers			
Male	4	70	90	41	119	134		16,387,642
%	27%	76%	82%	82%	78%	78%	54%	50%
Female	11	22	20	9	33	39		16,322,223
%	73%	24%	18%	18%	22%	23%	47%	50%

Source: WDI, multiple years

Table 9: Respondents' Marital Status

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
Married	12	87	96	49	134	151
%	80%	95%	87%	98%	88%	87%
Unmarried	1	2	5	0	7	8
%	7%	2%	5%	0%	5%	5%
No Response	2	3	9	1	11	14
%	13%	3%	8%	2%	7%	8%

Education

Respondents' education may affect their knowledge of farming and the way they receive information about farming associations and selling barley. Many fewer respondents in the survey reported having no schooling than the 2005/2006 national average (Table 9). On the other hand, far more achieved their O-level, a first secondary school level, and tertiary education than the national average. Far fewer non-sellers reported tertiary education and no schooling than both the national figures and the total sample.

Even if respondents have little or no formal education, the fact that another person in the household has some, may impact their ability and willingness to sell barley. Most households in the sample had members who had achieved at least their O-level (Table 11). Non-sellers, however, reported low household achievement of formal education. The numbers may be skewed on the low side because many of them did not answer the question.

Table 10: Individual Educational Achievement

	Non-sellers	Barley Sellers				Total Sample	Uganda (ages 25+)	Uganda (rural, ages 15+)
		UBL	NBL	Both Breweries	All Sellers			
No School	0	3	6	1	8	8	2,506,487	
%	0%	3%	6%	2%	5%	5%	32%	23%
Primary	6	25	20	13	32	41	3,576,693	
%	40%	27%	18%	26%	21%	24%	46%	54%
O-level	3	34	39	17	56	61	959,915	
%	20%	37%	36%	34%	37%	35%	12%	15%
A-level	2	9	9	5	13	15	707,186	
%	13%	10%	8%	10%	9%	9%	9%	1%
Tertiary	1	11	19	8	22	23	87,375	
%	7%	12%	17%	16%	15%	13%	1%	12%
No Response	3	10	17	6	21	25		
%	20%	11%	16%	12%	14%	15%	0%	0%

Source: Uganda Bureau of Statistics, 2002, 2005.

Table 11: Education Attainment of the Most Educated Person in the Household

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
No School	0	1	0	0	1	1
%	0%	1%	0%	0%	1%	1%
Primary	4	10	13	5	18	24
%	27%	11%	12%	10%	12%	14%
O-level	2	37	41	20	58	63
%	13%	40%	37%	40%	38%	36%
A-level	1	11	18	5	24	25
%	7%	12%	16%	10%	16%	15%
Tertiary	4	24	25	13	36	40
%	27%	26%	23%	26%	24%	23%
No Response	4	9	13	7	15	20
%	27%	10%	12%	14%	10%	12%

Because the Sabiny base their conceptions of wealth on a variety of factors, including their selflessness, self-wealth rankings are likely more a cause than an effect of selling barley or not. While selling barley may contribute to wealth rankings in the long term, Sabiny wealth manifests itself often in houses and education, which contribute to households' ability to cultivate various crops. A great majority of respondents in the sample reported considering themselves average in terms of wealth compared to the rest of their community. Fewer than 1 percent considered themselves very poor, 13 percent poor and around 10 percent rich. All of the groups had similar numbers except for the non-sellers, of whom less than half considered themselves average, 40 percent considered themselves poor and 6.7 percent considered themselves each very poor and rich.

Table 12: Respondents' Self-Wealth Rankings

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
Very Poor	1	0	0	0	0	1
%	7%	0%	0%	0%	0%	1%
Poor	6	9	11	5	15	22
%	40%	10%	10%	10%	10%	13%
Average	7	73	87	40	120	132
%	47%	79%	79%	80%	79%	76%
Rich	1	10	12	5	17	18
%	7%	11%	11%	10%	11%	10%
Very Rich	0	0	0	0	0	0
%	0%	0%	0%	0%	0%	0%

Having access to water within the household likely eliminates the time spent searching for water, leaving more time for cultivation activities. As barley on Mount Elgon is currently rain-fed, the in-house water is for household use, not for irrigation. In the full sample, around half of the respondents reported having water access within their households. Barley sellers, generally, reported water access at the same rate. Fewer than half of Nile Breweries sellers reported having water access in their households. Almost 60 percent of Uganda Breweries reported the same, and two thirds of non-sellers reported having access to water in the household.

While access to electricity may not have a direct effect on farming, it may allow households to participate in other activities like late-night studying or the maintenance of a shop, that could have an impact on the decision to sell barley. Very few households in any category have access to electricity within the household. Almost 7 percent of non-sellers report having access, which is the largest percentage across the sample's categories.

Table 13: Household Water Access

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
Access	10	55	51	29	77	87
%	67%	60%	46%	58%	51%	50%
No Access	5	37	59	21	75	85
%	33%	40%	54%	42%	49%	49%
No Response	0	0	0	0	0	1
%	0%	0%	0%	0%	0%	1%

Another household characteristic that may affect cultivation of barley is land ownership. The fact of owning the land one cultivates likely affects what one can and is willing to grow and how profitable cultivation can be. More than 90 percent of the respondents in the sample own the land they cultivate (Table 14). Nile Breweries sellers report owning their land at a rate of 95 percent, the greatest rate among categories in the sample.

Even if households own their land, they may share it for various reasons: to pay off debts, to raise funds, out of charity. Sharing may affect the amount of land available for cash crops like barley. For most categories within the sample, more than 90 percent of respondents reported not sharing land (Table 15). However, 13 percent of non-sellers do share their land.

Table 14: Farm Ownership

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
Own Farm	12	86	105	48	143	159
%	80%	94%	96%	96%	94%	92%
Do Not Own Farm	2	5	2	1	6	8
%	13%	5%	2%	2%	4%	5%
No Response	1	1	3	1	3	6
%	7%	1%	3%	2%	2%	4%

Table 15: Land Sharing

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
Share Land	2	5	5	1	9	11
%	13%	5%	5%	2%	6%	6%
Do Not Share Land	12	86	103	48	141	158
%	80%	94%	94%	96%	93%	91%
No Response	1	1	2	1	2	4
%	7%	1%	2%	2%	1%	2%

As association membership is supposed to be a prerequisite for selling barley to the breweries, all the barley sellers should be part of them. Such a condition should affect not only respondents' decisions to sell barley or not, but also their ability to benefit from it. However, fewer than 90 percent of barley sellers are in farming associations (Table 16). Only Uganda Breweries sellers have a portion of reported association members superior to 90 percent. Non-sellers reported belonging to farming associations at a rate of 80 percent.

Table 16: Agricultural Association Membership

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
Association Member	12	84	97	47	134	149
%	80%	91%	88%	94%	88%	86%
Not Association Member	3	7	12	2	17	22
%	20%	8%	11%	4%	11%	13%
No Response	0	1	1	1	1	2
%	0%	1%	1%	2%	1%	1%

The identity of the person or persons within the household who make decisions may affect households' willingness and ability to sell barley to different breweries. Tables 17-20 show how many households in the sample report women participating in the

cultivation, consumption, and purchasing decisions, either alone or jointly with someone else in the household. Between 45 and 57 percent of respondents report women being involved in household purchasing decisions and between 30 and 40 percent report women being involved in deciding how to use agricultural proceeds in particular. Consumption and growing decisions, however, prompt more extreme responses. The fourths of all barley sellers say women are involved in household food consumption decisions, while between 70 and 80 percent of respondents report that women *are not* involved in growing decisions.

Table 17: Household Consumption Decisions

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries Sellers	All Sellers	
A woman is involved in household consumption decisions	9	71	84	39	116	129
%	60%	80%	78%	78%	78%	77%
No woman is involved in household consumption decisions	6	18	24	10	32	39
%	30%	20%	22%	20%	22%	23%

Table 18: Household Purchase Decisions

	Non-sellers	Barley Sellers				Total Sample
		UBL Sellers	NBL Sellers	Both Breweries	All Sellers	
A woman is involved in household purchase decisions	7	50	56	26	80	90
%	47%	57%	54%	52%	56%	55%
No woman is involved in household purchase decisions	8	38	48	22	64	74
%	53%	43%	46%	44%	44%	45%

Table 19: Household Agricultural Proceeds Decisions

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries	All Sellers	
A woman decides how to spend agricultural proceeds	5	35	40	15	60	65
%	39%	41%	39%	30%	42%	40%
No woman decides how to spend agricultural proceeds	8	51	64	31	84	97
%	62%	59%	62%	62%	58%	60%

Table 20: Household Growing Decisions

	Non-sellers	Barley Sellers				Total Sample
		UBL	NBL	Both Breweries Sellers	All Sellers	
A woman decides which crops to grow	2	23	32	11	44	47
%	13%	26%	30%	22%	30%	28%
No woman decides which crops to grow	13	66	76	38	104	121
%	87%	74%	70%	76%	70%	72%

Following a series of tests of means between x-variables and an examination of a bivariate correlation table, we have a list of 23 variables (Table 21) that may explain the outcomes of interest through the barley growing decision. This combination of variables includes those that produced the highest pseudo R-squared²⁹⁹ in the probit equation predicting barley cultivation.

²⁹⁹ Measure of explanatory power in non-linear regressions

Table 21: Variables Used to Construct the Propensity Score (X-variables)

Abbreviation	Definition
age	age
agesq	square of age
olevel*	respondent has completed the first portion of secondary school
maxedo	person in the respondent's household with the greatest amount of formal education has completed the first portion of secondary school
alevel	respondent has completed both portions of secondary school
maxeda	the person in the respondent's household with the greatest amount of formal education has completed first both portions of secondary school
daysawayhh	number of days per month that the respondent spends migrating for employment
gender*	gender: 1 = female, 0 = male
wombuy*	a woman in the household participates in purchasing decisions
womgrow*	a woman in the household participates in growing decisions
selfcons*	the respondent participates in household consumption decisions
selfspend*	the respondent participates in making spending priorities
hhpop	household population
sharewomen	share of household members who are adult women
sharechild	share of household members who are children
sharegirls	share of household children who are girls
assoc*	respondent belongs to a farming association
farmsize	number of acres of land respondent cultivates
kmtown	number of kilometers household lies from nearest town
waterhh*	access to water within the household
rich*	respondent's wealth ranking is rich
average*	respondent's wealth ranking is average
poor*	respondent's wealth ranking is poor
* discrete, binary variable, with values equal to 0 or 1	

Results

The results of the propensity score estimation are presented in this section. For selling barley generally, selling barley to Uganda Breweries, and selling barley to Nile Breweries, the data are presented in this order: 1) the unmatched differences in indicator

means between the two groups being compared; 2) the probit estimation of the propensity score, which shows which characteristics may predict selling barley to either of the breweries³⁰⁰; 3) the area of common support between the two groups being compared; and 4) the differences in indicator means between matched members of the two groups being compared.

