Local Food Policy & Consumer Food Cooperatives: Evolutionary Case Studies

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LOCAL FOOD POLICY & CONSUMER FOOD COOPERATIVES:

EVOLUTIONARY CASE STUDIES

By

Afton Hupper

B.S. University of Maine, 2017

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Darwin’s theory of natural selection has played a central role in the development of the biological sciences, but evolution can also explain change in human culture. Institutions, mechanisms that govern behavior and social order, are important subjects of cultural evolution. Institutions can help stabilize cooperation, defined as behavior that benefits others, often at a personal cost. Cooperation is important for solving social dilemmas, scenarios in which the interests of the individual conflict with those of the group. A number of mechanisms by which institutions evolve to support cooperation have been identified, yet theoretical models of institutional change have rarely been applied to local food institutions, which may be sustained by cooperation (Ikerd, 2012; Renting, Schermer, & Rossi, 2012; Tremblay & Waring, 2015).

This thesis poses the general question, *how do local food institutions and organizations evolve?*

Chapter one uses a macro-evolutionary framework to explore the emergence and spread of two local food policies over time and space. First, I demonstrate how the rapid proliferation of cottage food laws in the U.S. is consistent with positive selection pressure at the individual, group, and state levels. Second, I illustrate how social learning and group transmission played a key role in the spread and diffusion of a municipal food sovereignty ordinance in Maine,
ultimately changing selection pressure at the state level and amplifying town-level adoption. Finally, I offer concluding thoughts about the application of this framework to similar cases, including the propagation of single-use plastic bag bans.

Chapter two serves as a micro-evolutionary analysis of organizational change in food buying clubs, small organizations which use collective purchasing power to obtain bulk quantities of organic, local, and specialty foods. Since these groups require cooperation from members through order-sharing and shared work tasks, I hypothesize that successful clubs possess traits which allow them to sustain cooperation and overcome social dilemmas. I predict that club members will be cooperative toward their groups, and that successful clubs will exercise generalized reciprocity and adopt rules to stabilize cooperation. Data from online surveys, experimental economic games, and phone interviews were analyzed using mixed methods to identify patterns of cooperation in groups. My results provide general support for my hypothesis that successful clubs have adaptations suited to overcome challenges. Specifically, I find that 1) buying club members are especially cooperative toward their groups when compared to other populations, 2) clubs exercise reciprocity in order-sharing, 3) reciprocity itself may not be a group adaptation, but group size is sufficient to support reciprocity in clubs, and 4) the adoption of rules is likely a key factor in club success and longevity. Finally, I offer practical advice for buying club management and operation.
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CHAPTER 1
LOCAL FOOD POLICY & AUTONOMY IN THE UNITED STATES:
AN EVOLUTIONARY ANALYSIS

Introduction

In the period following the Second World War, rapid technological advancement led to an increase in the use of agricultural pesticides, fertilizers, and new strains of high yield crops around the world (Pingali, 2012). Known as “The Green Revolution,” this era brought tremendous growth in agricultural output and helped to forge a new global food economy. Pioneers of this revolution were praised for alleviating hunger. Most notably Norman Borlaug was awarded the Nobel Peace Prize in 1970 for his efforts to fight food insecurity by developing highly modernized agricultural systems of much larger scale than traditional systems (Hesser & Carter, 2006). While such systems are extremely efficient, providing an abundance of high-calorie foods at low costs to consumers, they have also given rise to many concerns including negative human health impacts, loss of biodiversity and ecosystem services, climate change, and new challenges for small-scale farming operations and local food systems (Pollan, 2006). Recent interest in small-scale, local, and sustainable food provision is largely motivated by increasing public concern about industrial, commodity-driven food systems, as in the U.S. and other nations around the world (Oosterveer, Sonnenfeld, & Sonnenfeld, 2012).

The recent surge in consumer demand for locally-produced food in the U.S. is rooted in the movement toward a more resilient, sustainable, community-governed food system (Martinez, 2010). Organizations including farmers’ markets, food hubs, buying clubs, food co-ops, and community-supported agriculture (CSA) expand consumer choices and allow for more democratic participation in the food system (Renting et al., 2012). These business models
provide alternatives to traditional markets, strengthening consumer freedom of choice and helping communities build a sense of autonomy over their food production. The U.S. local food movement is also closely related to the global movement toward food sovereignty, defined as “the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems” (“What is Food Sovereignty,” 2013). The food sovereignty movement has been gaining momentum since the 1990s when it was pioneered by members of La Vía Campesina, an international organization of farmers dedicated to advocating for peasant rights, sustainable food production, and global food security. Activists have described food sovereignty as a movement away from the global, neoliberal, industrial food system toward a more just, sustainable, and localized system (Patel, 2009; Shiva, 2005). Since the 1990s, formal declarations of food sovereignty have been spreading and diffusing from rural to urban areas around the world (McMichael, 2014). The Food Sovereignty movement outlines broad policy goals for national governments and other political bodies, including equitable land ownership, property rights reform, farmer rights to save seed, fair prices for producers and consumers, subsidies for small-scale producers and workers, increased funding for agricultural extension services, and citizen involvement in policy design and implementation (Pimbert, 2009). Seven countries have adopted formal food sovereignty legislation, including Ecuador, Venezuela, Mali, Bolivia, Nepal, Senegal, and Egypt (Wittman, Desmarais, & Wiebe, 2010). While the United States has yet to adopt food sovereignty legislation at the federal level, there is evidence that related policies have been emerging and spreading at the municipal and state levels, which will be explored further in this chapter.
In the U.S., the food sovereignty movement has manifested in the widespread adoption of cottage food laws, which aim to support small-scale producers of low-risk, shelf-stable food items by exempting them from state regulations (Rice, Leib, & Balkus, 2018). Cottage food laws have been taken a step further in states such as Wyoming, which passed the “Food Freedom Act” in 2015 and recently amended it to exempt the in-state production and sale of meat products from regulation (Food Freedom Act-Amendments, 2017). North Dakota was the second state to adopt similar legislation in 2017, and Utah passed a more restrictive version in 2018 (Sibilla, 2019).

The state of Maine has recently experienced the spread of a municipal food sovereignty ordinance, which exempts the local sale of raw and perishable items from state licensure and inspection. This municipal ordinance has spread rapidly across the state since 2011 (St. Peter, 2011), and was reinforced by the state’s adoption of the Maine Food Sovereignty Act in 2017 (Bayly, 2017). The aim of this chapter is to shed light on the process of policy evolution across multiple levels of governance by studying the emergence and spread of cottage food laws in the U.S. and food sovereignty ordinances in Maine.

**Economic Conditions & Policy Considerations**

Increasing efficiency in the agriculture sector has created challenging economic conditions for small and mid-size farms, which have been experiencing a long term decline in the U.S. since the period following the Green Revolution (Wadley, 1985). The share of total annual farm sales generated by small farming operations (generating less than $250,000 in sales) has rapidly declined, with small farms accounting for only 14 percent of sales in 2007, down from 41 percent in 1982 (Hoppe, 2010). The Green Revolution, in tandem with commodity-focused government subsidies, has created a path-dependent food system in the U.S. where the increasing need to maximize efficiency through industrial practices has stymied the growth and success of
small-scale, diversified farms (Gowdy & Baveye, 2018; Iles & Marsh, 2012). Mid-size farms, known as “agriculture of the middle,” may face an even steeper challenge in this economic climate because they are not well suited for bulk commodity production or in-person sale of specialty items (Thompson & Gaskin, 2018).

Policymakers have been challenged to offer solutions that help small-scale food industries thrive in these economic conditions. At the federal level, the Farm Bill includes key provisions for local food, including planning and implementation grants (Starmer, 2017), expansion of EBT benefits to farmers’ markets, and support for research in areas like organic farming, farmland stewardship, crop innovation (“SNAP in the Farm Bill”). Local food policies have also been spreading at the state level. For example, Maine’s L.D. 1584 was signed into law in 2018, requiring all Maine government institutions (except local schools) to source 20 percent of food from local producers by 2025 (Strout, 2018). This act was inspired by many higher education institutions, which have recently pledged to source a certain percent of foods locally by a given date (Pols, 2018).

A grassroots movement toward food sovereignty has also emerged at the municipal and state levels in the form of deregulation. The movement toward the deregulation of local food is a direct response to the 2011 Food Safety Modernization Act (FSMA), which sought to reduce foodborne illness outbreaks by expanding the FDA’s authority on food production, harvest, and processing (Food Safety Modernization Act, 2011). Proponents of deregulation argue that the FSMA favors industrial systems and undermines small-scale farmers by imposing crippling costs with respect to licensing and inspection (Kurtz, 2015). The enactment of the FSMA, coupled with the 2008 recession which led to the rise of the gig economy (Friedman, 2014), created conditions ripe for the spread of cottage food and food sovereignty legislation in the early 2010s.
The pressure to generate additional income streams rose during the recession, which spurred growth in the cottage food industry (Burger, 2017). Contrary to other industries, the local food industry has continued to grow in the period following the 2008 recession. Between 2007 and 2015, the number of farmers’ markets in the U.S. grew 180 percent, the number of food hubs increased threefold, and farm-to-school programs grew 430 percent (Low, 2015). This trend suggests that local food institutions can be resilient and even thrive during times of economic downturn.

The neoclassical economic view offers insight into some of the driving forces behind the spread of cottage food and food sovereignty legislation. Rational choice theory holds that the collective behavior of a society is driven by individual, utility-maximizing choices (Blume & Easley, 2008). Neoclassical economists might argue that municipalities and states, seeking to maximize benefits, will adopt legislation at based upon local industry needs and comparative advantages. For instance, because cottage food laws reduce costs for small home bakers, states with larger home baking industries might be more likely to adopt such policies. In the case of the food sovereignty ordinance, which reduces costs for small farms, towns with more small farms may be more likely to adopt this type of policy than those with large farming operations or no farming industry at all. Economic theory helps explain the choice of whether or not to adopt certain legislation, given the associated benefits and costs. However, this approach does not necessarily help explain how policies might spread via social learning between individuals and groups.

**Policy Diffusion**

Recent literature examining the mechanisms of policy emergence and spread represents a departure from the more traditional, top-down legislation framework. The growing body of
literature on multilevel governance, particularly in the natural resource management context, emphasizes the importance of decision-making at every level from local organizations to global institutions (Lang, Barling, & Caraher, 2001; Nelson & Winter, 2002; Piattoni, 2009; Stephenson, 2013). Research has shown that “local-level governments can evolve into a resilient collaboration of multi-level governance when national institutions recognize the importance of smaller governance units and work with them rather than destroying them” (Ostrom & Janssen, 2005). Other work has focused on analyzing the specific mechanisms of policy spread and diffusion across different levels of governance. Policy diffusion is the idea that states and localities may serve as “policy laboratories” which aid in the geographical and hierarchical spread of policies. Political scientists have been studying and debating the mechanisms of policy spread and diffusion for decades (Shipan & Volden, 2006, 2006; Tews, 2005; Tews, Busch, & Jörgens, 2003). Shipan and Volden observed three mechanisms of policy diffusion: learning from, competing with, and imitating other entities, as well as being coerced by state governments. Tews’ work has focused on environmental policy diffusion at the international level, as well as the diffusion of ideas in the field and policy convergence.

**Framework: Cultural Multilevel Selection Theory**

Building on the policy diffusion literature, I propose the use of an evolutionary framework to add explanatory and predictive value to the case of food autonomy laws in the United States. Anthropologists, psychologists and economists have used the generalized framework of adaptive evolution to identify patterns in individual and group behavior over time and develop causal mechanistic explanations and predictive tools. Natural selection, the process by which adaptive evolution occurs, requires three elements: variation, transmission, and selection. Variation is defined as differences among traits in individuals, transmission or heredity
is the passing on of traits from one generation to the next, and selection is the differential survival and/or reproduction of individuals due to trait variation (Darwin, 1859). Adaptive evolution is distinguished from genetic drift, or random fluctuations in a trait due to chance variation in random copying (Hahn & Bentley, 2003). While Darwin’s work was largely predicated on individual-level selection, he conjectured that natural selection may also operate on ethical principles (Darwin, 1859), hinting at the concept of cultural evolution via group-level selection (Hodgson & Knudsen, 2010). The theory of group selection describes the evolutionary process by which intergroup competition drives group-advantageous behavior, often leading more cooperative groups to outcompete less cooperative ones. This theory paved the way for the development of Multilevel Selection Theory (MLS), which suggests that the Darwinian principles of variation, transmission and selection operate at numerous levels from genes, to cells, to organisms, and groups of organisms (Wilson & Wilson, 2007).

Cultural evolution uses Darwinian principles to explain how language and institutions function as social mechanisms of inheritance or units of replication (Mesoudi, Whiten, & Laland, 2004). Similar to the way genes are passed down from one generation to the next, cultural traits including languages, music, art, tools, technologies, and religions are transmitted through cultural inheritance, peer influence, parent-offspring correlations, and descent in culture. Multilevel selection recognizes that in theory, selection can happen at any level. The level at which selection is strongest is known as the dominant level of selection (Okasha, 2006).