For each outcome (selling barley at all, selling barley to Nile Breweries, selling barley to Uganda Breweries, and selling barley to both breweries), the probit estimation of the propensity score includes as many of the above X-variables as possible. However, in cases where variables exhibit collinearity or where all observations for a binary variable have the same value for a particular outcome, they are omitted.

Selling Barley

The test of means between barley sellers and non-barley sellers reveals no statistically significant difference between barley sellers and non-sellers' incomes, expenditures, and credit availability. Nor does it show any difference between their experience of environmental degradation or use of fertilizers. However, while there is no statistically significant difference between barley sellers and non-sellers' likelihood of reporting consuming alcohol, sellers are 52 percent more likely than non-sellers to report consuming Nile Breweries products and 58 percent more likely than non-sellers to report consuming Uganda Breweries products.

³⁰⁰ Probit coefficients are reported as marginal effects, generated by STATA command `dprobit`.

Table 22: Differences in Indicator Means Between Barley Sellers and Non-sellers

Unmatched Outcomes			
Indicator	Difference Between Sellers and Non-sellers	t-statistic	Observations
ln(per capita monthly income)	0.102	0.3	129
ln(per capita monthly expenditures)	0.203	0.74	133
having access to credit	0.204	1.34	135
currently receiving credit	0.129	0.78	131
experienced environmental degradation	-0.037	-0.33	134
organic fertilizer use	-0.031	-0.23	98
inorganic fertilizer use	-0.087	-0.63	110
alcohol consumption	0.078	0.49	133
consume NBL products	0.522**	2.32	118
consume UBL products	0.576**	2.58	90
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level			

As Table 23 demonstrates, the characteristics that most strongly predict selling any barley are largely household-level characteristics. The greater the proportions of women and children in a respondent's household, the more likely he or she is to report selling barley. Respondents who call themselves rich or average are 1.9 percent and 10.4 percent, respectively, more likely to sell barley than those who do not. The latter result is statistically significant at the 1 percent level. Although the probit results suggest that the smaller a respondent's farm size is, the greater his or her likelihood of selling barley is, the coefficient on farm size is small and it is only significant at the 10 percent level.

At the individual level, respondents who decide alone or jointly how the household should spend its agricultural proceeds are 7.6 percent more likely than those who do not make this decision to sell barley. Given the breweries' insistence on working with farmers who belong to associations, all barley farmers should belong to associations and it should be impossible to use association membership to construct a propensity score. However,

some barley farmers do not belong to associations. Respondents who belong to associations are 12.1 percent more likely to sell barley than those who do not.

Table 23: Estimation of Propensity Score for Selling Barley

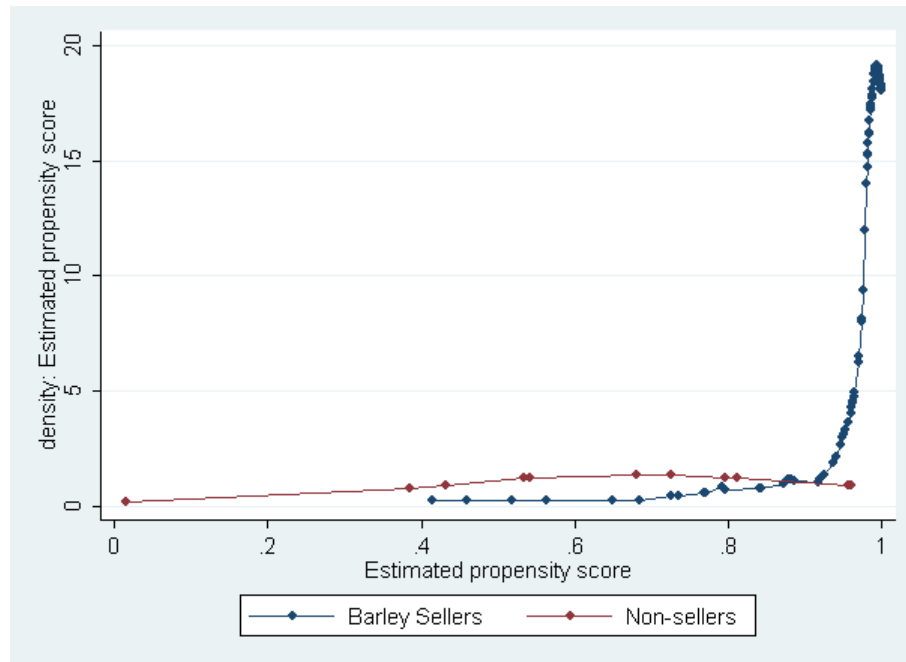
X-variables		
Variable	Marginal Effect on Respondent's Decision to Sell Barley	z value
age	-0.005	-0.82
agesq	0	0.67
olevel	0.024	1.28
daysawayhh	0.001	0.55
gender	0.012	0.97
wombuy	0.028	1.58
womgrow	0.004	0.24
selfcons	0.015	0.9
selfspend**	0.076	2.03
hhpop	-0.001	-0.35
sharewomen*	0.272	1.84
sharechild*	0.137	1.71
sharegirls	0.01	0.53
assoc**	0.121	2.17
farmsize*	-0.003	-1.73
kmtown	0.001	0.59
waterhh	-0.023	-1.6
rich*	0.019	1.76
average***	0.104	2.68
Observations		137
Pseudo R^2		0.403

significant at the * 10 percent level, ** 5 percent level, and
*** 1 percent level

As Figure 2 shows, barley sellers and non-sellers exhibit very different characteristics. The non-sellers in the sample, though few, represent a large distribution of propensity scores. Barley sellers, on the other hand, only have propensity scores superior to 0.4 and most are concentrated in the right tail. Because the groups are so dissimilar and the area of common support contains only 20 observations, for which many of the indicator

values are missing, a statistically sound comparison of similar barley sellers and non-sellers is impossible.

Figure 2: Area of Common Support Between Barley Sellers and Non-sellers



Selling Barley to Nile Breweries

An unmatched tests of means between Nile Breweries sellers and others (Table 24) shows that Nile Breweries sellers are not likely to exhibit any difference in income, expenditures, or access to credit. However, they are 26 percent more likely than others to say they have experienced environmental degradation on their farms, though they are not any more or less likely than others to rotate barley or use fertilizers. Whereas they are no more likely to consume alcohol than others, they are 35 percent more likely to consume Nile Breweries products and 28percent more likely to consume Uganda Breweries products than others.

Table 24: Differences in Indicator Means between Nile Breweries Sellers and All Others

Unmatched Outcomes			
Indicator	Difference Between NBL Sellers and Others	t-statistic	Observations
ln(per capita monthly income)	0.022	0.11	116
ln(per capita monthly expenditures)	0.025	0.13	120
having access to credit	0.057	0.63	128
currently receiving credit	0.083	0.87	126
environmental degradation	0.260***	4.17	128
rotating barley	0.02	0.5	124
organic fertilizer use	-0.068	-0.82	89
inorganic fertilizer use	-0.038	-0.43	105
alcohol consumption	0.071	0.75	126
consume NBL products	0.351***	3.49	116
consume UBL products	0.279**	2.56	85
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level			

As shown in Table 25, the only individual characteristic that predicts selling barley to Nile Breweries is having completed secondary school. Respondents who have completed secondary school are 22.7 percent more likely to say they sell barley to Nile Breweries than those who have not. Those who report their well-being as average are more likely than those who call themselves rich or poor to sell barley to Nile Breweries. Finally, the greater the share of women in a household, the more likely it is that a respondent from that household sells barley to Nile Breweries.

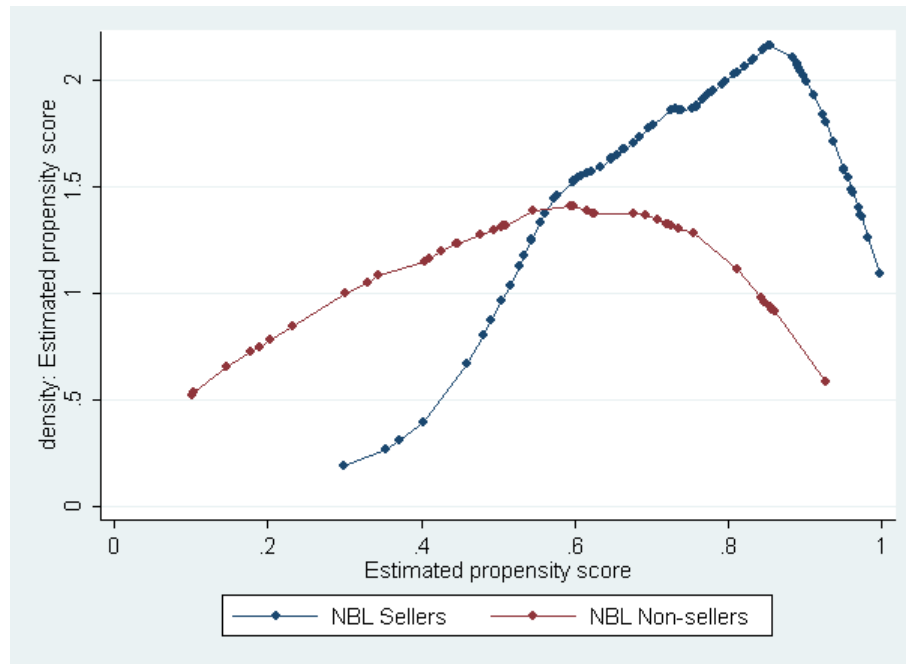
Table 25: Estimation of Propensity Score for Selling Barley to Nile Breweries

X-variables		
Variable	Marginal Effect on Respondent's Decision to Sell Barley to NBL	z value
age	-0.034	-0.92
agesq	0	0.98
alevel**	0.227	2.26
daysawayhh	0.001	0.1
gender	-0.008	-0.05
wombuy	0.026	0.24
womgrow	0.67	0.54
womcons	0.168	1.4
genbuy	-0.399	-1.63
gengrow	-0.408	-1.4
genspend	0.153	0.82
maxeda	-0.045	-0.4
sharewomen**	1.462	2.11
sharechild	0.664	1.47
sharegirls	0.064	0.42
farmsize	0.006	0.48
ownfarm	0.321	1.24
shareland	-0.237	-1
kmtown	0.008	1.18
waterhh	-0.093	-0.99
poor	0.081	0.46
average*	0.298	1.79
Observations		130
Pseudo R ²		0.175
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level		

In Figure 3, the distributions of propensity scores for farmers who sell barley to Nile Breweries and those who do not are more similar to each other than the previous example. That is, the distributions of Nile Breweries' suppliers and others' propensity scores are less polarized³⁰¹ than those for Uganda Breweries' suppliers and non-suppliers. Therefore, there are more farmers who can serve as counterfactuals for each other.

³⁰¹ less concentrated in the tails

Figure 3: Area of Common Support Between Nile Breweries Sellers and Others



In a comparison between matched (similar) farmers who sell barley to Nile Breweries and those who do not (Table 26), more differences appear than from the unmatched test of means. While there is still no statistically significant difference between Nile Breweries sellers and others' incomes, expenditures, or access to credit, matched Nile Breweries sellers report more experience with negative environmental effects. Nile Breweries sellers are between 36 and 37 percent more likely to experience environmental degradation, according to the three matched estimates. They are also 23 percent less likely than others to use organic fertilizer and, according to the nearest-neighbor and kernel estimates, 8 percent less likely to report rotating barley plots with other crops.

Again, there is no significant difference between Nile Breweries sellers and others' alcohol consumption, but Nile Breweries sellers are 28 percent more likely to report consuming Uganda Breweries products. According to the nearest-neighbor and kernel

estimates, they are 50 percent more likely to consume Nile Breweries products than others; according to the nearest-five-neighbor estimate 56 percent more likely to report consuming Nile Breweries products than others. Without propensity score estimation, reported barley crop rotation and the use of organic fertilizer would not appear significantly different between the two groups—they would be underreported. Similarly, differences in consumption of both Uganda Breweries and Nile Breweries products would be underreported.

Table 26: Estimated Differences in Indicator Means Between Nile Breweries Sellers and Others, Based on Three Propensity Score Matching Methods

	Matched Outcomes						
	Nearest Neighbor		Nearest 5 Neighbors		Kernel		
Indicator	Difference	t-statistic	Difference	t-statistic	Difference	t-statistic	Observations on Support
ln(per capita monthly income)	-0.202	-0.78	-0.07	-0.26	-0.202	-0.78	73
ln(per capita monthly expenditures)	-0.13	-0.51	-0.122	-0.53	-0.13	-0.51	76
having access to credit	0.048	0.34	0.046	0.34	0.048	0.34	82
currently receiving credit	0.098	0.65	0.081	0.57	0.098	0.65	81
rotating barley	-0.077*	-1.78	-0.058	-0.92	-0.077*	-1.78	
organic fertilizer use	-0.227**	-2.49	-0.227**	-2.49	-0.227**	-2.49	54
inorganic fertilizer use	0.087	0.52	0.13	0.93	0.087	0.52	52
environmental degradation	0.366***	2.81	0.362***	3.09	0.366***	2.81	82
alcohol consumption	0.167	1.13	0.21	1.51	0.167	1.13	84
consume NBL products	0.500**	3.78	0.558***	4.52	0.500**	3.78	67
consume UBL products	0.458***	2.73	0.486***	2.89	0.458***	2.73	56
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level							

Selling Barley to Uganda Breweries

A test of means between those who sell barley to Uganda Breweries and those who do not (shown in Table 27) demonstrates no significant difference in income, expenditures, access to or actually receiving credit. There is no significant difference between sellers to Uganda Breweries and others' experience with environmental degradation, barley rotation, or use of fertilizer. The single statistically significant difference between farmers who sell barley to Uganda Breweries and others is the likelihood of consuming Uganda Breweries products. Uganda Breweries sellers are 45percent more likely than others to report consuming Uganda Breweries products.

Table 27: Differences in Indicator Means between Uganda Breweries Sellers and Others

Unmatched Outcomes			
Indicator	Difference Between UBL Sellers and Others	t-statistic	Observations
ln(per capita monthly income)	0.022	0.11	116
ln(per capita monthly expenditures)	0.025	0.13	120
having access to credit	0.057	0.63	128
currently receiving credit	0.083	0.87	126
environmental degradation	0.260***	4.17	128
rotating barley	0.02	0.5	124
organic fertilizer use	-0.068	-0.82	89
inorganic fertilizer use	-0.038	-0.43	105
alcohol consumption	0.071	0.75	126
consume NBL products	0.351***	3.49	116
consume UBL products	0.279**	2.56	85
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level			

Individual characteristics that predict selling barley to Uganda Breweries include gender, belonging to a farming association, and the number of days a respondent spends outside their households per month. Female respondents are 18 percent more likely to report selling barley to Uganda Breweries than are male respondents. Association

members are 36 percent more likely to report selling barley to Uganda Breweries than non-members. For every day a respondent spends outside his or her household per month, he or she is 1.0 percent more likely to sell barley to Uganda Breweries.

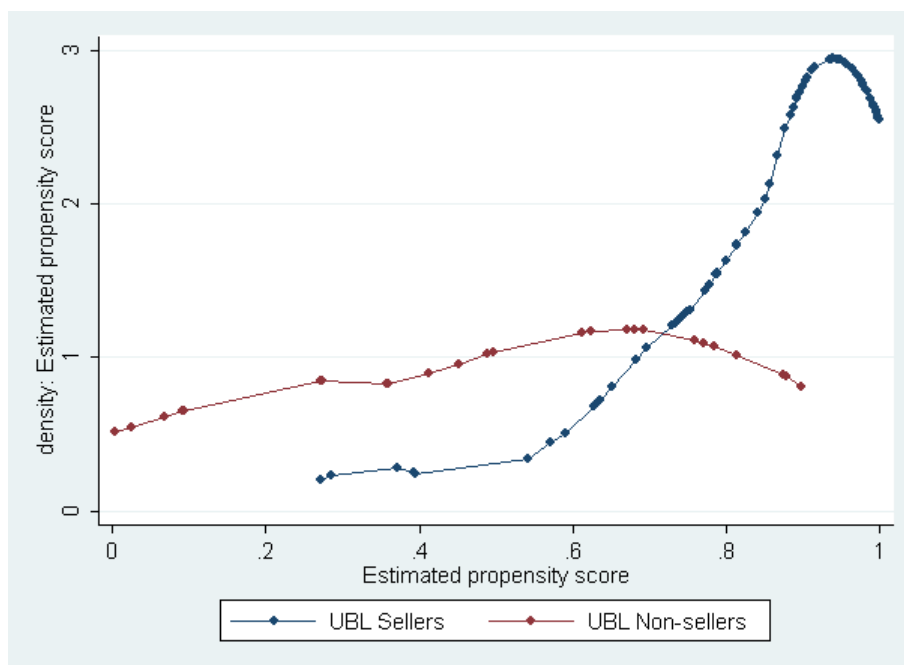
Participating in the decision of how to spend agricultural proceeds makes respondents 41 percent more likely to report selling barley than those who are excluded from such decisions. Respondents who live in households with water access are 19 percent more likely to sell barley to Uganda Breweries than those without. Those living in households where a woman is involved in decisions about which items the household buys are 18 percent more likely to sell barley to Uganda Breweries than those where women are excluded from such decisions. Furthermore, the greater the share of women in the household population, the more likely a household is to sell barley to Uganda Breweries.

Table 28: Estimation of Propensity Score for Selling Barley to Uganda Breweries

X-variables		
Variable	Marginal Effect on Respondent's Probability of Selling Barley to UBL	z-value
age	0.026	0.76
agesq	0	-0.89
olevel	0.081	0.74
daysawayhh*	0.01	1.65
gender**	0.183	2.08
wombuy**	0.18	2.05
womgrow	0.019	0.2
selfcons	-0.057	-0.67
selfspend***	0.406	2.73
maxedo	-0.082	-0.72
sharewomen***	1.926	2.76
sharechild	0.645	1.62
sharegirls	-0.161	-1.03
assoc**	0.363	2.59
farmsize	-0.014	-1.45
ownfarm	0.123	0.73
shareland	-0.132	-0.61
kmtown	0.007	1.25
waterhh**	0.187	2.4
poor	-0.033	-0.17
average	0.206	1.07
Observations		103
Pseudo R^2		0.33
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level		

The area of common support between Uganda Breweries sellers and others, shown in Figure 4, is broad, providing many matches for each group. However, the distribution of Uganda Breweries sellers is heavier in the right tail than in the common support. The propensity scores provide 48 matched observations.

Figure 4: Area of Common Support Between Uganda Breweries Sellers and Others



According to the comparisons of similar Uganda Breweries barley sellers and others (shown in Table 29), selling barley to Uganda Breweries has no effect on households' incomes or expenditures. However, Uganda Breweries sellers are 30 percent less likely to report having access to credit than others. All three matching methods return the same result.

Furthermore, there are no statistically significant differences between Uganda Breweries sellers and others' use of fertilizer, barley rotation, and experience with environmental degradation, or alcohol consumption. Besides decreased reported access to credit, Uganda Breweries sellers are 56 percent more likely than others to say that they consume Uganda Breweries products, according to the nearest-neighbor and kernel estimates. The nearest-five-neighbors estimate is statistically significant at the 1 percent

level, as are the other two, but it shows that Uganda Breweries sellers are 45 percent more likely than others to consume Uganda Breweries products.

Table 29: Estimated Differences in Indicator Means Between Uganda Breweries Sellers and Others, Based on Three Propensity Score Matching Methods

Matched Outcomes							
Indicator	Nearest Neighbor		Nearest 5 Neighbors		Kernel		Observations on Support
	Difference	t-statistic	Difference	t-statistic	Difference	t-statistic	
ln(per capita monthly income)	0.464	1.09	0.564	1.41	0.464	1.09	35
ln(per capita monthly expenditures)	0.288	0.79	0.35	1.01	0.288	0.79	35
having access to credit	-0.30*	-1.92	-0.30*	-1.92	-0.300*	-1.92	44
currently receiving credit	0.048	0.37	-0.075	-0.35	-0.1	-0.46	45
rotating barley	0.063	0.47	0.063	0.47	0.063	0.47	36
organic fertilizer use	0.231	1.04	0.231	1.13	0.231	1.04	29
inorganic fertilizer use	0.214	0.97	0.143	0.67	0.214	0.97	32
environmental degradation	0.048	0.37	0.048	0.32	0.048	0.37	48
alcohol consumption	0.25	1.22	0.275	1.38	0.25	1.22	45
consume NBL products	-0.053	-0.23	0	0	-0.053	-0.23	38
consume UBL products	0.556**	3.31	0.449***	3.31	0.556***	3.31	35
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level							

Selling Barley to Nile Breweries versus Uganda Breweries

As shown in Table 30, the unmatched comparison of Nile and Uganda Breweries sellers shows no statistically significant difference in the incomes, expenditures, and access to credit of farmers who sell barley to both breweries. Nor does it reveal any statistically significant difference in their likelihood to use fertilizer or rotate barley. However, Nile Breweries sellers are 26 percent more likely to report experiencing environmental degradation than Uganda Breweries sellers. As in previous results, there is no significant difference between Nile and Uganda Breweries sellers' likelihood to report consuming alcohol, but Uganda Breweries sellers are 26 percent more likely to say they consume Uganda Breweries products.

Table 30: Differences in Indicator Means between Nile Breweries Sellers Uganda Breweries Sellers

Unmatched Outcomes			
Indicator	Difference	t-statistic	Observations
ln(per capita monthly income)	0.092	0.33	53
ln(per capita monthly expenditures)	0.019	0.08	53
having access to credit	0.091	0.78	60
currently receiving credit	0.005	0.04	58
rotating barley	0.02	0.39	57
organic fertilizer use	0.169	1.62	51
inorganic fertilizer use	0.126	1.02	46
environmental degradation	-0.263**	-2.45	60
alcohol consumption	0.028	0.21	62
consume NBL products	-0.142	-0.98	46
consume UBL products	0.262*	1.84	49
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level			

In comparing the farmers who sell barley to both Uganda and Nile Breweries (Table 31), the propensity score matching reflects the respondents' propensity to sell barley to Uganda Breweries rather than to Nile Breweries.