**Evolutionary Social Science as a Tool for Policy Analysis**

The value of evolutionary social science is that it ties together the most useful elements from economics, psychology, and anthropology into one framework driven by observable biological principles (Gintis, 2014). It is unrealistic to expect the social sciences to converge to
one general understanding, given their fragmented nature. In fact, disciplines are more likely to diverge from one another, underscoring the need for a unifying framework (Wilson & Gowdy, 2013). Applying an evolutionary framework to the social sciences adds great richness to our collective understanding of who we are, how we became this way, and how we can make decisions today to better our prospects in the future.

There are many tools from evolution that can be applied to political science. Leveraging intergroup competition, for instance, can be used in policy analysis and development. Henrich (2015) explains how different forms of intergroup competition, including differential group survival (successful groups survive in harsh environments), migration (successful groups grow through immigration), reproduction (successful groups grow through reproduction), and prestige-based between-group learning (individuals learn from other individuals in successful groups), drive the spread and evolution of culture. Understanding how culture evolves can help policymakers identify conditions which may support or hinder the spread and diffusion of policies across time and space.

The use of evolutionary principles to help explain the emergence and adoption of policies over time has been utilized in a handful of studies. Waring and Acheson (2018) implement a rubric for cultural group selection to analyze the history of lobster fishing laws and regulations on the coast of Maine, including the v-notch law, escape-vent law, and voluntary trap limits. The authors identified between-group imitation and learning as the dominant mechanisms of group selection in this context, suggesting the adoption of lobster fishing policy is largely a social phenomenon among harvesters, managers and other key stakeholders in the industry. The case of the Maine lobster industry provides an example of the value of multilevel selection for understanding policy evolution. Waring et al. (2015) develop a multilevel evolutionary
framework for analyzing sustainability behavior and policy. Here, I will use this framework to study two cases of local food policy diffusion. Following Waring et al. (2015), I will track evolutionary factors in each case by detailing the focal trait, policy environment, history, and levels of selection.

**Case Study Analyses**

**Focal Trait: Cottage Food Laws in the U.S.**

Cottage food laws across the United States seek to support local food systems by exempting cottage food operations from food safety regulations and licensing. Cottage food operations are small, in-home kitchens run by individuals who sell and market their products locally. While cottage food laws vary from state to state, the term “cottage food” typically includes non-hazardous or shelf-stable items like baked goods, jams and other preserved foods, dry baking mixes, granola, popcorn, and candies. These laws generally do not provide protections for raw meat, dairy, eggs, or other perishable items. While the food sovereignty movement and related “food freedom” laws are generally more comprehensive by allowing the sale of raw and perishable items, cottage food laws provide opportunities for small-scale, artisanal, and local food businesses to thrive.

**Policy Environment.** The Tenth Amendment of the U.S. Constitution grants all states the right to regulate the intrastate production and sale of foods. While the federal government maintains control of interstate commerce, foods produced and consumed within state lines are regulated by the states themselves (Rice et al., 2018). The adoption of cottage food laws across U.S. states over the last thirty years has been driven in large part by growing demand for locally-produced foods. Locally-produced food sales rose from $5 billion in 2008 to $12 billion in 2014, a trend which is expected to continue by reaching $20 billion by 2019 (Vilsack, 2016).
**History.** The first cottage food law in the U.S. was passed in Vermont in 1951, with Maine and New York later adopting similar laws in 1980. Cottage food law data collected from LawAtlas.org (2017) and the Harvard Law School Food Law and Policy Clinic (2018) show that these laws continued to spread across jurisdictions throughout the 1990s, and gained momentum in the late 2000s and 2010s. From 2007-2012, an average of five states per year adopted some type of cottage food law (Burger, 2017). As of 2018, all U.S. states except for New Jersey have adopted some type of cottage food law which aims to protect small-scale food businesses (Rice et al., 2018). The spread of these laws appears to be partly determined by geographical proximity, spreading from the Northeast, to the Midwest, and finally to the perimeter states (see Figure 1.1).

The passage of these cottage food laws has led to the revival of the age-old cottage food industry. A survey of 775 cottage food producers in 22 states found that cottage food laws have been important for rural economic development by providing entrepreneurial opportunities, particularly for women with below-average income (McDonald, 2017). This study also found that industrial-scale food regulations can hinder the viability of cottage foods, but well-designed cottage food laws provide the flexibility and support needed to help these businesses thrive.
Levels of Selection. The adoption of cottage food laws is typically favored by cottage food producers and consumers who stand to gain an economic advantage from their passage. These laws may increase small scale food production and support the growth of this industry, particularly in rural areas. Thus, perhaps there is a positive selection for political support for cottage food laws among producers and consumers. Social learning has been an important mechanism for the spread of this policy at the individual level; the excitement around the movement has inspired entrepreneurs and patrons of local food to spread the word (Morris, 2011). Spatial diffusion may also play a role in the spread of these laws, as states in closer

1 Not shown: Alaska and Hawaii adopted cottage food laws in 2012 and 2017, respectively
proximity appear to have adopted them around the same time period (see Figure 1). This provides evidence of social transmission between states. Producers have also engaged with these laws by bringing lawsuits to court in states with more restrictive laws or no cottage food provision at all. These challenges have been successful in establishing and improving existing cottage food laws in states like Minnesota and Wisconsin. At the next level, selection is supported by groups of businesses and associations, including the New Jersey Home Bakers Association, which have also brought legal challenges to the state laws regarding cottage food production (Rice et al., 2018).

At the level of the state legislature, the popularity and widespread success of cottage food laws suggest that selection favors adoption. The U.S. federal system, granting the power to govern intrastate commerce to the states, has played a key role in allowing the spread of such laws. The case of cottage food laws is an excellent example of states serving as laboratories of democracy, a key motivation of federalist and multilevel governance structures (New State Ice Co. v. Leibmann, 1932). The successful legal cases brought forth by businesses and associations in order to institute, alter and improve cottage food laws show that the courts also favor cottage food laws, and serve as an important mechanism for businesses owners to self-advocate and influence public policy. The courts also allow the process of policy adoption to be iterative, as laws continue to evolve by being re-shaped and improved by governing bodies to better suit the changing needs of small businesses and the local food economy more broadly (Rice et al., 2018).

**Summary.** The widespread and rapid adoption of cottage food laws across the U.S. in recent years is an example of how policies can spread across jurisdictions given the right conditions. A number of social and economic factors including growing demand for local food, harsh economic conditions as a result of the Great Recession, and the constitutional right of states to
self-govern appear to have created positive selection pressure favoring policy adoption at multiple levels.

**Focal Trait: Maine’s Food Sovereignty Ordinance**

Maine’s municipal food sovereignty ordinance, titled the “Local Food and Community Self-Governance Ordinance” (LFCSGO) declares the right of a townspeople to “produce, process, sell, purchase, and consume local foods” by exempting small producers from state licensure, inspection, liability, and all other state food regulations pertaining to direct producer-to-consumer transactions (Local Food and Community Self-Governance Ordinance (Template), 2017). While the LFCSGO (commonly referred to as the food sovereignty ordinance, or FSO) does not apply to meat or poultry production, which is regulated by the state’s inspection program, it exempts the production and direct sale of dairy, eggs, produce and other perishable items from state food regulations. The rapid spread of the FSO across Maine towns from 2011-2018 represents an amplification of the cottage food movement, seeking to protect small-scale producers from burdensome regulations. The ordinance’s provisions make it more comprehensive and aggressive than cottage food laws, suggesting that cottage food laws alone might not go far enough in areas where local food systems and more traditional foodways are thriving.

**Policy Environment.** Demand for locally-produced foods has been on the rise in the U.S. since the late 2000s (Day-Farnsworth et al., 2009). This growth in demand has been observed in Maine, with 80 percent of Maine consumers preferring food grown, raised or caught in Maine in 2013 (Maine Food Strategy, 2014). Changing demands have led to an increase in the value of Maine’s crop and livestock operations by 24% from 2007-2012 and the number of farms by 13.6% during this period (Valigra, 2014). Young people are also seeking farming careers in
Maine, with a 185 percent increase in the number of Maine farmers age 25-34 from 2002-2007 (Harlow, 2013) contrasting with the national trend of rapidly aging farmers (USDA, 2017).

Growth in Maine’s local food sector has led to increased interest in the legal ramifications of small-scale food production, particularly the sale of raw meats, dairy and eggs. The cost of compliance with state regulations presents a significant burden to small producers in the state, who have attempted but failed to institute scale-appropriate state regulations (Kurtz, 2015). Failure to induce legal changes at the state level sparked the inception and spread of the LFCSGO throughout the state, beginning in 2011 and continuing into 2018.

**History.** Maine’s food sovereignty ordinance was first penned and adopted in 2011 by five coastal Maine towns: Blue Hill, Penobscot, Sedgwick, Trenton, and Hope. A key driving factor in the spread of the FSO has been Local Food Rules (LFR), a group of activists led by farmer Heather Retberg of Quill’s End Farm in Penobscot. Since its formation in 2011, LFR has been working to help Maine towns pass the ordinance. Data collected from LocalFoodRules.org (2018) show that a total of 45 municipalities representing thirteen of Maine’s counties have adopted the ordinance (see Figure 1.2). The spread of the municipal ordinance across Maine appears to be at least partly influenced by geographical proximity, beginning in the Midcoast region and spreading through the interior of the state, suggesting that the adoption of the FSO may also be transmitted via social learning from friends and neighbors.

Until recently, the ordinance itself did not provide any legal protection at the state level for farmers. The first test of the ordinance’s legal validity failed in 2013 when Blue Hill farmer Dan Brown was issued an injunction for the unlicensed sale of raw milk (Kurtz, 2015). This act outraged supporters of the food sovereignty movement, which built awareness and encouraged the spread of the ordinance across the state. In 2017, the Maine legislature passed and signed into
law An Act to Recognize Local Control Regarding Food Systems (also referred to as the Maine Food Sovereignty Act, or LD 725), which recognizes the right of a Maine municipality to adopt and enforce its own FSO, and exempts “food products that are grown, produced or processed by individuals within that municipality who sell directly to consumers” from state law (Maine Food Sovereignty Act, 2017).

Figure 1.2. Adoption of a Local Food Sovereignty Ordinance in Maine
Data provided by LocalFoodRules.org

Levels of Selection. At the individual level, the adoption of the FSO is supported by local food consumers and producers who wish to deregulate the industry. High input costs and low profit margins have motivated small-scale farms to support the ordinance, which frees them from
costly state regulations. Those who do not support the ordinance include citizens concerned with food safety aspects as well as producers who follow current rules and would like others to do the same. Large dairy producers including The Maine Cheese Guild has opposed various food sovereignty measures due to their high standards and emphasis on quality (Dowling, 2013). Local food patrons and activists are motivated to support the ordinance because it aims to build a stronger local food system throughout the state by lowering the costs of food production. At the municipal level, adoption of the ordinance is supported by social learning and cultural group transmission between towns, due in large part to campaign efforts by the grassroots organization Local Food Rules. This is evident in the spatial diffusion of the ordinance, where towns in close proximity appeared to adopt the ordinance around the same time (see Figure 1.2). County-level courts have not supported the ordinance in previous legal decisions. The FSO failed to prevent the Hancock County Superior Court from issuing an injunction against Mr. Dan Brown for distributing raw milk without a license in Blue Hill, which had adopted the ordinance in 2011 (Kurtz, 2015).

The confines of the state legal system appear to have selected against the ordinance at the level of the Maine state judiciary. As a result, the ordinance was deemed unconstitutional by the Maine Supreme Court in 2014 (State of Maine v. Dan Brown, 2014). The municipal ordinance failed to protect Mr. Brown from an injunction first issued by the county court, and later affirmed by the state court. However, support for the ordinance at the state level changed directions when the legislature passed the Maine Food Sovereignty Act with bipartisan support, which was signed into law by Governor Paul LePage in 2017. This act recognizes the right of towns to enforce food sovereignty ordinances under Maine’s home rule authority ("The Maine Food Sovereignty Act", 2017). Maine legislators supported this bill due to widespread enthusiasm among
constituents for the municipal ordinance, which diffused from the municipal level to the state level via cultural group transmission. The passage of the 2017 act created a powerful institutional change, evident in the 22 municipal ordinance adoptions which followed in 2018, representing nearly half of all adoptions since inception of the ordinance in 2011 (see Figure 2). This is an excellent example of multi-directional policy spread, from municipal to state level, and from state to municipal level. As a result, adoption of the ordinance created a positive feedback: towns adopted the ordinance, and the state formally recognized it, in turn encouraging more towns to adopt the ordinance.

**Summary.** Maine’s municipal food sovereignty ordinance is a strong example of local adaptation in the face of institutional challenges. What began as a small, grassroots movement of small farmers and local food patrons grew and became strong enough to spread across municipalities, ultimately reversing the direction of state policy on the issue. The diffusion of this policy across municipalities and multiple levels of governance created a positive feedback mechanism, in which support for ordinance adoption at the municipal level is amplified by support at the state level.

**Discussion & Conclusions**

These two case studies have demonstrated the spread of local food policy over time and space across multiple levels of governance, using an evolutionary framework to illustrate the mechanisms involved in the policy diffusion process. The cases of cottage food and food sovereignty tell the story of the emergence and spread of local food autonomy laws in the U.S. The spread of cottage food laws gained momentum in the 1990s, around the time of the inception of the food sovereignty movement. While these laws vary, they generally exempt small, in-home food production of shelf-stable items (e.g. jams, baked goods, candies, etc.) from state food
safety regulations and licensure. The right of states to control intrastate commerce, growing
demand for local food, and harsh economic conditions have played a role in determining the
selection pressure in favor of the adoption of cottage food laws at the individual, group, and state
levels. As a result of this pressure to adopt across multiple levels, the spread of cottage food laws
in the U.S. has become a strong example of how policies can spread and diffuse rapidly given the
right conditions.

Building on the food sovereignty movement, the state of Maine recently experienced the
widespread adoption and diffusion of a municipal food sovereignty ordinance, which exempts
the direct farm-to-consumer sale of eggs, dairy, produce and other perishables from compliance
with state regulations and licensure. Individual-level pressure in favor of the FSO has helped it
spread, as patrons and farmers alike benefit from the deregulation of local foods, which lowers
the costs of production. Social learning and group transmission between towns was also
important in the FSO’s spread. While legal constraints and precedent challenged the FSO at the
state level, where it was struck down in 2014 (State of Maine v. Dan Brown) by the Maine
Supreme Court, the diffusion of the FSO eventually led to the state’s adoption of the Maine Food
Sovereignty Act (LD 725), recognizing the right of towns to adopt ordinances and reversing the
direction of state-level pressure. The diffusion of the FSO to the state level created a positive
feedback in which town-level selection was amplified after the passage of LD 725.

One limitation of this analysis is that, without data on industry outcomes (e.g. profits,
survival rates, and other success measures), it is not possible to determine whether or not these
policies are actually being selected for, and hence whether or not they are truly adaptive.
Alternatively, evidence suggests that these case studies may be examples of non-adaptive drift,
with traits being copied and transmitted randomly. Some evidence has emerged to suggest that
cottage food laws have allowed the industry to thrive and grow (McDonald, 2017; Sibilla, 2019), but the case of Maine’s food sovereignty ordinance has yet to be analyzed ex-post. Only time and data will tell if these policies result in the strengthening of local food organizations and institutions or not.

The implementation of an evolutionary framework in policy analysis can help us understand not only how policies spread, but also the conditions which help or hinder the diffusion of policies across multiple levels of governance. Tools from evolutionary social science allow us to identify the dominant levels and direction of selection, so that policymakers can potentially alter selection pressures to change outcomes. For example, identifying where high costs of adoption are likely to impede the spread of certain policies is helpful in developing incentives. Maine is currently experiencing the spread of municipal plastic bans, which prohibit the use of single-use plastic in restaurants and retail outlets (Abbate, 2018). One thing activists and policymakers might consider in this case is the direction of selection at different levels, which might draw attention to the extra costs to businesses this policy poses, and how those costs might be mitigated. Paying attention to transmission also becomes important when working for political change, as the Local Food Rules organization did when it pushed for the adoption of the municipal food sovereignty ordinance in Maine. Further, an evolutionary analysis is particularly useful in making predictions about how policies might spread in the future. For example, now that Maine has become the first state to adopt food sovereignty legislation, we might expect to see states like Vermont, New York, and other early adopters of cottage food laws experience the spread of food sovereignty legislation.
CHAPTER 2

CAPTURING COOPERATION IN FOOD BUYING CLUBS:
AN EVOLUTIONARY CASE STUDY

Cooperation & the Evolution of Organizations

Despite the perpetual incentive for individuals to free-ride, the human ability to leverage cooperation in groups has allowed our species to dominate the Earth’s ecosystem (Henrich, 2015). Cooperation, defined in game-theoretic terms, is an act that benefits others. It is distinguished from altruism, defined as an act of cooperation resulting in a net loss for the actor. Cooperation itself is not favored by natural selection unless specific mechanisms are at work (Rand & Nowak, 2013). This is because social dilemmas, scenarios in which the interests of the individual are in conflict with those of the group, present an incentive for individual group members to free-ride by reaping the benefits of the group without contributing (Axelrod & Hamilton, 1981; Nowak, 2006). Cooperation is necessary in order to solve social dilemmas, which are present in many contexts but often play a central role in sustainability challenges, as noted by Hardin’s (1968) *The Tragedy of the Commons*. The challenge of managing free-ridership is demonstrated mathematically by the Prisoner’s Dilemma, a hypothetical scenario in which two players’ self-interested behavior fails to provide the highest total payoff (Camerer, 2003). In the game, both players’ defection is considered the Nash equilibrium, a strategy in which no other player has anything to gain by changing their own play. This creates a perpetual grid-lock in which the two players continually defect. If an entire population adopts this strategy, it cannot be invaded by a mutant a cooperator, and defection becomes the evolutionarily stable strategy (ESS). While a cooperator cannot invade a group of defectors, a single defector may
invade a group of cooperators. This conundrum illustrates how strongly defection is favored over cooperation by the process of natural selection.

The process of group selection, whereby natural selection acts at the level of the group, has allowed humans to become conditional cooperators, requiring specific mechanisms to stabilize and support cooperation. Those mechanisms include direct and indirect reciprocity, spatial selection, multilevel selection, and kin selection (Rand & Nowak, 2013). Social mechanisms, including reciprocity, reputation and social norms have been shown to be more powerful at promoting cooperation than material rewards (Kraft-Todd, Yoeli, Bhanot, & Rand, 2015). Other factors which can help stabilize cooperation include a small group size, repeated interactions, and punishment mechanisms (Stewart & Plotkin, 2016; D.S. Wilson, Elinor Ostrom, & Michael E. Cox, 2013).

In order for cooperation to be stabilized enough to actually resolve social dilemmas, the pressure to cooperate must be stronger than the pressure to free-ride. In essence, group-level selection must dominate individual-level selection. This happens when intergroup competition (e.g. war and raiding, differential group survival, migration, reproduction, and prestige-based group transmission) drives cooperation (Stewart & Plotkin, 2016; D.S. Wilson, Elinor Ostrom, & Michael E. Cox, 2013). These various mechanisms of intergroup competition drive the evolution of institutions, rules and norms which support cooperation. Ostrom’s (1990) institutional solutions to support cooperation and manage common-pool resources are well studied, and have been identified as useful for groups in contexts outside of natural resource management (Wilson & Gowdy, 2013). Intergroup competition also drives the evolution of organizations, defined as specific types of institutions with clearly-defined boundaries, principles of sovereignty, and a hierarchy of responsibility (Hodgson & Knudsen, 2010). Competition motivates organizations to
seek out the best solutions to improve performance, and their subsequent successes and failures result in learning, which then triggers learning in rival organizations (Barnett & Hansen, 1996). This selection process creates conditions in which more cooperative organizations outperform and outlive less cooperative ones, ultimately driving the evolution of organizations.

**Cooperation in Cooperatives**

This research is concerned with the evolution of a special type of organization: the consumer food cooperative. Cooperatively-structured firms are distinguished from traditional, hierarchical firms in that they are typically member-owned and controlled democratically (ICA, 2015), and may even rely on cooperation to survive (Fulton, 1990). Experimental evidence has shown that customers of cooperatives exhibit a higher base level of cooperation than shoppers at a traditional grocery (Tremblay, Hupper, & Waring, 2019). The cooperative structure has been criticized for being less efficient and less profitable than hierarchical firms. However, such arguments often ignore the niche role of cooperatives in counteracting market failure (Nilsson, 2001). For example, cooperatives have demonstrated resilience and even growth during times of economic downturn (Birchall & Ketilson, 2009; Craig & Pencavel, 1992). This resilience is likely the result of the cooperative structure, emphasizing collective decision-making and inclusive solutions to support members and their communities. However, the cooperative structure does pose a social dilemma that requires members to cooperate (Fulton, 1990). Cooperatives’ reliance on cooperation motivates an investigation into the mechanisms by which these organizations have evolved to maintain cooperation and thrive in niche markets.

Due to the underlying social dilemma, cooperatives must manage the problem of free-ridership to be successful (Cook & Iliopoulos, 2016). Cooperatives often use a set of guidelines which originated in England in the 1840s and have spread to become common among different
types of cooperatives (ICA, 2015). There are a total of seven principles for successful co-operative management, including (1) Voluntary and open membership, (2) Democratic member control, (3) Member economic participation, (4) Autonomy and independence, (5) Education, training and information, (6) Cooperation among cooperatives, and (7) Concern for community (ICA, 2015). Some work has noted similarities between the co-op principles and Ostrom’s institutional design principles (Lund, 2011), which have been identified as highly applicable to cooperatives (Gupta, 2014). Not unlike the design principles, the historical record suggests that the co-op principles are a set of institutional adaptations which emerged as a result of selection on organizational structure, as well as descent with modification which helped co-ops thrive and spread (Waring & Lange, 2019). The current study of small-scale, informal cooperative purchasing groups will aid in the understanding of how these adaptations emerged and what role they play in stabilizing cooperation within an organizational context.

**Consumer Food Cooperatives**

Cooperative businesses take many forms; they can be worker-owned, producer-owned, or consumer-owned, and vary greatly by mission and industry. This research focuses on small consumer food cooperatives, which are owned and operated by consumers and operate in retail settings. Food buying clubs are informal food cooperatives which arise when individuals convene to use their collective purchasing power to obtain bulk quantities of food at per-unit prices lower than offered by traditional grocers, or specialty items which cannot be found elsewhere. Food buying clubs order directly from wholesalers and local producers, removing the middleman and allowing members more control over their desired goods and means of provision (Herrmann, 1993). Many food buying clubs seek to purchase primarily organic, local, non-GMO, sustainable, fair trade, and rare or ethnic food items, in addition to a number of natural and
organic household and personal care products offered by some larger distributors like United Natural Foods, Inc. (UNFI) and Frontier Co-op. Many buying clubs use online catalogs to collate orders, a more efficient method than using paper order books or manually entering orders into spreadsheets. While much of these clubs’ activity occurs online, members typically meet in person to break down and distribute orders biweekly or monthly, and some clubs have annual or semi-annual meetings.

Buying clubs vary in size and formality – some are very large with complex sets of rules and requirements, while others are relatively small and informal. Successful buying clubs which are able to overcome the problem of free-ridership may eventually grow and transition to formal cooperative stores or “food co-ops,” physical storefronts which market and sell products to consumers directly. While co-ops are certainly more formal than buying clubs, they retain group-level attributes similar to their informal predecessors, including formal membership, collective governance, and work-sharing (ICA, 2015).

**Buying Clubs & Cooperation**

The structure of buying clubs likely requires members to cooperate with one another, both organizationally and economically (Tremblay & Waring, 2015). Unlike traditional food buying venues, buying clubs require a significant amount of work and energy from members to be sustained. Most clubs are run by a single coordinator, who oversees the group and may solicit help from members in breaking down orders, bookkeeping, hosting meetings, submitting orders to vendors, greeting a delivery truck, managing surplus items, managing new members, and other tasks. These tasks require members to donate time and labor for the benefit of the group, as opposed to online retailers or traditional storefronts which offer greater convenience. The amount of organizational cooperation required by clubs can sometimes be too costly for
prospective members. In one phone interview I conducted with the coordinator of a club with
detailed work requirements, the coordinator said, “plenty of people inquire [about the club], and
are shown the FAQs (work tasks and job rotation), after which they often decide not to join.”

In addition to work tasks, the nature of buying clubs requires members to cooperate
economically by sharing purchases of bulk items. Shared purchases, or “splits,” happen when at
least two club members contribute to the purchase of a bulk item which is to be divided and
redistributed upon receipt. The challenge of coordinating and filling split orders is likely to
require cooperation among club members when preferences diverge and members must purchase
items they do not prefer in order to help others fill splits. In this case, members behave
altruistically to help the group, versus simply coordinating to fill a split which is mutually
agreeable when members’ preferences sufficiently overlap.

The organizational and economic cooperation required in buying clubs makes them
difficult to operate and maintain, particularly in a broader natural food market that continues to
offer greater levels of convenience and lower prices to consumers. While food buying clubs help
members gain access to specialty items, they exist in competition with many other vendors
including online retailers, farmers’ markets, natural food stores, and traditional grocery stores
and supermarkets. This competition creates a harsh environment in which clubs operate, and
makes them less resilient to external shocks than their formal competitors. As one club
coordinator put it, “You have to be organized and plan [to be in the club]. Life happens, but
being part of a food co-op\(^2\) is a conscious choice. Families need to eat but they don’t need to
belong to a food co-op.” Buying clubs’ likely reliance on cooperation implies that group

\(^2\) I refer to the informal buying clubs as “groups” or “clubs” to avoid confusion with formal cooperative stores,
however they are commonly referred to as “food co-ops” or “co-ops” by members.
selection via harsh environmental conditions (e.g. competition with other vendors) and exogenous shocks (e.g. loss of meeting space, coordinator leaving the group), will lead more cooperative clubs to outperform and outlive those which are less cooperative.