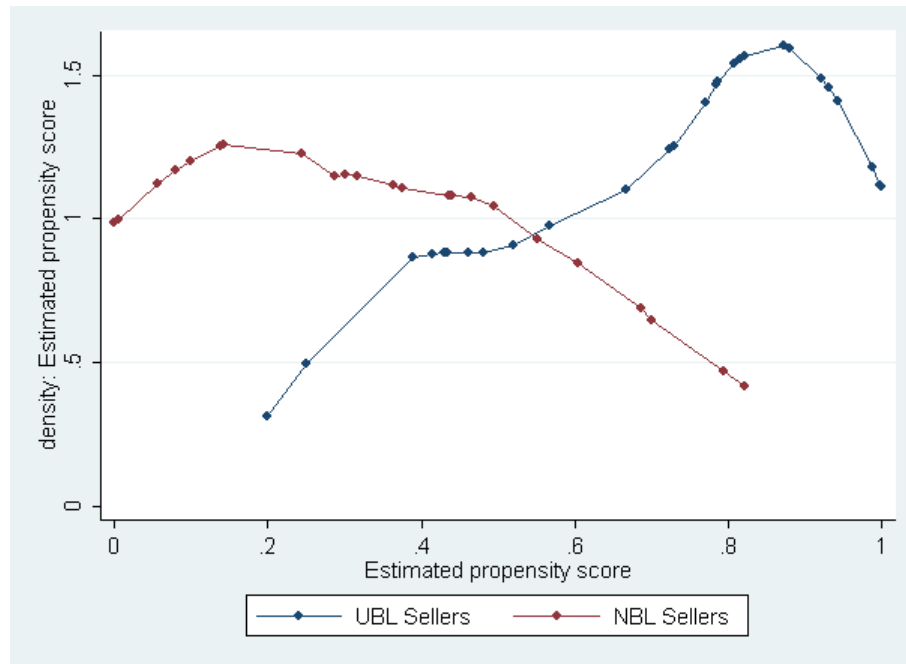
Female respondents are 54 percent more likely to report selling barley to Uganda Breweries rather than Nile Breweries. Apart from gender, all of the characteristics that strongly predict selling barley to Uganda Breweries rather than Nile Breweries are at the household level. Respondents who have water access at home are 58 percent more likely to report selling barley to Uganda Breweries than to Nile Breweries. Those who participate in their household decisions about what to grow and how to spend agricultural proceeds are, respectively, 76 percent less likely and 90 percent more likely to sell barley to Uganda Breweries than Nile Breweries. Additionally, the greater the proportions of women and children are in respondents' households, the more likely they are to sell barley to Uganda Breweries rather than Nile Breweries.

Table 31: Estimation of Propensity Score for Selling Barley to Uganda Breweries Rather than Nile Breweries

X-variables		
Variable	Marginal Effect on the Probability of Selling Barley to UBL	z-value
age	-0.007	-0.08
agesq	0	0.22
olevel	-0.057	-0.21
daysawayhh	0.013	0.55
gender*	0.541	1.67
selfbuy	0.303	1.42
selfgrow***	-0.756	-2.84
selfcons	-0.142	-0.55
selfspend***	0.897	2.79
maxedo	-0.296	-0.97
sharewomen**	5.94	2.13
sharechild*	2.034	1.72
sharegirls	-0.464	-1.12
assoc	0.244	1.08
farmsize	-0.006	-0.15
shareland	-0.032	-0.1
kmtown	0.008	0.54
waterhh***	0.575	2.68
poor	-0.372	-1.07
average	0.149	0.43
Observations		54
Pseudo R ²		0.337
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level		

Shown in Figure 5, the area of common support between Nile Breweries and Uganda Breweries barley sellers is broad and provides many potential matches for each comparison group. While each group's propensity scores are most dense at either tail, most of their observations fall within the area of common support.

Figure 5: Area of Common Support Between Nile Breweries Sellers and Uganda Breweries Sellers



When only similar farmers who sell only to either Nile Breweries or Uganda Breweries compared (Table 32), all differences between them become statistically insignificant, except their access to and current receipt of credit. According to the nearest-neighbor and kernel estimates, which are statistically significant at the 5 percent level, farmers who sell barley only to Uganda Breweries are 63 percent more likely to report having access to credit than those who sell to Nile Breweries. They are also 71 percent more likely to say they are currently receiving credit. The nearest-five-neighbors estimates, which are significant at the 10 percent level, suggest that farmers who sell barley to Uganda Breweries are 50 percent more likely to report having access to credit and 57 percent more likely to say they are currently receiving it than farmers who sell barley only to Nile Breweries.

Table 32: Estimated Differences in Indicator Means Between Nile Breweries Sellers and Uganda Breweries, Based on Three Propensity Score Matching Methods

	Matched Outcomes						
	Nearest Neighbor		Nearest 5 Neighbors		Kernel		Observations on Support
Indicator	Difference	t-statistic	Difference	t-statistic	Difference	t-statistic	
ln(per capita monthly income)	0.159	0.33	0.24	0.52	0.159	0.33	28
ln(per capita monthly expenditures)	0.672	1.18	0.672	1.25	0.672	1.18	28
having access to credit	0.625**	2.08	0.500*	1.87	0.625**	2.08	33
currently receiving credit	0.714**	2.29	0.571*	1.93	0.714**	2.29	32
rotating barley	0	--	0	--	0	--	29
organic fertilizer use	0.25	0.45	0.25	0.71	0.25	0.45	23
inorganic fertilizer use	0.5	1.15	0.25	0.65	0.5	1.15	25
environmental degradation	-0.125	-1	-0.125	-1	-0.125	-1	33
alcohol consumption	-0.333	-1.11	-0.333	-1.23	-0.333	-1.11	35
consume NBL products	-0.333	-1.08	-0.333	-1.08	-0.333	-1.08	26
consume UBL products	-0.167	-0.62	-0.167	-0.62	-0.167	-0.62	24
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level							

Selling Barley to Both Breweries versus One Brewery

As mentioned previously, 50 barley producers sell to both breweries, even though they are only supposed to sell barley to one brewery. This section examines farmers' likelihood of selling barley to both breweries and its effect on their welfare.

Although the unmatched comparison between farmers selling barley to both breweries and others shown in Table 33 demonstrates no statistically significant difference between the incomes of farmers who sell barley to both breweries and those who sell barley to one brewery, the expenditures of farmers who sell barley to both breweries are 45 percent lower than those of farmers who sell barley to one brewery. They are 30 percent less likely to report having access to credit than farmers who sell barley to one brewery, though there is no significant difference between farmers who sell barley to one versus two breweries in terms of actually receiving credit.

Farmers who sell barley to both breweries are 29 percent more likely to report experiencing environmental degradation than those who do not. They are also 17 percent more likely to use inorganic fertilizer, though there is no significant difference in their likelihood to use organic fertilizer or to rotate barley with other crops.

Although there is no significant difference in farmers' likelihoods to consume alcohol based on their decision to sell barley to both or just one brewery, farmers who sell barley to both breweries are 24 percent more likely to consume Nile

Breweries products and 34 percent more likely to consume Uganda Breweries products.

Table 33: Differences in Indicator Means between Farmers Who Sell Barley to Both Breweries and Those Who Sell Barley to Only One Brewery

Unmatched Outcomes			
Indicator	Difference	t-statistic	Observations
ln(per capita monthly income)	-0.18	-0.85	73
ln(per capita monthly expenditures)	-0.446***	-2.65	73
having access to credit	-0.296***	-2.87	85
currently receiving credit	-0.071	-0.65	84
rotating barley	-0.023	-0.56	85
organic fertilizer use	-0.027	-0.24	57
inorganic fertilizer use	0.165*	1.75	71
environmental degradation	0.288***	3.55	73
alcohol consumption	0.132	1.49	83
consume NBL products	0.239**	2.16	79
consume UBL products	0.339***	3.24	85
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level			

Several individual and household characteristics predict selling barley to both Uganda and Nile Breweries, as Table 34 shows. The individual characteristics that predict selling barley to both breweries instead of one are respondents' gender, membership in a farming association, and their participation in their households' decisions about which items to purchase. Female respondents are 44 percent less likely than male respondents to say they sell barley to both breweries. Farmers who belong to associations are 36 percent more likely to report selling barley to both breweries. Respondents who participate in decisions about what their households should buy are 34 percent more likely to say they sell barley to both breweries. The ones who call their welfare average are 59 percent more likely to sell barley to both breweries than those who are rich or poor.

At the household level, the distance from town, the share of women in the household, water access, and the fact of sharing land bear on the likelihood of selling barley to both breweries rather than one. For every kilometer a respondent's household is located from the nearest town, he or she is 4 percent more likely to report selling barley to both breweries. Households with water access are 29 percent more likely to sell barley to both breweries, whereas those who share their land with others are 47 percent less likely to sell barley to both breweries. The greater the proportion of women in a respondent's household, the more likely he or she is to report selling barley to both breweries.

Table 34: Estimation of Propensity Score for Selling Barley to Both Breweries Rather than One

X-variables		
Variable	Marginal Effect on the Probability of Selling Barley to Both Breweries	z-value
age	0.086	1.49
agesq	-0.001	-1.53
olevel	0.041	0.2
daysawayhh	0.017	1.09
gender*	-0.436	-1.85
selfbuy*	0.344	1.93
selfgrow	-0.138	-0.43
selfcons	-0.249	-1.62
selfspend	-0.36	-1.45
maxedo	0.135	0.56
sharewomen**	3.04	2.5
sharechild	0.517	0.69
sharegirls	-0.023	-0.08
assoc*	0.36	1.9
farmsize	0.029	1.22
shareland**	-0.472	-2.08
kmtown***	0.04	3.44
waterhh**	0.293	2.2
poor	0.42	1.46
average**	0.587	2.38
Observations		86
Pseudo R ²		0.332
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level		

The area of common support between barley sellers to both breweries and sellers to just one brewery (Figure 6) is wide, allowing for 60 matched observations.