Buying clubs may overcome these challenges by instituting adaptations which stabilize cooperation. Because many clubs require individuals to cooperate by performing work tasks and sharing purchases, they often struggle to manage free-ridership. One adaptation clubs may use to support cooperation is reciprocity, or the expectation that kind acts will be rewarded (Trivers, 1971). Theoretical modeling suggests that buying clubs may rely on reciprocity. Tremblay (2017) shows that generalized reciprocity supports cooperation in buying clubs using an agent-based model designed to simulate splitting behavior. This research builds upon Tremblay’s original findings by further examining the role reciprocity plays in maintaining buying club cooperation, function, and overall success.

Another adaptation that may be important for stabilizing cooperation in buying clubs is the adoption of rules and requirements for club membership. Institutional design principles, like rules in buying clubs, can stabilize cooperation and help groups sustainably manage public goods (Ostrom, 1990). In buying clubs, such rules may help distribute responsibility evenly among members, preventing individuals from free-riding on coordinator efforts. Consistent with Waring and Lange’s (2019) finding that cooperatives have been able to overcome adaptive challenges by adopting a set of management principles, it is likely that similar adaptations may also be observed in buying clubs, the informal precursor of co-ops. If cooperation is as important for cooperatives as suggested by theory, then it should be possible to measure it in food buying clubs.
Hypothesis & Predictions

Over their lives, clubs will face many challenges. Some of these challenges include soliciting help from members, distributing work tasks fairly, reaching order minimums, filling splits, managing ordering cycles, and other organizational challenges. I hypothesize that groups which adapt to these challenges will outperform those who do not, as they will be more resilient when facing harsh economic conditions and exogenous shocks. Key adaptations that may help clubs succeed include maintaining strong reciprocity between members and adopting formal rules to sustain cooperation.

Figure 2.1. Adaptive Process of Food Buying Clubs.

I explore the impact of club reciprocity and rules on various measures of success. Reciprocity and rules are expected to help reduce group reliance on generous individuals by encouraging members to cooperate with one another. More reciprocal and more formal clubs are expected to be more functional than less reciprocal, less formal clubs, because reciprocity and institutions support cooperation. Finally, if reciprocity and rules are organizational adaptations, they should be more prevalent in older clubs, given the evolutionary implication that less reciprocal and less formal clubs would be selected out of the population.

Prediction 1. Due to the cooperative structure of buying clubs, members will be cooperative toward their groups.

Prediction 2. Buying clubs will exercise reciprocity through order-sharing.
**Prediction 3.** Reciprocity will help clubs succeed. Specifically,

A. Reciprocity will reduce the need for altruism & support (non-altruistic) cooperation in clubs.

B. Reciprocity will promote club functionality.

C. Older clubs will be more reciprocal.

**Prediction 4.** The adoption of rules will help clubs succeed. Specifically,

A. Rules will reduce the need for altruism & support (non-altruistic) cooperation in clubs.

B. Rules will promote club functionality.

C. Rules will help clubs survive.

**Methods**

This research observed a group of food buying clubs subscribed to two online ordering services, BuyingClubSoftware, Inc. (BCS) and Foodclub.org (Foodclub). Access to buying club data was made possible through partnerships between the research team and the owners of these two services, Mr. Jeremy Bloom (of BCS) and Mr. Adi Fairbank (of Foodclub), who obtained permission from groups before granting the research team access to club data. The team also received multiple approvals from the University of Maine’s Institutional Review Board before soliciting or viewing any human subject data via the clubs’ purchasing history, online surveys, and phone interviews. A total of 48 buying clubs (2,951 total individuals) are represented in the purchasing data from BCS and Foodclub combined. Of those 48, 14 clubs (177 total individuals)
are represented in survey data, with seven from BCS and seven from Foodclub. Interviews with eight coordinators and one member represent seven clubs from Foodclub, and one from BCS.

Table 2.1. Buying Club Study Sample Sizes.

<table>
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<th>Software</th>
<th>Groups/people</th>
<th>Purchase data</th>
<th>Survey</th>
<th>Experiment</th>
<th>Interview</th>
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<td>94</td>
<td>DG: 93; PGG: 90</td>
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<tr>
<td>All</td>
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<td>177</td>
<td>173</td>
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</tbody>
</table>

**Coordinator Interviews**

A major component of this research is concerned with the organizational environment of food buying clubs. This thesis follows up on previous work which analyzed data collected in a survey of BuyingClubSoftware, Inc. groups (Hupper, 2017). In the original BCS survey, club coordinators were prompted to answer a set of questions separate from the main survey, regarding the history, structure, and organization of their club. Many of these questions were designed to measure whether and to what extent groups implement similar versions of Ostrom’s (1990) institutional design principles in their organization. After analyzing results from the first survey, it was decided that in order to gain a richer understanding of how clubs operate, the coordinators should be interviewed. A round of semi-structured phone interviews with Foodclub coordinators replaced the coordinator section of the original online survey, effectively shortening and simplifying it for respondents. Further, establishing trust and personal connections with coordinators over the phone before undertaking a full examination of the clubs improved the quality of data collected from Foodclub groups.
Phone interviews with club coordinators were conducted in the summer of 2018. Interviews were scheduled via email, and coordinators were informed that the interview would be helpful to their club, confidential, and take about 30 minutes to complete. When coordinators answered the phone, the interviewer read a statement of informed consent prior to beginning the interview and asked if the subject was willing to participate. Consent was provided by answering “yes” verbally. Interviews were not recorded on any devices, but notes were taken on the computer by the interviewer while questions were being answered. The interview template used contains 17 questions, including sections on club history, group function, order-sharing, member contributions, integration of Ostrom’s design principles⁴, and the club’s biggest challenges and successes over the years (see Appendix A). The interview concludes by asking permission for the research team to access the club’s purchasing history, as well as permission to share the online survey with the club. All coordinators interviewed agreed to both requests.

When compared to survey responses, the richness of interview dialogue allows for a greater level of precision when classifying qualitative data into quantitative variables. After reviewing interview notes, a new dataset was generated by compiling the number of active members, club age in years, and number of rules adopted. This club-level dataset is a key element of multilevel analysis, providing a source of variation among clubs.

**Online Surveys**

This research combines data from two online surveys, one conducted from 2016-2017 with BCS groups⁵ (located in the US), and the second survey was implemented in 2018 with

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⁴ Principle eight (nested enterprises) was not included in the interview questions because I find it does not apply as well to small, informal groups like buying clubs as the first seven design principles do.

⁵ See Hupper (2017) for full details of the original survey
Foodclub groups (located in New England). Of the 16 active Foodclub groups whose contact information was made available to the team, seven coordinators agreed to have their club participate. Qualtrics Survey Software was used to build the survey and generate a unique URL for each club, which coordinators shared via email with members. Members were informed that the survey is built to help their club by providing key information for diagnostic and buying club “health” reports, includes a paid economic game, will provide high-participation clubs with $100 off their Foodclub.org fees, is fully confidential, and takes roughly 15 minutes to complete.

The original BCS survey was revised and shortened to create a new, 32-question survey for Foodclub groups. Many questions were shortened and restructured for clarity and brevity, and others were removed for being less useful to the goals of the research than originally anticipated. Reused questions include the dictator and public goods games, percent of household needs met through the club, percent of the time members help others fill splits (assistance given), percent of the time members are helped by others in splits (assistance received), Likert scale questions regarding club communication, member contributions, member benefits, overall club function, and club satisfaction, as well as suggestions for club improvement, and demographic variables\(^6\). A handful of new questions were also added (see Appendix B), but these variables have been excluded from the dataset in order to preserve the full sample of BCS and Foodclub groups for analysis.

The Foodclub survey was launched in mid-July, 2018 and ran through the end of September, 2018, collecting a total of 83 complete responses (see Table 2.1). After closing the survey, respondents were compensated via the Cash App with payments based on the outcome of

\(^6\) All demographic questions from the original survey were preserved except household size and number of household earners. This is because the number of household dependents is likely to be a more relevant indicator of a member’s reliance on their buying club than household size or number of earners.
the two economic games played. High-participating clubs were compensated with a $100 credit to their Foodclub account. In order to prepare the BCS and Foodclub survey data for analysis, .CSV files were exported from Qualtrics and cleaned using the software R. Packages used in this process include ‘tidyr’ (Wickham, Henry, & RStudio, 2018), ‘dplyr’ (Wickham, Francois, Henry, Müller, & RStudio, 2018), and ‘readr’ (Wickham, Hester, et al., 2018). After cleaning, CSVs of each dataset were generated and merged manually. Club-level data for BCS groups was gathered by reviewing coordinator survey responses to determine club age, size, and number of rules. Although this method of extraction doesn’t match the accuracy and nuance of interview data, it provides the second-best insight into how the clubs are structured. The final dataset used for analysis includes 164 observations and 13 variables.

**Experimental Economic Games**

In keeping with the structure of the original BCS survey, the Foodclub survey begins by presenting respondents with two experimental economic games. The first is a one-shot dictator game, designed to measure individual-to-individual altruism or unenforced fairness (Camerer, 2003; Kahneman, Knetsch, & Thaler, 1986). In this version of the game, the respondent (the dictator) is presented with an initial endowment of $8 and given the option to donate any whole-dollar amount of that endowment ($0-$8) to the next player (the recipient) who is identified as an anonymous member of the respondent’s buying club (see Figure 2.1). The dictator also serves as the anonymous recipient in round two (i.e. when another respondent acts as the dictator). The respondent’s total compensation is therefore equal to the amount of the initial endowment kept while acting as the dictator, plus the amount received when acting as the recipient for another dictator.
After completing the dictator game, respondents are presented with a one-shot public goods game, which is designed to measure individual-to-group cooperation (Camerer, 2003; Davis & Holt, 1993). This version of the game has a setup similar to the dictator game, except that respondents are given the option to donate any whole-dollar amount of their $8 endowment ($0-$8) to a collective fund for their buying club instead of a single anonymous individual. The group fund then sums all donations, multiplies them by 1.4, and distributes them evenly among players (see Figure 2.3). The respondents are then compensated with the remaining amount of the endowment they chose to keep, plus the payoff from the pooled group fund.

**Figure 2.2. Dictator Game Setup.**

**Figure 2.3. Public Goods Game Setup.**
Summary of Interview, Survey & Experimental Data

A total of eight coordinators and one founding member agreed to participate in phone interviews, representing a total of seven Foodclub groups (see Table 2.1 for a full summary of data collection) and one BCS group that had disbanded. For Foodclub groups, all except for clubs F1, F5 and F6 achieved 100 survey percent participation among members\textsuperscript{7}.

Figure 2.4. Survey Response Rates\textsuperscript{8}.

Interview & Survey Data Analysis

Interview and survey results include both qualitative and quantitative data. Qualitative data are analyzed by searching for patterns in the responses relevant to research predictions. Interviews and surveys were coded on categories such as club age, size, number of rules, etc. A club-level dataset of quantitative data from surveys and interviews was constructed for formal

\textsuperscript{7} It is possible that more than one member of some households took the survey. Some manage two separate accounts but typically order from one main account. This might impact the “true” response rate from clubs. However, this cannot be determined from the data, and usernames which are present in the survey but not in the purchase data are dropped from the analysis.

\textsuperscript{8} Club names are not revealed in order to protect the identities of research participants. Club IDs were assigned to each group, and chosen based on whether the group is subscribed to Foodclub (F) or BCS (B). Numerical rankings were chosen based on observed group size, with larger clubs ranked lower and smaller clubs ranked higher.
analysis, with variables including club age, size, number of rules, average game contributions, and averages of individual survey measures including satisfaction with club, overall club function, even distribution of work tasks (member contributions), help given to others to complete splits, and help received from others to complete splits.

Results

Overview of Qualitative Results

Phone interviews with club coordinators and qualitative survey responses reveal rich information about some of the key challenges buying clubs face as they grow and age. Results support the prediction that buying clubs require two major types of cooperation to function: economic cooperation (order-sharing) and organizational cooperation (work-sharing). Sharing bulk purchases is an important function of many clubs. As one coordinator said, “Foodclub’s big feature is the splits – it is essential to what we do.” Many coordinators praised Foodclub and BCS for providing an easy platform to coordinate and organize orders, particularly with split items which “were very time consuming” before the software was available. However, club size can limit the amount of splitting clubs can do, which is a problem faced by nearly all groups in our study. When asked about a “sweet spot” in terms of club size, many coordinators gave a number between 20 and 25 people, a range substantially larger than the average club size in our study, which is about 15. Clubs often struggle to recruit enough regularly ordering members to reach order minimums and gain access to a variety of items. As one coordinator stated, “more people on splits creates a greater variety of products, due to more varied preferences.” Another coordinator mentioned that “50 percent of splits end up failing” because the club is too small to fill bulk orders. Some coordinators mentioned having to purchase surplus items to help the group
reach order minimums and achieve splits, and one club in particular had to merge with another club to gain enough members to be able to place an order every month.

Equally as important as splits, if not more, is group membership. As one coordinator explained, “splits are not the most important feature (not all vendors require splits), the community is – lots of people have made friends and are like-minded.” Having a sufficient number of motivated members also help clubs accomplish necessary work tasks, because “a smaller pool of members creates more work for everyone.” Clubs are fundamentally challenged with optimizing membership based on split and order needs, work tasks, and overall efficiency. Finding and recruiting members can be tough, as some groups have experienced “a lack of members wanting to take the time to participate.” Depending on the club, the necessary contributions (i.e. sharing work tasks) can discourage potential new members. When asked about problems faced by their clubs, many survey respondents mentioned something along the lines of “not enough people to fill splits,” “getting all members engaged and committed” and needing “more members to share the work.”