Figure 6: Area of Common Support Between Barley Sellers to Both Breweries and Sellers to One Brewery

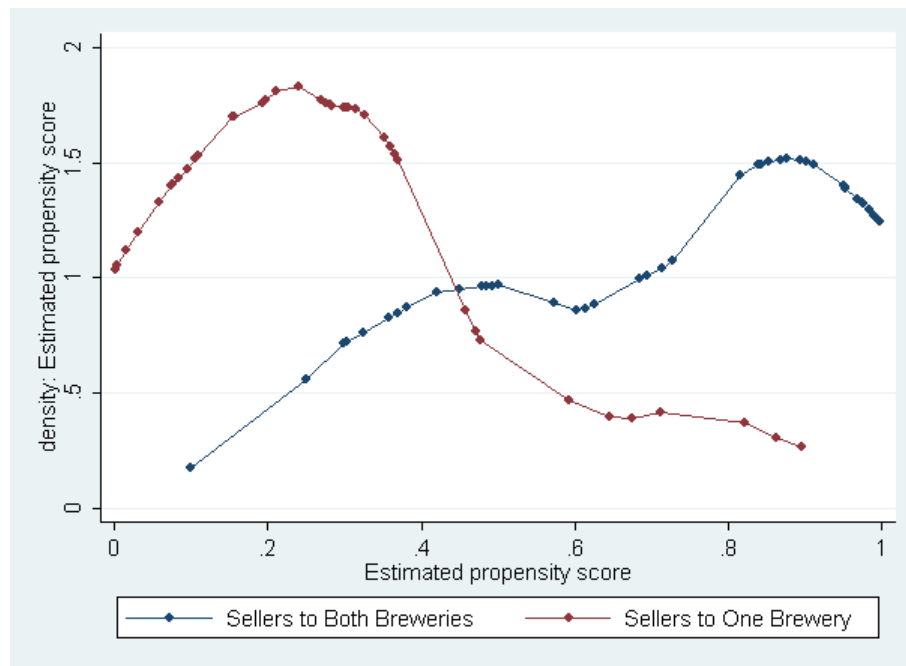


Table 35 shows the matched differences in outcome indicators between farmers who sell barley to both Uganda and Nile Breweries and farmers who sell barley to just one brewery. In comparing similar farmers who sell either to both breweries or to just one, all effects on income, expenditures, and access to credit disappear. Instead, farmers who sell barley to both breweries are 35 percent more likely to report receiving credit currently, according to nearest-neighbor and kernel estimates. According to nearest-five-neighbor estimates, they are 38 percent more likely to report receiving credit currently.

Nearest-neighbor and kernel estimates show that farmers who sell barley to both breweries are also 35 percent more likely to report experiencing environmental degradation than farmers who sell barley to just one brewery. The

nearest-five-neighbors method estimates that farmers who sell barley to both breweries are 38 percent more likely than farmers who sell to one brewery to say they experience environmental degradation. None of the matching methods suggests any significant difference in the fertilizer use or barley rotation of farmers who sell barley to both breweries versus farmers who sell barley to one brewery.

There is no significant difference in the reported alcohol consumption of farmers who sell barley to both breweries and those sell barley one brewery. However, the nearest-neighbor and kernel matching methods estimate that farmers who sell barley to both breweries are 38 percent and 33 percent more likely to report consuming Uganda Breweries and Nile Breweries products, respectively. The nearest-five-neighbors estimates show no significant difference in the consumption of either brewery's products.

Table 35: Estimated Differences in Indicator Means Between Sellers to Both Breweries and Sellers to Only One Brewery, Based on Three Propensity Score Matching Methods

	Matched Outcomes						
	Nearest Neighbor		Nearest 5 Neighbors		Kernel		Observations
Indicator	Difference	t-statistic	Difference	t-statistic	Difference	t-statistic	on Support
ln(per capita monthly income)	-0.07	-0.16	0.002	0	-0.07	-0.16	48
ln(per capita monthly expenditures)	-0.446	-1.31	-0.282	-0.88	-0.446	-1.31	48
having access to credit	-0.118	-0.6	-0.23	-1.28	-0.118	-0.6	59
currently receiving credit	0.353**	2	0.382**	2.24	0.353**	2	59
rotating barley	0	0	0	0	0	0	59
organic fertilizer use	-0.25	-1.53	-0.208	-1	-0.25	-1.53	43
inorganic fertilizer use	0.182	0.87	0.144	0.74	0.182	0.87	42
environmental degradation	0.353**	2.56	0.377***	3.04	0.353**	2.56	60
alcohol consumption	0	0	0	0	0	0	59
consume NBL products	0.333*	1.65	0.239	1.23	0.333*	1.65	53
consume UBL products	0.375**	1.99	0.271	1.47	0.375**	1.99	56
significant at the * 10 percent level, ** 5 percent level, and *** 1 percent level							

CHAPTER 6

QUALITATIVE FINDINGS ABOUT BARLEY CULTIVATION IN EASTERN UGANDA

In this chapter we consider the qualitative responses that farmers have provided in the survey. By combining these qualitative findings with the econometric results of the survey, we can form a fuller illustration of the effects of barley cultivation on Mount Elgon than with only one or the other.

Agricultural Livelihood Strategies

While income, expenditures, and access to credit measure some material wealth and certain capabilities, properly assessing the wealth effects of the barley-buying scheme requires knowing what participating farmers consider wealth. When describing the characteristics of wealth, most respondents say that the ability to send one's children to school and having nice clothes are markers of wealth. Others include owning land, having permanent houses, owning livestock, and using machinery on the land. Although they list both productive and non-productive assets as evidence of wealth, the latter of which are markers of stability.

On the other hand, illiteracy, poor clothes, having no land or livestock and poor sanitation were commonly cited characteristics of poverty. Several respondents also said that spending 2000 Uganda Shillings (UGX) per day is also a characteristic of poverty. In 2010, 2178 UGX corresponded roughly to \$1³⁰², so it is possible that they were simply citing the United Nations' first Millennium Development Goal.³⁰³

³⁰² World Development Indicators, multiple years.

³⁰³ United Nations, *United Nations Millennium Development Goals*; available from <http://www.un.org/millenniumgoals>; Internet; accessed 24 August 2011.

In order to attain wealth and avoid poverty, the respondents grow and sell agricultural produce. In the survey, respondents said that the most cultivated crops in the area include maize, barley, wheat, Irish potatoes, beans, cowpeas, coffee, and matooke (type of savory banana found in East Africa). The produce that respondents grow include mostly maize, wheat, beans, and Irish potatoes. They consume most of the same crops they sell--few report eating barley.

To supplement their diets and complement their produce sales, many respondents also report keeping livestock. The benefits from tending livestock that most respondents cite are food and income from selling them, and oxen's ploughing ability. The challenges they report usually involve the unavailability of cash, difficult transport, and the high cost of agricultural inputs. Feeding animals and treating them when they are sick requires money that respondents often find scarce. Another prevalent problem is a lack of land on which to graze cows.

Agricultural Organizations

In order to meet agricultural challenges, these farmers share experiences through farming associations. They share information with each other informally, as well as in association trainings, farming meetings, through field days, and also in the market place. The radio is an important means of disseminating information to many, spread-out farmers at once.³⁰⁴ Many describe their relationships with each other as very "brotherly." In

³⁰⁴ One of the ways that Nile Breweries communicates its produce needs and preferential prices to farmers is through radio broadcasts. On the evening of June 30, 2010, George Mbogo and Joseph Kalule of Nile Breweries, and the investigator joined Vincent Kamba and Faustino Kavule of the Amalgamated Farmers' Association of Budaka and Buteleja for a radio spot for Bugwere FM 97.2. Such radio broadcasts serve to advertise for Nile Breweries' products, inform the public about supplying opportunities, and ensure that farmers in associations know how much money they should receive from their associations. In this way, it makes deceit on the part of associations difficult. Public health initiatives have used radio successfully to increase demand for HIV/AIDS testing kits (Kato et al, 2006; Ajewole, 2009).

addition to advice and training, the farmers who belong to associations also mention seeds and loans as benefits they receive from their associations. Many farmers who sell to Uganda Breweries say that it was the training they received through KaCoFA that began their relationship with the brewery. Farmers working with Nile Breweries, on the other hand, say they began working with them when MEVACA agents began going into villages and to farms. Farmers working with both breweries say they expected high prices and free inputs from them. While many farmers obtain their inputs from associations, the vast majority obtain them in the "open market," which likely means shops.

Although many of the respondents in this sample report that schools equip farmers with farming skills, including improved methods, crop timing, and fertilizer application, there are many anecdotal accounts of how little primary and secondary school prepare one for agriculture in Uganda. It is possible that respondents are referring only to Farmer Field Schools, which exist to pass agricultural knowledge from farmer to farmer.

Qualitative Accounts of Barley's Income Effects

Most respondents who sell barley find it to be beneficial. In fact, many farmers would like to sell more barley to the breweries than they currently do. The ones who sell less to Uganda Breweries than they would like lament the low prices they receive, as well as delayed payments. Nile Breweries sellers, on the other hand, cannot sell as much as they would like because they say the seed provided by the brewery is poor.

When comparing Uganda and Nile Breweries, the farmers who have sold to both say that they prefer selling barley to Nile Breweries because the payments arrive on time. Most respondents who sell barley to Nile Breweries report positive experiences, but since the brewery has just begun its barley project, some farmers report not seeing any differences

yet. Satisfied farmers selling to them report having enough cash for basic needs and general feelings of happiness. All farmers selling barley only to Uganda Breweries also say that they feel more secure than they did before beginning to sell to the company. However, several of them say that the benefits of selling barley to Uganda Breweries were less pronounced before Nile Breweries entered the market. The farmers selling to both breweries say overwhelmingly that they have improved their ability to pay school fees and medical bills, to obtain loans, and to be happy.

A great majority of farmers who sell barley to Uganda Breweries report having improved access to medical services since beginning to sell barley to them. They say that they can now afford those services, whereas they could not before. More than half, but a lower proportion of Nile Breweries sellers say the same. This difference may simply be due to the fact that Uganda Breweries has been buying barley in the area for much longer than Nile Breweries.

Very few (just seven) farmers report having stopped any of their income-generating activities since beginning to sell barley to either brewery, indicating that they are not entirely reliant on their barley. However, few interviewed farmers express having a back-up plan in case they cannot harvest the barley they expect. Most say that if they were to lose their entire barley crop this season, they would expect the breweries or farming associations to compensate them in some way. The others say some variant of "I suffer."

Credit

In addition to providing seeds and inputs on loan, KaCoFA and MEVACA give farmers signed letters to take to banks in order to open lines of agricultural credit³⁰⁵.

³⁰⁵ SABMiller, 2009; Kissa Presentation, 2010.

Indeed, many of the farmers report having access to credit through Centenary Bank and Stanbic Bank, the two major formal banking institutions in Kapchorwa town. Others report having access to credit through their farming associations or the breweries, family, and friends. Those who report currently receiving credit say they use it for buying agricultural inputs, employing labor, and renting land. Some use it for more immediate needs, like food and school fees. A few use it to start and maintain small businesses.

Despite the fact that the breweries demand that farmers sell to only one of them, many sell to both. In fact, David Kissa, Director of KaCoFA, complains that farmers take the seed his association provides, then sell it to his competitor MEVACA. In this way, they take advantage of KaCoFA's high-yielding seed and sell its produce to Nile Breweries for higher, quicker payments than Uganda Breweries provides through KaCoFA.

Unintended Consequences of Barley Cultivation

Many of the respondents have experience with soil erosion and landslides. Although some report having experienced drought, more complain of flooding. Deforestation and overgrazing are also common environmental problems. No farmers complain of poor soil, though. Almost all of the respondents report rotating their crops. The crop that barley sellers most commonly rotate with barley is the Irish potato.

Alcohol Consumption

The respondents who report consuming alcohol say they do so in order to "pass time" or for "social reasons." Only one person says he drinks in order to become drunk. Peter Cherwaru, Director of MEVACA, explained that women were less visible on Mount

Elgon than men because women did most of the agricultural work, while the men socialized.³⁰⁶

Gender

However, both men and women in the sample cite gender as a cause of agricultural problems. However, while 54 percent of women report experiencing gender-related agricultural problems, just 39 percent of men do. The women in the sample recount experiences similar to those that Deere and León document.³⁰⁷ They say that their gender precludes their ownership of land and access to draught animals. Plus, several say that because of their gender, they must work alone. In addition, they mention great home care responsibilities and a lack of cash to tide their households over when they become pregnant. Men often cite a lack of money as one of the agricultural problems that their gender causes. They also claim that because they are heads of their households, they carry much of the burden of making decisions. A few men cite their wives as their gender-related problems. For example, one man lamented, "If you want to plant barley she will talk of wheat, etc."

³⁰⁶ Peter Cherwaru, Series of interviews by Cleo Roberts between 1 July and 7 September 2010.

³⁰⁷ Deere and León, 2003.

CHAPTER 7

DISCUSSION OF BARLEY CULTIVATION ON MOUNT ELGON

Income and Expenditures

The fact that barley sellers on Mount Elgon report incomes higher than average for all households in eastern Uganda may be due more to the high cost of living on Mount Elgon than to selling barley. Not only is transport for farmers who want to sell agricultural goods costly, so are goods that have had to be transported to them from the lowlands of eastern Uganda.³⁰⁸

Beyond income, the Sabiny traditionally value productive assets, especially land and livestock. Little mention is made in the literature about the Sabiny of non-productive assets. Furthermore, in this sample, respondents associated almost exclusively productive assets and education with wealth. The only non-productive assets they list include houses and clothing. That farmers associate selling barley with being able to send their children to school (evidence of one's well-being) indicates that they believe it is a worthwhile opportunity. Furthermore, it suggests that barley enables them to decide their futures.

Although the empirical evidence shows no significant effect of selling barley to any combination of breweries on respondents' incomes or expenditures, the fact that the farmers who break their contracts to sell barley to both Uganda Breweries and Nile Breweries are cash poor and live far from town compared to other barley farmers suggests that selling barley to both breweries is a measure of last resort for them.

³⁰⁸ Angus Deaton, *The Analysis of Household Surveys: A Microeconomic Approach to Development Policy*, (Baltimore and London: World Bank/Johns Hopkins University Press, 1997).

Credit and Insurance

The largely positive reaction of farmers in the survey to the breweries suggests that transaction costs have not stopped farmers' from cultivating barley. Both breweries diminish the financial burden of growing barley by providing loans in kind. Furthermore, Nile Breweries' efforts to buy barley at farms eliminates farmers' transportation costs and allows farmers to keep more of their proceeds than otherwise. Yet, it is important to note that Nile Breweries likely travels to farms mostly to edge out Uganda Breweries. It is unclear that the company will continue to do so if and when its Ugandan supply of barley is sufficient to erase the need for importing barley.

By providing loans themselves and easing access to financial institutions for their suppliers, Uganda Breweries and Nile Breweries broaden the range of economic activities in which those suppliers have the opportunity to participate. Linking barley cultivation to finance likely reduces the barriers to formal financial institutions. Furthermore, the breweries' insistence on dealing only with farming organizations reduces the burden an individual farmers must bear and makes the group of farmers more attractive as borrowers than they would be as individuals.

The financing course that Uganda and Nile Breweries are following with their suppliers supports Poulton et al's notion that ensuring farmers' access to credit enables them to benefit from cultivating cash crops. Their practice of interlocking spreads the ability to cultivate barley beyond the cash-rich.

While both Uganda Breweries and Nile Breweries enter into legal contracts with their suppliers, their relationships are at risk of becoming tenuous. Uganda Breweries is already experiencing the weakening of its relationships with its suppliers because of

delayed payments to farmers and Nile Breweries' aggressive marketing. As the farmers cannot be sure that they will receive the price they agreed to accept from Uganda Breweries, strategic default (purposefully avoiding repayment) is becoming more and more common. The long-term investments by both breweries in the region and their efforts to increase farmers' access to formal credit are likely to decrease strategic default that is due to ignorance about credit. However, Uganda Breweries' failure to pay farmers in a timely manner probably increases fears that the company cannot be trusted from season to season.

The fact that some of the farmers are using credit to begin small businesses implies that there are spillover benefits from selling barley. Spillover effects from the breweries' local sourcing of barley may include greater revenue received by producers of other crops and other business owners and operators. Some farmers' use of credit for immediate needs, however, suggests that their incomes are not large enough to cover what they consider necessities. As many farmers have no back-up plan in case they cannot sell barley, they risk becoming dependent on the breweries if barley becomes an important source of income for them.

Alcohol Consumption

Individuals' reporting of whether or not they consume Uganda Breweries' or Nile Breweries' products may reflect the fact that the breweries produce non-alcoholic beverages in addition to beer. Many individuals mentioned soda when asked which Uganda and Nile Breweries products they consumed. Otherwise, they may simply have lied about their alcohol consumption. They may have seen the interviewers as representatives of each of the companies and did not want to disappoint them. At the same time there is

some shame attached to alcoholism (and sometimes even the consumption of alcohol) among the Sabiny, so some respondents might have found it more comfortable to say they drink soda rather than admit they drink beer.

However, alcohol is related closely to Sabiny cultural and economic norms and practices. Sabiny rituals once revolved around it and it was once a medium of exchange. As the Sabiny's relationships with alcohol and cash have changed, so has the level to which these barley projects might be appropriate. Despite some respondents' opposition to alcohol, they were still willing to sell barley for cash, possibly because cash has replaced alcohol as a medium of exchange and means of social mobility. It is also possible that they cultivate barley for lack of a better option.

Environmental Consequences

The presence of crop rotation is evidence that farmers can use the same land and similar labor for multiple tasks, obtaining more value from them than if they cultivate only one crop. That Nile Breweries farmers rotate their barley less than other farmers may be due to the fact that many of them have just started to cultivate barley or it might be due to a lack of trainings about crop rotation's benefits.

At the same time, it is unclear whether farmers rotate to preserve the soil or because they do not want to expose themselves to the risk that barley may not be as lucrative one season as it was the previous season, if they have been advised to do so by their associations; or if they find it advantageous for any number of other reasons. If they are only planting other crops in barley plots between barley seasons, then increased income from barley could lead them to specialize in it. In turn, specialization in one crop or

another might mean that farmers stop alternating crops or allowing land to lie fallow. This, in turn, could lead to monoculture and soil nutrient depletion.

The heightened experience with environmental degradation that Nile Breweries sellers experience might be due to their farming practices. On the other hand, it might be due to the fact that Nile Breweries reaches farmers by traveling to them. The farmers whom Nile reaches in this way might tend less-favored lands. Land pressures are an especially serious concern on Mount Elgon because of its already-delicate ecology.

This possibility might also explain why farmers selling barley to both breweries report experiencing environmental degradation at higher rates than their counterparts selling to only one brewery. These farmers are farther from town and poorer than farmers selling barley to one brewery. A simpler explanation may be that they are overtaxing their soil by providing barley to two breweries. However, the quality of their land should be examined to find the source of differences in environmental degradation.

Uganda Breweries and Nile Breweries

As both Uganda Breweries and Nile Breweries are majority foreign companies, Uganda is likely to experience some capital flight from their presence. However, their local sourcing and development of domestic value chains, as well as high domestic corporate tax rates are likely to provide local benefits.

By introducing barley to the region in 2003, Uganda Breweries, through KaCoFA familiarized farmers, including some smallholders, with its cultivation. However, due to changing corporate dictates, the manufacturer's relationship with its suppliers has become fraught with challenges as payments have been delayed.

Uganda Breweries' main advantages over Nile Breweries are the quality of its barley seed and the region's familiarity with the company. However, delayed payments threaten to erode suppliers' faith in the company. Moreover, if Uganda Breweries cannot offer farmers prices competitive with those of Nile Breweries, the company is likely to lose not only a source of barley, but the value of the seed lent to farmers. Compounding this problem is the likelihood that pursuing defecting farmers will prove expensive. If, in the most extreme scenario, Uganda Breweries decides to stop competing with Nile Breweries in Kapchorwa, Bukwa, and Kween, smallholders will lose a large potential buyer and prices may drop, possibly reducing income gains made so far from barley. On the other hand, it is possible that the value chain that the breweries have helped develop will remain and continue to be useful for other crops.

Marginalized Groups

Although barley farmers in this sample are more cash-rich than non-barley farmers and Nile Breweries farmers more than Uganda Breweries farmers, this difference might be due more to the small size of the sample than to the breweries' effects. Barley sellers and non-sellers in the sample are very different, as their poor area of common support shows clearly. This fact may be due to the small sub-sample of non-sellers or it may reflect a real inequality between the two groups. The poorest members of society may not be able to cultivate barley because of land or social capital constraints. Moreover, the difference in income might be a condition for growing barley rather than a result of it.

Whereas women slightly outnumber men in the region, men retain more power over household assets and growing decisions. As the few responses from women suggest, land rights among Sabiny women remain weak. If barley relies on women's labor, but they

do not see any reward for this work, then it simply exacerbates women's disadvantaged position relative to men. Furthermore, the fact that households where women decide which crops to grow are less likely to sell barley than other households may mean that selling barley affects women's growing decision power negatively.

Female respondents report that their households benefit less financially from barley than do their male counterparts. This may be due to the household decision-making structures that households reported. Many of the women in the sample, as the descriptive statistics show, do not decide what to grow or buy. Therefore, they may give incorrect or underestimated accounts of the amount of money their households earn and expend because they handle little of the money. On the other hand, it is possible that the men in the sample exaggerate their funds. Further research is necessary to identify the cause of women's lower incomes and expenditures.

CHAPTER 8

CONCLUSION

As Uganda's population is young and concentrated in rural areas, development projects that focus on enhancing rural livelihood opportunities are necessary. By exploiting locally produced (and viable) crops, Uganda Breweries and Nile Breweries support internally-focused development in eastern Uganda. Rather than importing inputs, both breweries are developing local capacity for barley production.

The Effects of Selling Barley

The greatest benefits from selling barley likely come from the presence of two breweries competing for farmers' produce. As many Uganda Breweries sellers reported, their prices dropped and payments were delayed after years of selling. Only when Nile Breweries appeared did improvements come. If just one brewery were sourcing barley from Mount Elgon, the farmers would likely have to accept whatever price it offered or change cash crops, if possible. Instead, they have the option to switch breweries if the price offered at the beginning of the season is not high enough. Furthermore, as two large corporations are vying for barley from the same suppliers and neither brewery has yet filled its barley needs from local sources, it will likely take several years for the market to become saturated with suppliers.