One way clubs are able to recruit help from members and distribute work tasks more fairly is by establishing rules and norms to support cooperation. The number of rules adopted by the clubs in our study ranges from one to six (see Table 2.2). Some rules are formal and enforced, while others are informal social norms. The most common rules include requiring members to 1) complete their designated work task, 2) attend meetings, 3) pay an annual membership fee, 4) pay a service fee on orders to cover operating costs, 5) bring money to breakdown meetings, 6) pick up their order on time, 7) be willing to help with breakdown, and 8) help the coordinator break down large bulk orders. Common designated work tasks include bookkeeping, collating orders, organizing breakdown meetings, managing invoices, picking up
foods from local vendors, meeting the delivery truck, and weighing, counting and measuring split items at breakdown meetings. Most clubs allow members to sign up for jobs voluntarily, and some have a rotating job schedule.

Table 2.2. Summary of Club-Level Data

<table>
<thead>
<tr>
<th>Club ID</th>
<th>Club age in years</th>
<th>Number of active members</th>
<th>Number of rules adopted</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>13</td>
<td>27</td>
<td>1</td>
</tr>
<tr>
<td>B2</td>
<td>10</td>
<td>25</td>
<td>3</td>
</tr>
<tr>
<td>B3</td>
<td>4</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>B4</td>
<td>6</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>B5</td>
<td>8</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>B6</td>
<td>7</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>B7</td>
<td>7</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>F1</td>
<td>29</td>
<td>38</td>
<td>4</td>
</tr>
<tr>
<td>F2</td>
<td>30</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>F3</td>
<td>36</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>F4</td>
<td>7</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>F5</td>
<td>3</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>F6</td>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>F7</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Average</td>
<td>11.8</td>
<td>15.1</td>
<td>3.4</td>
</tr>
<tr>
<td>Median</td>
<td>7</td>
<td>11.5</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Experimental Games Results

The following results were obtained from two experimental economic games played in online surveys with food buying club members in 2016 and 2018. The dictator game measures individual-to-individual altruism or unenforced fairness, and the public goods game measures individual-to-group cooperation (see Figures 2.2 and 2.3 for game structures). Figures 2.5 and 2.6 provide a distribution of donations for each game.

---

9 Active members are defined as those who use BuyingClubSoftware or Foodclub.org regularly. This number may underestimate the true size of the club, as some members choose to purchase from other ordering platforms, but those individuals cannot be observed in the data.
The average percent of endowment donated in the dictator game was $4.67, and the average percent of endowment donated in the public goods game was $5.61 (see Table 2.3). The dictator game typically produces a tri-modal distribution with donations primarily centered on the minimum, median and max, in descending order (Engel, 2011). Here I observe very few donations at the minimum ($0), with the most common choice at the median ($4) and the next most common choice at the max ($8). The public goods game also typically follows a tri-modal distribution similar to that of the dictator game, but these results follow the reverse pattern with few donations at the min ($0) and most at the max ($8).

Table 2.3. Experimental Game Summary Statistics.

<table>
<thead>
<tr>
<th></th>
<th>Dictator game</th>
<th>Public goods game</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean donation</td>
<td>$4.67</td>
<td>$5.61</td>
</tr>
<tr>
<td>Mean % of endowment donated</td>
<td>58%</td>
<td>71%</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.83</td>
<td>2.49</td>
</tr>
<tr>
<td>Sample size</td>
<td>176</td>
<td>173</td>
</tr>
</tbody>
</table>

One way to analyze the dictator and public goods game results is to compare them to those of other studies. Such games are widely used in academic literature, although study design
can differ slightly. To gain a sense of where these results fall in comparison to other populations, I conduct a meta-analysis of studies that implement similar versions of the dictator and public goods games with various groups and individuals. The types of groups studied across this literature ranges from small-scale societies and indigenous groups to college students belonging to Western, educated, industrialized, rich, and democratic (WEIRD) societies (Norenzayan, Henrich, & Heine, 2010).

I compare our results to a total of eight similar studies. Six of those studies provide enough information to perform a test of differences in proportions, while two are meta-analyses and only provide a study-wide mean. Lamba & Mace (2011), Leider et al. (2009), and Paciotti et al. (2011) each reported the standard deviation, mean and sample size directly. Data generated by Eckel & Grossman (1998) had to be recreated and analyzed manually using a summary of data. Apicella et al. (2012) only provided the sample size and standard error, which was used to calculate the standard deviation manually. Henrich et al. (2001) only reported a mean and sample size, but was still included for calculating the percent change in means. Engel (2011) and Zelmer (2003) are meta-analyses and only provide the mean percent of endowment donated. Many other studies were examined but ultimately excluded from analysis because they involve iterated games, which invoke different interpretations than one-shot games, as played in the current study (Henrich et al., 2010). Tables 2.4 and 2.5 provide a full summary of comparison results.

Table 2.4. Dictator Game Meta-Analysis (One-Shot Games).

<table>
<thead>
<tr>
<th>Study</th>
<th>Subject</th>
<th>Sample size</th>
<th>Mean % of endowment contributed</th>
<th>% change (this study)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>This study</td>
<td>food buying clubs</td>
<td>176</td>
<td>58%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2.4 continued.

<table>
<thead>
<tr>
<th>Study</th>
<th>Subject</th>
<th>Sample size</th>
<th>Mean % of endowment contributed</th>
<th>% change (this study)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paciotti et al., 2011</td>
<td>Community groups WEIRD</td>
<td>183</td>
<td>48%</td>
<td>+21%</td>
<td>3.49</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Leider et al., 2009</td>
<td>WEIRD students (friends)</td>
<td>181</td>
<td>38%</td>
<td>+53%</td>
<td>10.78</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Engel, 2011*</td>
<td>Mixed</td>
<td>129</td>
<td>28%</td>
<td>+107%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eckel &amp; Grossman, 1998</td>
<td>WEIRD students (women)</td>
<td>60</td>
<td>16%</td>
<td>+263%</td>
<td>23.44</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Eckel &amp; Grossman, 1998</td>
<td>WEIRD students (men)</td>
<td>60</td>
<td>8%</td>
<td>+625%</td>
<td>28.01</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

The mean percent of endowment contributed in the dictator game in this study is larger than all other means analyzed, and statistically significantly greater than results from all other studies analyzed with a t-test. The mean dictator game donation closest to that of the current study is 48 percent (community groups), while the mean donation farthest from that of the current study is 8 percent (male students).

Table 2.5. Public Goods Game Meta-Analysis (One-Shot Games).

<table>
<thead>
<tr>
<th>Study</th>
<th>Subject</th>
<th>Sample size</th>
<th>Mean % of endowment contributed</th>
<th>% change (this study)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>This study</td>
<td>food buying clubs</td>
<td>173</td>
<td>71%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Henrich et al., 2001</td>
<td>Orma (Kenya)</td>
<td>24</td>
<td>58%</td>
<td>+22%</td>
<td>9.82</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Apicella et al., 2012</td>
<td>Hadza (x3(^{10})) (Tanzania)</td>
<td>205</td>
<td>57%</td>
<td>+25%</td>
<td>6.60</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Lamba &amp; Mace, 2011</td>
<td>Pahari Korwa (India)</td>
<td>301</td>
<td>52%</td>
<td>+37%</td>
<td>12.02</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Zelmer, 2003*</td>
<td>WEIRD students</td>
<td>27 studies</td>
<td>38%</td>
<td>+87%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{10}\) The Hadza bands played public goods games with a multiplier of 300%
The mean percent of endowment contributed in the public goods game in the current study is larger than all other means analyzed, and statistically significantly greater than results from all other similar studies analyzed with a t-test. The mean public goods game donation closest to that of the current study is 58 percent donated by the Orma people, while the farthest mean is thirty-eight percent donated by students. Overall, these results provide support for prediction 1 by showing increased cooperation among buying club members compared to other populations.

**Scientific Questions & Data Structure**

This research is primarily concerned with answering the question of how buying clubs might adapt to the challenges they face. To address my predictions, I will examine how group-level structures influence both individual and group-level outcomes. For this purpose, the data collected follow a hierarchical structure, containing individual (member) and group (club) characteristics. A common statistical approach used to analyze this type of data is a hierarchical linear model (HLM), which estimates random slopes and/or intercepts for each grouping class assigned. HLMs are designed to resolve non-independence within nested classes of data, and has the ability to control for between-group variation which may impact individual-level data. The following analyses will take a broad-to-narrow approach, first by summarizing the amount of variation explained by each group, then by estimating a series of random effect models to explain the effects of individual and group-level explanatory variables on dependent variables of interest.

**Summary of Data by Club**

The following scatterplots illustrate how data from a handful of survey questions vary across groups. Points have been jittered to show the density of observations at the value, and the black diamonds represent means for each club. The following plots summarize four individual-level dependent variables including dictator game donation (in $), public goods game donation
(in $), reciprocity in shared purchases, and overall club function (measure of perceived club function). Reciprocity is calculated by subtracting the percent of the time members report giving assistance in splits from the percent of the time they report receiving assistance to others (net received or NR). This calculation centers perfectly balanced reciprocity (giving the same amount as receiving) at zero, with negative scores indicating altruistic behavior (giving more than receiving) and positive scores indicating free-riding behavior (giving less than receiving).

Hierarchical Linear Model Specification

HLMs not only control for individual and between-group differences, but also provide a measure of variation in the data explained across levels. While I control for individual-level differences using data collected in the survey (demographics, etc.), I am primarily interested in how differences are explained between groups, and what the group-level characteristics are that
drive those differences. I apply the random-intercept model, which allows group intercepts to vary but assumes fixed slopes across groups. While the random slope and intercept model is likely the most realistic, the random intercept model is simpler and best suited to examine the proportion of total variation explained by groups. I also employ an ANOVA for random-effects, which conducts a likelihood ratio test (LRT) on two models (with and without the random effect) to determine which of the two models best fits the data according to their log-likelihoods. The HLMs used in this thesis are of the form,

\[ Y_{ij} = \beta_{0j} + \beta_{1j}X_{ij} + e_{ij} \]  
\[ \beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{0j} \]

where \( Y_{ij} \) is a dependent variable, \( \beta_{0j} \) is the level 2 intercept, \( \beta_{1j} \) is the slope of relationship (in level 2) between level 1 predictor and dependent variable, \( X_{ij} \) is the level 1 predictor variable, and \( e_{ij} \) is the random error (level 1), \( \gamma_{00} \) is the overall intercept (grand mean across groups), \( \gamma_{01} \) is the overall regression coefficient, \( W_j \) is the level 2 predictor (number of rules, reciprocity slope, etc.), and \( u_{0j} \) random error (deviation of group from overall intercept).

Individual control variables were chosen from game theory literature, which provides the expected sign for the effect of demographic variables on game donations. For the dictator game, females tend to donate more than males (Pan & Houser, 2011), wealthier individuals tend to donate less than less wealthy individuals (Piff, Kraus, Côté, Cheng, & Keltner, 2010), and older participants typically donate more than younger ones (Engel, 2011). In the public goods game, women tend to donate more than men (Nowell & Tinkler, 1994), older individuals tend to donate less than younger individuals (Rieger & Mata, 2015), and wealth has no significant effect on donations (Buckley & Croson, 2006). In order for models to converge, individual control variables were scaled so predictor means were centered to zero.
Percent of household needs met through the club, which captures the extent to which individuals rely on their club to meet their needs, was used as a control variable for all models. Individual reliance on and involvement in clubs may influence the way people feel and behave toward their group. For example, if one person meets 80 percent of their total household needs through the club, they may have an increased propensity to join in on split orders, compared to another person who only fills 20 percent of their needs. This key difference may also translate to experimental game outcomes, as the games were chosen for their ability to mimic the social context of order-sharing in the clubs. In addition, individuals who rely more on their club and are more involved might feel differently about certain measures of success (i.e. overall club function) than those who operate less frequently or are less invested.

Table 2.6. Control Variable Summary Statistics.

<table>
<thead>
<tr>
<th>Control Variable</th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>157</td>
<td>51</td>
<td>50</td>
<td>13</td>
<td>22</td>
<td>79</td>
</tr>
<tr>
<td>HH income ($K)</td>
<td>140</td>
<td>69</td>
<td>65</td>
<td>34</td>
<td>2</td>
<td>150</td>
</tr>
<tr>
<td>% HH needs met</td>
<td>159</td>
<td>31</td>
<td>29</td>
<td>21</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Gender</td>
<td>156</td>
<td>141 F (90%), 14 M (9%), 1 other (0.6%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.7. Summary of HLM Results$^{11}$.

<table>
<thead>
<tr>
<th>Prediction</th>
<th>Ind. variable</th>
<th>Dep. variable</th>
<th>Effect size</th>
<th>p-value</th>
<th>% variance explained by club$^{12}$</th>
<th>LRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>NR</td>
<td>DG</td>
<td>0.00</td>
<td>0.70</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>3A</td>
<td>NR</td>
<td>PGG</td>
<td>0.00</td>
<td>0.86</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>3B</td>
<td>NR</td>
<td>Function</td>
<td>0.04</td>
<td>0.64</td>
<td>15</td>
<td>4.55*</td>
</tr>
<tr>
<td>3C</td>
<td>Club age</td>
<td>NR</td>
<td>0.42</td>
<td>0.19</td>
<td>3</td>
<td>0.23</td>
</tr>
<tr>
<td>3C</td>
<td>Club size</td>
<td>NR</td>
<td>0.58**</td>
<td>0.01</td>
<td>0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

$^{11}$ See Appendix C for full regression tables.

$^{12}$ Variance explained by club divided by total variance
Table 2.7 continued.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4A</td>
<td># rules</td>
<td>DG</td>
<td>-0.20</td>
<td>0.20</td>
<td>13</td>
</tr>
<tr>
<td>4A</td>
<td># rules</td>
<td>PGG</td>
<td>0.06</td>
<td>0.70</td>
<td>3</td>
</tr>
<tr>
<td>4B</td>
<td># rules</td>
<td>Function</td>
<td>2.81*</td>
<td>0.08</td>
<td>7</td>
</tr>
</tbody>
</table>

* p < 0.1, ** p < 0.05, *** p < 0.01

Evidence for P1: Buying Club Members Will Be Cooperative Toward Their Groups

The self-interested Nash Equilibrium strategy predicted by rational choice in this game is a donation of zero. Instead, donations in the dictator game tend to be clustered around the median ($4) and the max ($8). The range of average donations in this game was $4-$6. Clubs B1 and B7 had the largest spread of data points from $0-$8. The mean donation was $4.67, or 58 percent of total endowment. Donations in the public goods game had a much larger spread, with most clubs exhibiting the full range from $0-$8. Overall, these data vary greatly in comparison to the dictator game donations, but all groups followed the general trend of donations clustering at the max. The mean donation in the public goods game was $5.61, or 70 percent of total endowment. These results, in combination with the findings from the meta-analysis, demonstrate that the buying club members in this study do behave cooperatively toward their groups. The analyses of game donations provide strong support for P1.

Evidence for P2: Buying Club Members Will Exercise Reciprocity in Order-Sharing

In the scatterplot of NR by club, points tended to be clustered around 0 (balanced reciprocity) with a good number of points from all groups dropping well below into the negative range (altruistic behavior). Only a handful of points landed in the positive range (free-riding behavior) from five clubs (B2, B2, B3, B5, and F1). Overall, people tended to report being altruists more frequently than being free-riders. The mean NR across survey respondents was
–10.60, and the standard deviation was 24.42. On average people reported that they exercise relatively balanced reciprocity, with a slight tendency to report giving more than receiving. These results indicate that clubs do exercise reciprocity in order-sharing, and that it varies between individuals and between clubs.

**Evidence for 3A: Reciprocity Will Reduce Altruism & Support Cooperation**

In order to estimate the effect of reciprocity on altruism (DG) and cooperation (PGG), I estimate the effect of individual reciprocity (NR) on dictator and public goods game donations, controlling for age, income, gender, and percent of household needs met through the club, and allow intercepts to vary by club (see Appendix Tables C.1 and C.2). NR was not a significant predictor of donations in either game. For the both models of game donations, zero percent of the variance in the data can be explained by variation across clubs, and grouping by club does not significant predict game donations. These results do not provide any support for prediction 3A.

**Evidence for 3B: Reciprocity Will Promote Club Functionality**

I estimate an HLM of club overall function explained by percent of household needs met through the club and NR (see Appendix Table C.3). NR was not found to be a significant predictor of overall club function. Roughly 15 percent of the variation in club function can be explained by differences in between clubs, and grouping by club ID is a significant predictor of club function (LRT=4.55, p=0.03). These results do not support prediction 3B.

**Evidence for 3C: Older Clubs Will Be More Reciprocal**

In order to examine the relationship between club age and reciprocity, I estimate an HLM of individual reciprocity (NR) as explained by percent of household needs met through the club and club age in years (see Appendix Table C.4). Club age was not found to be a significant predictor of reciprocity ratio, and 3.28 percent of the variance in reciprocity can be explained by
differences across groups. The LRT result shows that grouping by club ID is not a significant predictor of reciprocity. Results do not provide support for prediction 3C.

While club age may not be a significant predictor of reciprocity, club size may be. Club and age size are positively correlated, and it is likely that larger club size makes order-sharing easier by increasing the variety of preferences in the group. I estimate an HLM of NR explained by club size and controlling for % HH needs met (see Appendix Table C.5), and found that club size is a significant positive predictor of NR (effect size=0.58, p=0.01). Grouping by club ID did not change results or explain additional variation.

**Evidence for 4A: Rules Will Reduce Altruism & Support Cooperation**

Qualitative results support the prediction that more formally organized clubs tend to express less altruism and more cooperation than informal clubs. Quotes are chosen from interviews and online surveys to highlight trends identified across groups, and are generally representative of those groups. The informal clubs in this study are primarily operated by coordinators, who run the groups with little or no contributions from members. When asked about member contributions, one coordinator said, “because the club is small, I don’t mind doing all the work.” Another coordinator said that work tasks were not fairly distributed among members, but might be “if the club got larger” since “there is not enough work to be spread among members.” Many coordinators of informal groups admitted that they would like more help from members, since they tend to do all of the work and make all decisions regarding club operation. Coordinators of clubs with formal rules and norms told a very different story. When asked about member contributions, they gave responses like “everybody is required to do something, and does their job” and “it’s not hard to get people to [contribute]. There are no
problems with free-riders.” These more formal clubs are highly cooperative, soliciting help from all members to run the groups rather than relying on the altruism of a few individuals.

To measure the effect of rules adopted on individual measures of cooperation, I estimate two HLMs of dictator and public goods game donations regressed on number of rules adopted and control for age, income, gender, and percent of household needs met through the club (see Appendix Tables C.6 and C.7). Number of rules adopted was not found to be a significant predictor of donations in either game. Between-group variation explains 13.26 percent of variation in dictator game donations, and club ID grouping was reported as significant (LRT=4.59, p=0.032). Between-group variation explains 3.18 percent of variation in public goods game donations, and was not a significant predictor of donations. These results do not provide support for prediction 4A, and are in apparent disagreement with qualitative data.

Evidence for 4B: Rules Will Promote Club Functionality

Qualitative results from surveys and interviews support the prediction that rules promote club functionality. While some coordinators of informal groups are happy to altruistically provide services to others, or so invested in the club that they are willing to “do whatever it takes to make it happen,” others have become frustrated with the lack of support. One coordinator explained that running the club without any help from members is causing them to lose their patience and “weed out less reliable members.” Another coordinator said, “although I take care of all facets of the club…I wish my members were able to be more involved.” The coordinators aren’t the only ones who recognize this problem; many members of informal clubs wish to be more involved in their clubs. One respondent said, “I wish there was more opportunity for more participation in the workload, […] or that the coordinator would get some financial benefit from doing all the work.” Other members admitted feeling guilty, saying things like “I feel bad that
the responsibility of ordering, collecting money, and sorting food falls primarily on just one person.” Many respondents expressed concern about the future of their group. One member worries that “if a few key helpers/coordinators could not do it any longer, the buying club would not function well.” Coordinators and members of clubs with more rules said things like, “I’m very satisfied,” “I love my club,” and “our club rocks.”

Table 2.8. Interview & Survey Quotes About Club Functionality.

<table>
<thead>
<tr>
<th># of rules adopted</th>
<th>What members &amp; coordinators say</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 rule</td>
<td>“There is no decision making or almost any volunteer contribution besides my own. I am not sure why I am continuing to do this unpaid job.”</td>
</tr>
<tr>
<td></td>
<td>“Members need to contribute more. The same people always help.”</td>
</tr>
<tr>
<td>2 rules</td>
<td>“[Running the club] is a big pain.”</td>
</tr>
<tr>
<td>3 rules*</td>
<td>“It was all me [doing the work], especially by the end.”</td>
</tr>
<tr>
<td></td>
<td>“For the most part members carry their weight.”</td>
</tr>
<tr>
<td>4 rules</td>
<td>“[…] the club is much better organized and run than any other groups we belong to.”</td>
</tr>
<tr>
<td>5 rules</td>
<td>“Everybody steps up […] it seems like people feel a sense of responsibility.”</td>
</tr>
<tr>
<td>6 rules</td>
<td>“I love my club. I don’t need it for many things, but I would really miss having it around. [The coordinator] does an excellent job!”</td>
</tr>
<tr>
<td></td>
<td>“I love my club” and “I’m very satisfied”</td>
</tr>
</tbody>
</table>

*dead club

To estimate the effect of number of rules adopted on club functionality, I estimate a HLM of club overall function explained by number of rules adopted, and controlling for % HH needs met through the club (see Appendix Table C.8). Number of rules adopted was found to be a positive significant predictor of overall function (effect size=2.81, p=0.08). Only 6.83 percent of the variation in club function can be explained by differences in between clubs, so grouping by club ID is not a significant predictor of club function.
Evidence for 4C: Rules Will Help Clubs Survive

To test the effect of number of rules adopted on club age, I estimate a univariate OLS regression of the form $Y = a + \beta x + \epsilon$, where $Y$ is club age in years and $x$ is the number of rules adopted in a club (see Appendix Table C.9). Number of rules had a significant effect on club age (effect=3.33, $p=0.00$). However, this model is limited to only 12 degrees of freedom. To obtain a more robust result, I conducted a bootstrap analysis on this model with 1000 iterations. Bootstrap results indicate that number of rules is a significant predictor of club age, with an additional rule increasing club age by about 3.34 years ($p=0.00$). The 95% confidence interval for this effect size was 2.5–4.3.

For this prediction, causation is difficult to prove. I cannot be certain whether rules cause clubs to survive longer (adaptation), or longer-living clubs have more experience and opportunity to adopt rules (learning). The data is consistent with both of these predictions, and I expect that in reality, a combination of both is at play in the evolution of buying clubs.

Summary of Results

Overall, results indicate that buying club members are cooperative toward their groups, and do exercise reciprocity in order-sharing. Model results indicate that the only variables by which a significant proportion of the variance can be explained by group differences include overall club function (P3B: reciprocity will promote functionality), and dictator game donations (P4A: rules will reduce the need for altruism). For the other models, results did not vary significantly between groups. NR was not found to be a significant predictor of game donations or club function. Club age was not a significant predictor of individual NR, but club size was. The number of rules adopted was not a significant predictor of game donations, but was a significant predictor of overall club function. Overall, results suggest that group-level variables
don’t generally appear to be strong predictors of individual-level outcomes in all cases, except for in the case of club size being positively associated with NR, and number of rules adopted being positively associated with overall club function. The number of rules adopted was also found to be significantly positively associated with club age.

**Study Limitations**

There are a handful of limitations important to note in this study. First, there may be a considerable amount of bias impacting survey results. This research does not obtain a random sample of buying clubs. The non-random sample makes it difficult to generalize results to larger populations (e.g. buying clubs in the U.S.). Also, while response rates for groups were fairly high, it is likely that self-selection bias may impact responses, where more cooperative members may have chosen to partake over those less cooperative. This bias has the potential to inflate measures of cooperation including experimental games. In addition, many questions were left unanswered or partially answered in the survey, leaving gaps in the data and making it difficult to obtain a complete picture of the individuals in the clubs. Finally, it is possible that the measures of reciprocity in the online survey could be influenced by self-serving bias, the tendency to see oneself in an overly favorable light (Myers, 2015). It would be useful to compare individuals’ reported measures of reciprocity to what is observed in their purchasing history, which would help lend some insight into this question of biased survey responses.

Second, this thesis does not formally analyze the qualitative data collected, but rather treats it as a supplement to the quantitative data examined. Qualitative interview and survey responses provide key insights and supporting material for quantitative results, but some data (e.g. number of rules adopted) can be difficult to quantify. Further, the number of rules might not always be as important as the type of rule and the extent to which it is enforced or not. For
instance, a rule that requires members to pick up their order on time might not have the same effect on cooperation as one that requires members to complete their work task.

Finally, the sample used in this research is relatively small, with only 14 buying clubs and 177 individuals represented in the dataset. Consequently, the analyses conducted here have limited statistical power. A larger, random sample would provide more robust results.

**Discussion & Conclusions**

Overall, results provided general support for predictions 1, 2, and 4, and findings were consistent across data collection instruments. Buying club members were found to behave cooperatively toward their groups, and exercise reciprocity in order-sharing. Reciprocity was not found to be a strong predictor of cooperation, altruism, overall function, or club survival, and is likely not an adaptation as I had originally predicted. However, free-riding (receiving more than giving in splits) appears to be more common in larger clubs, whereas smaller clubs tended to have more instances of altruism (receiving less than giving). These results suggest that club size may free up constraints on individual altruists, likely by expanding and diversifying preferences within the group. Reciprocity may not be an adaptation in the sense that more reciprocity helps clubs succeed or survive, but may be a key metric to determine whether clubs are faced with a dangerous reliance on altruism or free-ridership, both of which can cause long-term problems for groups.