Farmers are likely to benefit financially from this barley linkage with breweries as long as the competition between Nile and Uganda Breweries remains fierce. As long as the companies buy less barley than they would like, they will continue to chase barley aggressively. However, if one bests the other, farmers may see declining benefits.

SABMiller (Nile Breweries' parent company), in particular, aims to dominate every market

in which it competes. The company knows that in Africa, long-term profit and market domination require customers who have the means to purchase their products. Thus, it is doing its best to edge out local brews across the continent and ensure that its supply chains are firmly in place. Diageo's (Uganda Breweries' parent company) hands-off approach to brewing in East Africa, combined with the shift of responsibilities in their barley chain has likely contributed to the inefficiencies that are encouraging farmers to default on their seed and input loans. Unless it devotes more attention to Mount Elgon, its interests will continue to deteriorate due to its delayed payments and strong competition from Nile Breweries.

On Alcohol Consumption

While some may worry that Uganda and Nile Breweries' beers are supplanting the local brews common in Africa, others would argue that this is a good thing. While the replacement of local brews with commercial beers may have negative consequences for social ties maintained through alcohol, it also ensures that the level of alcohol in the beverages is non-toxic. Plus, in the case of the Sabiny, locally brewed beer has all but lost its former social significance. Instead, recent Sabiny religious and cultural opposition to commercial beer might have significant implications for barley's cultivation. It is possible that farmers cultivate barley for lack of other opportunities, rather than because they see it as an attractive livelihood option. If so, the public sector ought to explore income-generating activities in which they can comfortably participate. Doing so may involve government or NGO projects or efforts to attract foreign private sector actors.

Although this study found no statistically significant association between selling barley and income or expenditures, one may exist. If selling barley seems to have a positive effect on income, it probably has a positive effect on how available farmers find commercial

beer. As the WHO reports that changes in health can result from even a change in the availability of alcohol, the breweries' project will likely have long-term health implications. Whether their effects are positive due to increased income to pay for medical services or negative because of alcohol-related health problems remains to be seen.

As the responses from this sample show, most of the farmers in the sample are not averse to consuming alcohol. Therefore, they may be substituting commercial beer for a more nutritious local brew. Or, if cash is scarce, they may consume less than they desire. This development project is unique in that the cultivated crop may have detrimental effects on the consumer. In cases where the cultivator is the consumer, he or she may experience both its positive and negative effects. Whether farmers in this study are suffering negative health effects from alcohol consumption is a question that merits further study.

On Marginalized Groups

The Sabiny's move into the cash economy has decreased women's command over male labor. Whereas a woman used to be able to benefit from both her female and male neighbors' labor by brewing a pot of beer, now she can rely only on her children and other women, available to her only through cooperatives. Her husband may not always want to help on the farm and while her male neighbors may once have felt some responsibility to work for her, now helping her without cash is just a favor.

To the extent that women can participate in cash crop cultivation, the move to the cash economy is likely to challenge gender roles as encouraging women to earn cash poses challenges to household dynamics. While women are receiving guidance about entering into traditionally male roles, men receive no such guidance about how to adapt to new

realities. This fact is supported by the fact that both sexes ascribe agriculture problems to their gender. Such changes could become a source of conflict within households.

In the broader community, the development of the Sabiny is tied up with the development of the Pokot and Karamojong. If the breweries manage to help the Sabiny acquire assets, those assets will likely be subject to raiding by the Pokot and Karamojong. To ensure the long-term success of the Sabiny in Kapchorwa, Bukwo, and Kween, the breweries may want to consider including those peoples in a development project, perhaps contracting sorghum from them or encouraging them to form agricultural cooperatives for lean times.

On Culture

If, as Goldschmidt said, “not to participate in *moykets* is not to be Sebei,” then the meaning of being Sabiny is changing. The Sabiny’s integration into the cash economy is likely irreversible given its land constraints and growing population, as well as the near absence of *moykets*. Therefore, the use of an alcohol ingredient as a cash crop does not conflict with the traditional use of alcohol as a medium of exchange or social cohesion. It may, however, conflict with more recent moral institutions, such as Pentecostal churches and mosques.

The Future of Barley Selling in Uganda

Uganda Breweries and Nile Breweries’ local barley sourcing shows how private sector actors can be positive forces for development. Whereas the Ugandan government tried to launch a similar project and failed, the breweries have been able to affect farmers lives in tangible ways because they have the capital necessary to conduct private sector development. The fact that the recipients of this project, smallholders, are also the

companies' customers may facilitate their communication with the breweries about their demands.

Sourcing barley locally has the potential to save both Uganda Breweries and Nile Breweries money in the long term, in production costs, shipping and taxes. However, the fact that integrating local actors into the value chain incurs costs to the breweries may threaten the sustainability of that initiative. If ever the costs of local sourcing become untenable for the breweries, they may begin cutting costs through the value chain, possibly decreasing or reversing any gains they have helped bring to the region. Pursuing the development of a domestic beer value chain in Uganda does not just provide skills to the local communities and actors involved, it is also in Uganda and Nile Breweries' long-term best interests. The greater local consumers' purchasing power and the fewer alcohol-related incidents occur, the more beer the breweries can sell with the fewest legal and political problems. As the value chain development that the breweries have undertaken is extremely expensive, only large corporations would be able to emulate their efforts.

Limitations and Threats to Internal Validity

This survey might best be viewed as an exploratory study, providing descriptive information that could be useful to future studies examining the effects of barley cultivation for beer on the lives of smallholders. The composition and diversity of households' diets with different barley contracts or without any at all could give clues to its effects on household members' lives. Further research should also find ways to reach disadvantaged groups. The educational and income data presented here suggest that the farmers in this sample are not the poorest of the Sabiny on Mount Elgon. A larger study could also monitor spillover effects on Mount Elgon's economy.

Future studies in this area should also ensure that the terms used in the survey instruments are appropriate for Mount Elgon and close many of the unnecessarily open-ended questions. They should also take note of the proxy means that respondents gave to determine how the breweries are affecting farmers. Types of housing and clothing, as well as education, are reasonable starting points.

Health services should also be a major part of any future study of barley's effects. Although many farmers report having increased access to medical services because of selling barley, it would also be beneficial to know whether they have an increased need for them due to alcohol consumption. Any future survey should take into account the number of and reason for clinic and hospital visits, especially if the study is longitudinal. Due to a translation particularity, many survey respondents considered questions about changes in yields or medical services to be necessarily questions about positive phenomena. Often, respondents said they experienced no change when they experienced decreases. While as many of these occurrences as possible were corrected in the data, it is possible that some were not.

Another important topic to cover is religion, as it likely has a profound effect on whether and how farmers participate in barley cultivation for either brewery. It would also be useful to ask farmers to diagram their plots to show land use patterns. Doing so would give researchers an idea of how much of their land farmers devote to cash crops and food crops. It would also provide information about the quality of the land that different household members cultivate. Moreover, further research should take into account whether and for how long farmers allow their land to lie fallow. Combining farm visits with the survey would provide evidence about soil quality.

Although this paper presents a great deal of data about these smallholders in Kapchorwa and Bukwa Districts, they cannot prove *why* some farmers are better off than others or how their situations are likely to change. To determine how both Nile Breweries and Uganda Breweries are affecting their affiliated farmers, it is necessary to collect responses from the farmers over more than one time period. While the current data can show whether farmers selling beer have greater or lower incomes, more or less access to education and medical services, and more or fewer options for borrowing money, they show only a static illustration of farmers' situations and they can only *suggest* the cause of these differences.

While propensity score matching with a single cross section provides a reasonable counterfactual for barley sellers, the matched estimates of barley's effects might still catch effects from more than one source. Performing a double difference estimate with propensity score matching would better approximate the ways in which barley farmers would have fared had they chosen not to cultivate barley and how non-selling farmers might have fared had they chosen to cultivate barley.

Limits to External Validity

Because of the Sabiny's former relationship with alcohol as a medium of exchange and social guarantee, generalizing about development from their experiences with Nile Breweries and Uganda Breweries might seem difficult. However, given the fact that the Sabiny obtain their alcohol almost exclusively with cash now, their experience may be replicable. The most important factor in their experience is the presence of two large corporations competing for their produce. In other contexts where this is possible, smallholders are likely to gain from their presence.

Policy Concerns

Uganda Breweries and Nile Breweries' development endeavors depend on a stable government and political environment. Political upheaval or rapid financial and economic changes are likely to incur costs to the companies. The rapid and numerous redistrictings in Uganda point to political instability, which could threaten gains made through selling barley. If Uganda faces unexpected currency devaluation, products may become expensive quickly. In such a situation, farmers may depend ever more on the cash from barley, though the investment environment for the breweries may be undesirable.

Moreover, the public sector ought to monitor the breweries' environmental impacts. While it is in the breweries' long-term best interests to encourage farmers to grow barley sustainably, if they begin eyeing short-term profits, they may encourage extractive cultivation techniques. Furthermore, welcoming development projects enacted by breweries may not be a wise course of action for a country in which alcoholism and alcohol-related problems are common.

APPENDIX A

FARMER LIVELIHOOD SURVEY

This survey will help Cleo Roberts obtain her Master's degree in international development/development economics at American University in Washington, DC. She is not affiliated with and holds no contract with Uganda Breweries, Nile Breweries, or any farmers' group or association.

Instructions for the interviewer

Please write clearly. Doing so will ensure that all participants' answers are recorded correctly. Leave no space blank. If a question does not apply to a particular respondent, write "not applicable" or "Ø". Where the survey gives options (especially in brackets), please circle or write "√" next to the appropriate option. Please do your best to obtain responses to every question.

IMPORTANT!

- Ask the respondent if he or she would like his or her responses to remain anonymous. If yes, mark an "A" here:
- If there are any particular questions whose responses the respondent would like to keep anonymous or would not like to see quoted, please indicate this by marking an "A" next to those questions.

To be completed by the interviewer

District:

Municipality:

County:

Sub-county:

Parish:

Individual Characteristics

1. Name _____
2. Gender (Male or Female) _____
3. Age _____
4.
 - a. Are you married or living with a man or woman? (Yes or No)
 - b. If yes, do you have more than one spouse? (Yes or No)
5. What is your level of education? (none, primary, O-level, A-level, tertiary)
6. What is your mother language? _____

General Questions

7. How much rain was there in the last growing season? (light, moderate, or heavy)

8. Which crop/s are most commonly grown in your area?

9. Which crop/s do most farmers prefer to grow?

10.

a. Which crop/s do you prefer to grow?

b. Of the above, which do you actually grow?

11. How does school prepare one for farming?

12. How are agricultural product prices determined (apart from barley and epuripur)?

13. When are the growing seasons for the crops you grow?

14. Which characteristics are associated with:

a. Wealth

b. Poverty

15. Please indicate your well-being compared to others in the community.

a. Very poor

b. Poor

c. Average

d. Rich

e. Very rich

16.

a. Does your gender pose any challenges to farming? (Yes or No)

b. If yes, which ones?