Qualitative and quantitative evidence provide general support for the prediction that rules will help clubs succeed. While rule adoption doesn’t appear to be correlated with individual game behavior, clubs with more rules reported significantly higher functionality. Rule adoption also had a small significant effect on club age, suggesting that rules may help clubs survive.
Overall, rules appear to be an important aspect of buying club evolution, whether they represent more of an adaptive process or are an example of institutional learning.

**Institutional Adaptations & Organizational Change in Buying Clubs**

This thesis presents evidence relevant to specific predictions regarding cooperation in buying clubs and the mechanisms that sustain it. These results provide general support for my overarching adaptive hypothesis of buying clubs, and may be used to refine and enhance the evolutionary model, shaping future research. Evidence collected across all sources in this study suggests strongly that buying clubs are cooperatively-structured organizations which require members to cooperate with one another, both economically and organizationally. This reliance on cooperation is tightly connected to many of the challenges clubs face, including sharing bulk orders, reaching order minimums, fairly distributing labor, and others. The availability of more convenient food vendors makes buying club membership a costly undertaking, which makes clubs less resilient in the face of harsh economic conditions and exogenous shocks (e.g. loss of a meeting space, loss of a key member or coordinator, etc.). Thus, clubs which are able to overcome the challenges of order-sharing and organization likely possess certain adaptations that support cooperation. This research found support for rule adoption as an institutional adaptation, but not reciprocity. Smaller clubs in this study tended to rely more on the generous acts of individual altruists to fill bulk orders, whereas larger clubs offered enough flexibility for individuals to actually free-ride on the benefits of the group. Hence, it is possible that the relevant adaptation is club size, which eases the pressures of order-sharing. Size will likely become an important variable in future projects concerned with cooperation and the organizational evolution of buying clubs. A refined version of the original adaptive hypothesis
may focus on rule adoption and club size as two key adaptations that help clubs succeed and survive.

Applications for Buying Clubs

There are a number of key takeaways from this research relevant to the organization and management of food buying clubs. One of the major patterns that emerged in survey and interview responses was the challenge of maintaining group membership. Clubs often struggle to recruit a sufficient number of motivated and reliable members to ensure that orders are filled, splits are possible, and work tasks are evenly distributed without overburdening coordinators. When asked about an optimal group size for their club, many coordinators provided a number between 20 and 25 people, yet the average size of the clubs in this study population is 15. Group size is also a determinant of reciprocity. Having a sufficient group size is key for sustaining cooperation and reducing reliance on altruistic individuals in buying clubs.

Another characteristic that supports cooperation and reduces the burden on individual altruists in buying clubs is the adoption of rules. Many coordinators who manage all aspects of their clubs expressed frustration, and members of these groups often admitted to feeling guilty about not contributing or wishing they could be more involved. The adoption of rules in a buying club can help disperse responsibility across members by holding them accountable for paying on time, placing regular orders, attending meetings, performing work tasks, and participating in whatever capacity is needed to keep the group running smoothly. These rules differ depending on the size, schedule, and organization of the club, and should be designed to suit a club’s particular needs. Some of the older clubs in the study have experienced periods of struggle, which ultimately led to a change in leadership, organization, or rules, allowing the clubs to adapt.
and succeed. The ability to learn from mistakes and challenges and be fluid enough to make necessary changes appears to be an important determinant of club success and longevity.

**Future Research**

One limitation of this study is that it does not differentiate club rules by type. Future projects might explore how the type of rule adopted by clubs influences outcomes both at the individual group level. Creating an index of rules and categorizing them by type and level of formality may provide further insight into how rules emerge, evolve, and impact club success. Finally, there is a large amount of data excluded from this analysis that could be integrated in creative ways. For instance, future work might compare survey and interview results with social network statistics derived from club purchasing history to capture the intricacies of order-sharing. Variables measured in the online surveys and interviews also remain to be analyzed, including measures of how closely clubs integrate rules similar to Ostrom’s institutional design principles. Other variables measured that were not analyzed in this thesis but may be of interest include frequency of splits failing due to lack of support, changes in food preferences due to experience in the club, hours worked for the club, costs and benefits of participating in the club, and decision-making structure of the club.
REFERENCES


*Local Food and Community Self-Governance Ordinance (Template),* (2017).


APPENDICES

Appendix A: Coordinator Interview Questions

University of Maine
Notice of Informed Consent

You are invited to participate in a research project lead by professor Tim Waring and student researchers at the University of Maine. The project is a study of the challenges faced by food buying clubs, and the solutions that groups have discovered. You must be at least 18 years of age to participate.

What Will You Be Asked to Do? You will be asked to answer a series of questions regarding the way your buying club operates.

Voluntary: Participation is voluntary; you may stop the interview at any time.

Confidentiality: Your responses will be treated confidentially, and will be encrypted for security. Your email address and personal identifying information will never be published, presented, or shared outside of the research team. Identifying information will be destroyed at the end of the project (~5 years). Summary data (key findings, trends, themes etc.) will be shared with Adi Fairbank (or Jeremy Bloom), and buying club participants, but no raw data will be shared.

Risks: The only risks to participating in this experiment are the time and inconvenience of participation.

Benefits: There are no direct benefits to you. The research will benefit society by improving our understanding of food buying clubs and cooperation.

Compensation: There will be no compensation, monetary or otherwise, for your participation in this interview.

Contact: If you have any questions about the research or its goals, please contact Afton Hupper at afton.hupper@maine.edu or (207) 691-1786, Taylor Lange at taylor.z.lange@maine.edu (607) 201-2441 or Dr. Waring at timothy.waring@maine.edu. Any questions about your rights as a participant may be directed to Gayle Jones, Assistant to the University of Maine’s Protection of Human Subjects, Institutional Review Board (IRB), at gayle.jones@umit.maine.edu or by phone: (207) 581-1498.
Do you understand the risks and benefits, and agree to participate in this interview?

**Introduction**

*Thanks for chatting with me today. We are a small research group at the University of Maine. We are studying what makes food buying clubs successful Thank you for making this study possible! We’ll let you know what we find. Today, I was hoping to learn a little more about your group, and its history.*

**History**

1. So, when did you become coordinator? [year]
2. What year was your club established? [year]
3. Please describe your group and how it works. [ex. club, farm, store, etc.]
4. How does your group use foodclub.org?
5. Can you give a basic timeline of the history of the club? Or, what are the biggest changes the club has seen? [list of events and rough dates]
   a. For each:
      i. What caused the change? [take notes]
      ii. What was the result of the change? [take notes]

*Look for signs of changes in cooperation, rules, numbers*

b. Are there any other major changes you can think of? [complete the list]

**Group Function**

*Can you help me understand a little about how your group works?*

6. How does your group coordinate orders? [verbal description]

**Splits**

*Splitting bulk purchases is often a central part of what makes food clubs work.*

1. Is splitting items important for your group? In other words, if you could not split purchases, would the group still function?
2. What is the right amount of splitting (%) or this group? [is there a sweet spot?]
3. In your experience, is there a group size that works best? Please explain. [is this related to item splitting?]
Clearly defined boundaries
6. Are the members of your buying club well-defined? [e.g. is it clear who is a member and who is not?]
7. Are there any requirements for members to join and/or stay in your club? [ex. membership fees, ordering requirements, perform work tasks, etc.]

Congruence between rules and conditions
8. How formal are the rules of your group? [are they written down and enforced, or are they informal social norms?]
9. Do members of your buying club generally follow the rules formulated by the group? [order-sharing, contributing labor, organizing, helping you, etc.]

Collective-choice arrangements
10. When the group makes a change, how is it decided? [ex. new supplier, coordinator, meeting times, etc.] [look for hierarchical vs participatory]
11. Do members participate in making decisions regarding the organization and management of the buying club?

Monitoring
In some groups, complying with any group rules and standards requires monitoring.
12. Does your group have any need to monitor behavior? If so, how is that done? [official monitor, everyone monitors, not needed, other system, etc.]

Graduated sanctions
13. What happens if members violate these “rules”? Are sanctions or punishments imposed on members if they violate the rules? [e.g. removal from the group, intervention, informal discussion, etc.]
   a. If so, do those sanctions or punishments vary depending on the seriousness or context of the rule breaking? [e.g. graduated?]

Conflict-resolution mechanisms
14. What happens when there is a conflict between members or leaders? Is there any procedure or routine for dealing with conflicts? [ex. informal discussion, intervention etc.]

Rights to organize
15. Does the group have the freedom to organize as they see fit, or does it face external constraints? [ex. laws/regulations, other institutional hurdles]

Challenges and Successes
16. What are some of the biggest challenges faced by your group, now and in the past?
17. What have been the biggest successes or breakthroughs your club has experienced?
Thanks so much for your time! We will share our findings with you as soon as possible.

**Cooperation Tools - Trial**

*I have one last question for you and your group.*

*We think that cooperation science can help food clubs thrive.*

*If you are interested, we could share some materials and ideas with your group on that.*

18. Do you think your group would be interested?
   a. If so, would it be okay for us to send your club a link to our online survey designed for food buying clubs?
   b. Since working with foodclub, we now have the opportunity to study your club’s purchasing history to try to glean more information about your cooperative purchasing behavior, would that be alright with you?
Appendix B: Food Club Survey

University of Maine Notice of Informed Consent

You are invited to participate in a research project lead by professor Tim Waring and student researchers at the University of Maine. The project is a study of the challenges faced by food buying clubs, and the solutions that groups have discovered. You must be at least 18 years of age to participate.

What Will You Be Asked to Do?
You will be asked to play two economic games with real money provided by the researcher, some of which you will get to keep. You will also be asked to complete a survey about your experience with your food buying club. In total this should take about 15 minutes.

Risks: The only risks to participating in this experiment are the time and inconvenience of participation.

Compensation: The economic games provide monetary compensation ranging from $0 to $35, depending on your choices in the game.

Confidentiality: Your responses will be treated confidentially, and will be encrypted for security. You will be anonymous to other players in the economic games. You will be asked to select your club ID from a list, and provide your email address so that we can compensate you. Email addresses, club IDs and personal identifying information will never be published, presented, or shared outside of the research team. Identifying information will be destroyed at the end of the project (~5 years). Summary data (key findings, trends, themes etc.) will be shared with foodclub.org, and buying club participants, but no raw data will be shared.

Benefits: There are no direct benefits to you. The research will benefit society by improving our understanding of food buying clubs and cooperation.

Voluntary: Participation is voluntary. You may stop at any time. However, if you stop before the end of the survey we will not be able to calculate your payment, or pay you.

Contact: If you have any questions about the research or its goals, please contact Afton Hupper at afton.hupper@maine.edu or (207) 691-1786, Taylor Lange at taylor.z.lange@maine.edu (607) 201-2441 or Dr. Waring at timothy.waring@maine.edu. Any questions about your rights as a participant may be directed to Gayle Jones, Assistant to the University of Maine’s Protection of Human Subjects, Institutional Review Board (IRB), at gayle.jones@umit.maine.edu or by phone: (207) 581-1498.
By continuing you signal that you understand the risks and benefits and agree to participate.

Thank you for taking time to fill out this survey.

Local Food Science is a collaborative research group at the University of Maine. We're working to find the best solutions to the biggest challenges faced by food buying clubs. Your responses are critical. We will share the results once your group has finished the survey. We hope they will help!

After a required University research statement, the survey proceeds as follows:

- Two paid economic games (2 min)
- Buying club experiences (10 min)
- Demographic information (3 min)

All together, it should take about 15 minutes to complete. We look forward to your input!

- The Local Food Science team

Economic Games
• First you will play two separate economic games.
• Your identity and responses will be completely confidential.
• You will be anonymous to other players, and they will be anonymous to you.

First Game
You are playing with: another person in your buying club.

• You have an endowment of $8.
• You may choose to contribute any whole-dollar amount ($0 to $8) to the other player.
• You will be paid the amount you chose to keep.
• The other player will be paid the amount you chose to contribute to them.

1. Use the slider to indicate how much, if any, you will contribute to another person in your buying club.

<table>
<thead>
<tr>
<th>Dollars contributed ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
</tbody>
</table>

Second Game
You are playing with the all other members of your buying club.

• You have an endowment of $8.
• You may choose to contribute any whole-dollar amount ($0 to $8) to a group fund.
• Every other player may choose to contribute to the group fund.
• The group fund will grow by 40%, then be divided equally between every member of the
group, regardless of their individual contributions.
• You will be paid the amount you kept, plus your equal share of the final group fund.
• Every other player faces the same scenario as you.

2. Use the slider to indicate how much, if any, you contribute to your buying club's group fund. Remember, the group fund will be increased 40% and divided evenly between all members.

Thank you. Your choices have been recorded. We will calculate your payment once all responses are recorded.

To make payment possible, you will be asked to provide your email address at the end of the survey. If you fail to complete the survey and provide a correct email address, we will be unable to pay you. Next, we ask a series of questions on your experience with your buying club.