Commercial Breweries

17.

- a. Have you heard of Nile Breweries? (Yes or No)
- b. Have you heard of Uganda Breweries? (Yes or No)
- c. If yes, how did you hear about them?

18.

- a. Do you sell any produce to Uganda Breweries? (Yes or No)
- b. If yes, which produce do you sell to Uganda Breweries?
- c. Do you sell any produce to Nile Breweries? (Yes or No)
- d. If yes, which produce do you sell to Nile Breweries? _____
- e. How much of your barley or epuripur produce did you sell to Nile Breweries? How much do you sell to Uganda Breweries? (kg)

- f. How much of your barley or epuripur did you sell to others? (kg)

- g. How long have you been selling to Nile Breweries? (Years or months)

- h. How did you begin selling to Nile Breweries?

- i. How long have you been selling to Uganda Breweries? (Years or months) _____
- j. How did you begin selling to Uganda Breweries?

Questions 19-22 are only for farmers who sell either barley or epuripur to either Uganda or Nile Breweries.

19.

- a. Before working with Nile Breweries, what did you expect from them?

- b. Before working with Uganda Breweries, what did you expect from them?

20. How has your life changed since you began to sell to either Uganda or Nile Breweries?

21.

- a. If you didn't sell to Uganda Breweries, to whom would you sell?

- b. If you didn't sell to Nile Breweries, to whom would you sell?

22.

- a. Do you consume Nile Breweries' products? (Yes or No)
b. Do you consume Uganda Breweries' products? (Yes or No)
c. If so, which ones?

- d. How many years have you consumed Uganda Breweries products?

- e. How many years have you consumed Nile Breweries products? ____

Household Characteristics (N.B. The respondent is included in the household)

23. How far is your household from the nearest town (km)? ____

24.

- a. How many adults stay in your household? ____
b. How many are females? ____
c. How many are males? ____

25.

- a. How many children live in your household? ____
b. How many are females? Indicate also whether they are in private, public, or no school.
i. ages 0-5 _____ schooling _____
ii. ages 6-10 _____ schooling _____
iii. ages 11-15 _____ schooling _____
iv. ages 16-19 _____ schooling _____
v. ages 20 + _____ schooling _____
c. How many are males? Indicate also whether they are in private, public, or no school.
i. ages 0-5 _____ schooling _____
ii. ages 6-10 _____ schooling _____
iii. ages 11-15 _____ schooling _____

- iv. ages 16-19 _____ schooling _____
- v. ages 20 + _____ schooling _____
26. How are the people in your household related to you? (spouse, own children, siblings, parents, other relatives, others)
- 27.
- How many days in a month do you stay with the members of your household? _____
 - If you stay apart from your household, why do you stay away from it?

28. What is the maximum level of education that the most educated person in your household has attained, including yourself? (none, primary, O-level, A-level, tertiary)
29. Who, in your household decides which crops to
- grow _____
 - consume _____
 - buy _____
 - Who decides how to spend the proceeds from your produce?

30. How much are your household expenses?
- Monthly _____
 - Annually _____
31. How much is your household income?
- Monthly _____
 - Annually _____
32. Which mode of transport do you use to move yourself and other members of your household? _____
33. Which produce (from any source) does your household consume?

34. Which sanitation services are available to your household?

- 35.
- Do you have running water at home? (Yes or No)
 - If no, do you have access elsewhere? (Yes or No)
- 36.
- Do you have electricity at home? (Yes or No)
 - If no, do you have access elsewhere? (Yes or No)
37. How much do you expect to earn from barley or epuripur this growing season? _____

38. This question is only for farmers who sell either barley or epuripur to Uganda Breweries or Nile Breweries.

- a. Has your household income changed since you began selling to Nile Breweries? (Yes or No)
- b. If yes, has it increased or decreased? _____
- c. Does more of your household income come from barley or epuripur now than it did before you started selling to Nile Breweries? (Yes or No)
- d. Has your household income changed since you began selling to Nile Breweries? (Yes or No)
- e. If yes, has it increased or decreased? _____
- f. Does more of your household income come from barley or epuripur now than it did before you started selling to Nile Breweries? (Yes or No)

39.

- a. Have you got other sources of income besides barley or epuripur? (Yes or No)
- b. If yes, please list them.

40. This question is only for farmers who sell either barley or epuripur to Uganda Breweries or Nile Breweries.

- a. Have you stopped any other income-generating activities since beginning to sell barley or epuripur to Nile Breweries? (Yes or No)
- b. Have you stopped any other income-generating activities since beginning to sell barley or epuripur to Uganda Breweries? (Yes or No)
- c. If yes, under which circumstances would you begin to do those other activities again?

Farm Characteristics

41. How large is your farm? (Indicate hectares or acres)

42. Which produce (that you grow) do you consume?

43. Which produce (that you grow) do you sell?

44. How many growing seasons do you have for each crop?

45. What was the yield of either barley or epuripur in the last growing season? (Please indicate either kilograms per hectare or kilograms per acre)_____

46.

- a. Do you keep livestock? (Yes or No)
- b. If yes, which livestock?

- c. What are the benefits to you of keeping livestock?

- d. Do you seek veterinary services for them? (Yes or No)

- e. Which challenges do you face in keeping livestock?

47.

- a. Do you have any experience with contamination or environmental degradation on your farm? (Yes or No)
- b. If yes, what kind?

48. Do you own your land? (Yes or No)

49. Do you share your land with anyone? (Yes or No)

50.

- a. Do you employ anyone on your farm? (Yes or No)
- b. If yes, how many people? _____

51. These questions are for those who own their land.

- a. If you were to sell your farm today, how much money would you ask? (UGX per acre) _____
- b. How much would you have asked for your farm before starting to work with Nile Breweries? (UGX per acre)

- c. How much would you have asked for your farm before starting to work with Uganda Breweries? (UGX per acre)

- d. If you were to hire your land today, how much money would you ask? (Indicate UGX per acre per year) _____

- e. How much would you have asked to hire your land before starting to work with Nile Breweries? (Indicate UGX per acre per year)

- f. How much would you have asked to hire your land before starting to work with Uganda Breweries? (Indicate UGX per acre per year)

52. These questions are for those who hire land.

- a. How much do you hire your land per acre per year?

- b. How much did you hire your land per acre per year before selling to Nile Breweries? (Indicate UGX per acre per year)

- c. How much did you hire your land per acre per year before selling to Uganda Breweries? (Indicate UGX per acre per year)_____

Questions 53-54 are only for farmers who sell either barley or epuripur to either Uganda or Nile Breweries.

53.

- a. How much money do you receive for each kilogram of either barley or epuripur? (UGX) _____
- b. If you didn't sell to Nile Breweries, how much money would you receive for each kilogram of either barley or epuripur? (UGX)

- c. If you didn't sell to Uganda Breweries, how much money would you receive for each kilogram of either barley or epuripur? (UGX)

54.

- a. Has your yield changed since you began selling to Uganda Breweries? (Yes, No or Doesn't Apply)
- b. If yes, has it increased or decreased? _____
- c. Has your yield changed since you began selling to Nile Breweries? (Yes, No or Doesn't Apply)
- d. If yes, has it increased or decreased? _____

Farming Community

55. How do you interact with other farmers? (For example, in field days, in shows, in the marketplace, in politics, etc.)

56. How do you give and receive information from other farmers? (For example, newspapers, radio, conversation, meetings, trainings, etc.)

57. How useful is this information, usually?

58.

- a. Do you belong to a farmer group or association? (Yes or No)
- b. If yes, what kind of help do you receive from your group or association?

Farming Behavior

59. What activities are necessary for barley or epuripur production?

60. Please list the inputs you use for barley or epuripur?

61. Where do you obtain these inputs? (For example, open market, your farming group or association, companies, etc.)

62. Do you use any second-generation seeds? (Yes or No)

63. How and where do you obtain water for your farm?

64.

- a. If you sell to Nile Breweries, has your need for water changed since you started selling to them? (Yes, No, or Doesn't Apply)
- b. If yes, has it increased or decreased? _____
- c. If you sell to Uganda Breweries, has your need for water changed since you started selling to them? (Yes, No, or Doesn't Apply)
- d. If yes, has it increased or decreased? _____

65. Do you use any of the following?

- a. Inorganic fertilizer (Yes or No)
- b. Organic fertilizer (Yes or No)
 - i. Compost (Yes or No)
 - ii. Farmyard manure (Yes or No)
 - iii. Green manure (Yes or No)
- c. Why do you choose to use or not use any of the above?

66. Which modes of transport do you use to move your produce?

67. Which pests, weeds, and diseases are common to your barley or epuripur garden?

- a. Pests _____
- b. Weeds _____
- c. Diseases _____

68. How do you protect your crops from the above?

a. Pests

b. Weeds

c. Diseases

69.

a. Which tools or equipment do you use on your farm?

b. Where do you obtain them?

70. How do you store your produce?

a. Bags

b. Granaries

c. Silos

d. Your house

e. Other (describe) _____

71.

a. Do you rotate your barley or epuripur plots? (Yes or No)

b. How often?

i. Every growing season

ii. Every year

iii. Every two years

iv. Not at all

v. Other intervals (Please indicate) _____

c. With which crop do you rotate barley or epuripur?

72.

a. What are some of the dangers or challenges that you face in farming?

i. _____

ii. _____

iii. _____

iv. _____

b. How do you deal with these problems?

i. _____

ii. _____

iii. _____

iv. _____

Coping Mechanisms

73. What would you do if your barley or epuripur produce were destroyed? (For example, by disease or a natural calamity)

74.

- a. Do you have access to credit? (Yes or No)
- b. If yes, from where?

- c. Do you currently receive credit from any source, including family and friends? (Yes or No)
- d. If yes, how much? _____
- e. For what purpose do you use this credit?

75.

- a. Have you experienced post-harvest losses last season? (Yes or No)
- b. If yes, from what? _____

76.

- a. If you sell to Uganda Breweries, has anything prevented you from selling as much barley or epuripur to them as you expected? (Yes, No, or Doesn't Apply)
- b. If yes, what? _____
- c. If you sell to Nile Breweries, has anything prevented you from selling as much barley or epuripur to them as you expected? (Yes, No, or Doesn't Apply)
- d. If yes, what? _____

77. This question is only for farmers who sell either barley or epuripur to Uganda Breweries or Nile Breweries.

- a. If you sell to Nile Breweries, how has your access to medical services changed since you began selling to them?

- b. If you sell to Uganda Breweries, how has your access to medical services changed since you began selling to them?

Drinking Behavior

78. Which alcoholic beverages do you consume?
- a. Local brew
 - b. Commercially sold beer
 - c. Spirits
 - d. Wine
 - e. Other _____
 - f. None
 - g. Of the above, which is your favorite? _____
 - h. Which do you drink most often? _____
 - i. How many do you take at once? _____
79. What is your goal when you drink?
- a. Becoming drunk
 - b. Passing time
 - c. Tasting a good beer
 - d. Being social
 - e. Other _____

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