3. When did you join your food buying club?

4. Prior to joining one, how did you first learn about food buying clubs?

5. What are your primary motivations for joining your buying club?
Select all that apply.

☐ To save money on food
☐ To gain access to certain foods
☐ To meet health and dietary preferences
☐ To support local producers
☐ To support good environmental practices
☐ To support good social practices
☐ To avoid industrialized food
☐ To socialize with club members
☐ Due to familiarity with buying clubs
☐ Due to personal connection or invitation
☐ Other ____________________________________________
6. What percent of your total household needs are met through your buying club?

<table>
<thead>
<tr>
<th>% of needs met (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 10 20 30 40 50 60 70 80 90 100</td>
</tr>
</tbody>
</table>

7. People in buying clubs often split big, bulk purchases.

Of your purchases:

<table>
<thead>
<tr>
<th>None</th>
<th>Some</th>
<th>Half</th>
<th>Most</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 10 20 30 40 50 60 70 80 90 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- How many of your purchases require the help of other club members to split? ()
- How often do you receive the help you need in splitting items? ()

8. How often do you initiate a split purchase that fails (due to lack of support)?

<table>
<thead>
<tr>
<th>Never</th>
<th>Sometimes</th>
<th>About half the time</th>
<th>Most of the time</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
</tr>
</tbody>
</table>

Frequency of "failed" splits ()

9. Do you ever buy items that don't fit your own preferences in order to help someone fill a shared purchase?

- Yes
- No

10. On average, what percent of your purchases don't match your own preferences, but help others split bulk items?

<table>
<thead>
<tr>
<th>Percent of items (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 10 20 30 40 50 60 70 80 90 100</td>
</tr>
</tbody>
</table>

11. When you help others complete splits, how often do they reciprocate on average?

<table>
<thead>
<tr>
<th>Never</th>
<th>Sometimes</th>
<th>Half of the time</th>
<th>Most of the time</th>
<th>Always</th>
</tr>
</thead>
</table>


12. What percent of members of your club typically reciprocate after they receive help completing a split?

13. Please select the types of foods that you purchase through the buying club. (Select all that apply)
   - Organic
   - Fair trade
   - Non-GMO
   - Sustainably sourced
   - Rare, ethnic or specialty foods
   - Local food
   - Other __________________________________________________

14. Have your food preferences or habits changed due to your experience in the buying club? If yes, please explain how.
   - Yes ____________________________________________________
   - No

Participation
This section focuses on your participation in the buying club.

15. How many hours per week, on average, do you do work tasks for the buying club? (Work tasks might include hosting deliveries, financial bookkeeping, scheduling or arranging deliveries, etc.)

   ▼ 0 (1) ... More than 20 (11)

16. Please consider how your group functions.

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
</tr>
</tbody>
</table>
My group communicates well. ()

Members contribute their fair share of the work. ()

Members benefit from participating. ()

Members help each other complete bulk purchases when needed. ()

My group functions well overall. ()

17. Please reflect on the various costs and benefits of participating in the buying club. Participating...

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>... benefits me financially. ()</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>... costs me financially. ()</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>... benefits me socially. ()</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>... costs me socially. ()</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVERALL: Participation benefits outweigh costs. ()</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. If your club operates on a set of "rules," do you view those rules as fair? Please explain your answer.

魔鬼     Yes _______________________________________________________
魔鬼     No  _______________________________________________________
魔鬼     We do not have any rules.

19. Please rank the accuracy of the following statements in terms of your buying club.
I have a strong sense of belonging to the buying club. ()

When I talk about the buying club, I usually say "we" rather than "they." ()

The needs and wants of other members of the buying club influence my needs and wants. ()

The buying club requires effort from all members to function. ()

19. As a member of this buying club, are you included in group decisions? (i.e. changes in suppliers, goals, rules, etc.)

Not at all Somewhat Partially Mostly Fully
0 25 50 75 100

I feel included in decisions ()

20. In general, how happy or satisfied are you with your group?

Very Unsatisfied Unsatisfied Neutral Satisfied Very satisfied
0 25 50 75 100

Level of satisfaction ()

20. Do you have unmet needs you wish the club could provide? If so, what changes would you like to see?

________________________________________________________________
________________________________________________________________

Demographic Information

The basic information provided in this section will be kept strictly confidential.

21. Please select your age.

▼ 18 (1) ... 100 (83)

22. What is your gender?

▼ Male (1) ... Prefer not to say (3)
23. Please describe your ethnicity by selecting all that apply.

- White
- Black or African American
- Latino / Latina
- American Indian or Alaska Native
- Asian
- Native Hawaiian or Pacific Islander
- Prefer not to say
- Other

24. Please select your highest completed education level.

▼ Some high school ... PhD, JD, MD, etc.

25. What is your approximate annual household income?

More than 150K

0 15 30 45 60 75 90 105 120 135 150

Approximate annual household income (in thousands) ()

26. Please select your employment status.

▼ Employed full time (1) ... Disabled (7)

27. How many dependents are in your household?

foodclub.org

Please consider how your group uses foodclub.org to organize shared orders. Your responses here will help improve foodclub.org.

28. How satisfied are you with foodclub.org's service?

Very Unsatisfied Unsatisfied Neutral Satisfied Very Satisfied

0 25 50 75 100

Satisfaction ()
29. What do you appreciate about foodclub.org?
________________________________________________________________
________________________________________________________________
________________________________________________________________

30. How could foodclub.org improve its service?
________________________________________________________________
________________________________________________________________
________________________________________________________________

Payment Details

**One last step... electronic payment!**
We use a free service called Square Cash to send your games payments electronically.

**Square Cash Details:**
- Square Cash is secure, fast, and will deposit the payment into your bank account.
- You will need a current debit card to accept the payment.
- You will receive an email from cash@square.com, with a link to accept the payment.
- You will have 14 days to accept the payment.
- The deposit will appear on your bank statement as “SQC*WARING” or “SQ*WARING”.

31. Please enter your email address below so we can send you your payment:
________________________________________________________________

You're all done! **Thank you.**

Your answers will help us better understand the best solutions buying clubs have found to their hardest challenges. Once everyone has been able to complete the survey and games, and we have analyzed them all, we will share the survey results with you and your club. We hope that the findings will be interesting and useful!

**Don't Forget:**
**Look for an email from cash@square.com with instructions to accept your games payment!**

- The Local Food Science Team
Appendix C: Regression Tables

Table C.1. OLS Model of Net Received Regressed on Dictator Game Donation

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DG</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.292*</td>
</tr>
<tr>
<td>(0.173)</td>
<td></td>
</tr>
<tr>
<td>HH income</td>
<td>0.394**</td>
</tr>
<tr>
<td>(0.173)</td>
<td></td>
</tr>
<tr>
<td>Gender (male)</td>
<td>-0.612</td>
</tr>
<tr>
<td>(0.631)</td>
<td></td>
</tr>
<tr>
<td>% HH needs met</td>
<td>-0.290</td>
</tr>
<tr>
<td>(0.180)</td>
<td></td>
</tr>
<tr>
<td>NR</td>
<td>-0.003</td>
</tr>
<tr>
<td>(0.008)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>4.522***</td>
</tr>
<tr>
<td>(0.198)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>96</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-190.868</td>
</tr>
<tr>
<td>Akaike Inf. Crit.</td>
<td>397.737</td>
</tr>
<tr>
<td>Bayesian Inf. Crit.</td>
<td>418.252</td>
</tr>
</tbody>
</table>

*p<0.1; **p<0.05; ***p<0.01
Table C.2. OLS Model of Net Received Regressed on Public Goods Game Donation

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>PGG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Club age</td>
<td>-0.390 (0.245)</td>
</tr>
<tr>
<td>HH income</td>
<td>0.417* (0.243)</td>
</tr>
<tr>
<td>Gender(Male)</td>
<td>0.263 (0.898)</td>
</tr>
<tr>
<td>% HH needs met</td>
<td>0.203 (0.248)</td>
</tr>
<tr>
<td>Net received</td>
<td>0.002 (0.011)</td>
</tr>
<tr>
<td>Constant</td>
<td>5.403*** (0.279)</td>
</tr>
<tr>
<td>Observations</td>
<td>97</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-224.970</td>
</tr>
<tr>
<td>Akaike Inf. Crit.</td>
<td>465.939</td>
</tr>
<tr>
<td>Bayesian Inf. Crit.</td>
<td>486.537</td>
</tr>
</tbody>
</table>

*p<0.1; **p<0.05; ***p<0.01
Table C.3. OLS Model of Overall Function Regressed on Net Received

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable:</strong></td>
<td><strong>Overall function</strong></td>
<td></td>
</tr>
<tr>
<td>% HH needs met</td>
<td>0.905</td>
<td>(2.015)</td>
</tr>
<tr>
<td>NR</td>
<td>0.037</td>
<td>(0.079)</td>
</tr>
<tr>
<td>Constant</td>
<td>80.580</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>(3.200)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-430.975</td>
<td></td>
</tr>
<tr>
<td>Akaike Inf. Crit.</td>
<td>871.949</td>
<td></td>
</tr>
<tr>
<td>Bayesian Inf. Crit.</td>
<td>884.925</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.1; **p<0.05; ***p<0.01

Table C.4. OLS Model of Net Received Regressed on Club Age

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable:</strong></td>
<td><strong>NR</strong></td>
<td></td>
</tr>
<tr>
<td>% HH needs met</td>
<td>-3.104</td>
<td>(2.426)</td>
</tr>
<tr>
<td>Club age</td>
<td>1.031</td>
<td>(2.356)</td>
</tr>
<tr>
<td>Constant</td>
<td>-11.292</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>(2.739)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>108</td>
<td></td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-492.041</td>
<td></td>
</tr>
<tr>
<td>Akaike Inf. Crit.</td>
<td>994.081</td>
<td></td>
</tr>
<tr>
<td>Bayesian Inf. Crit.</td>
<td>1,007.492</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.1; **p<0.05; ***p<0.01
### Table C.5. OLS Model of Net Received Regressed on Club Size

Dependent variable: NR

<table>
<thead>
<tr>
<th></th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>% HH needs met</td>
<td>-0.230** (0.101)</td>
</tr>
<tr>
<td>Number of members</td>
<td>0.257*** (0.098)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.015 (0.093)</td>
</tr>
<tr>
<td>Observations</td>
<td>110</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-156.123</td>
</tr>
<tr>
<td>Akaike Inf. Crit.</td>
<td>322.246</td>
</tr>
<tr>
<td>Bayesian Inf. Crit.</td>
<td>335.748</td>
</tr>
</tbody>
</table>

*p<0.1; **p<0.05; ***p<0.01
Table C.6. OLS Model of Dictator Game Donation Regressed on Club Age

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>DG donation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Club age in years</td>
<td>-0.269*</td>
</tr>
<tr>
<td></td>
<td>(0.146)</td>
</tr>
<tr>
<td>HH income</td>
<td>0.413***</td>
</tr>
<tr>
<td></td>
<td>(0.155)</td>
</tr>
<tr>
<td>Gender (male)</td>
<td>0.387</td>
</tr>
<tr>
<td></td>
<td>(0.523)</td>
</tr>
<tr>
<td>Gender (other)</td>
<td>-2.750</td>
</tr>
<tr>
<td></td>
<td>(1.734)</td>
</tr>
<tr>
<td>% HH needs met</td>
<td>0.105</td>
</tr>
<tr>
<td></td>
<td>(0.162)</td>
</tr>
<tr>
<td>Rules</td>
<td>-0.202</td>
</tr>
<tr>
<td></td>
<td>(0.148)</td>
</tr>
<tr>
<td>Constant</td>
<td>5.366***</td>
</tr>
<tr>
<td></td>
<td>(0.567)</td>
</tr>
<tr>
<td>Observations</td>
<td>139</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-273.113</td>
</tr>
<tr>
<td>Akaike Inf. Crit.</td>
<td>564.227</td>
</tr>
<tr>
<td>Bayesian Inf. Crit.</td>
<td>590.637</td>
</tr>
</tbody>
</table>

*p<0.1; **p<0.05; ***p<0.01
Table C.7. OLS Model of Public Goods Game Donation Regressed on Club Age

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>PGG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years (years)</td>
<td>-0.378* (0.206)</td>
</tr>
<tr>
<td>HH income</td>
<td>0.212 (0.213)</td>
</tr>
<tr>
<td>Gender (male)</td>
<td>0.712 (0.739)</td>
</tr>
<tr>
<td>Gender (other)</td>
<td>-4.441* (2.457)</td>
</tr>
<tr>
<td>% HH needs met</td>
<td>0.297 (0.219)</td>
</tr>
<tr>
<td>Rules</td>
<td>0.062 (0.157)</td>
</tr>
<tr>
<td>Constant</td>
<td>5.366*** (0.598)</td>
</tr>
</tbody>
</table>

| Observations | 140 |
| Log Likelihood | -320.196 |
| Akaike Inf. Crit. | 658.391 |
| Bayesian Inf. Crit. | 684.866 |

*p<0.1; **p<0.05; ***p<0.01
Table C.8. OLS Model of Overall Function Regressed on Rules

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Overall function</th>
</tr>
</thead>
<tbody>
<tr>
<td>% HH needs met</td>
<td>0.955 (1.737)</td>
</tr>
<tr>
<td>Rules</td>
<td>2.811** (1.430)</td>
</tr>
<tr>
<td>Constant</td>
<td>70.768*** (5.536)</td>
</tr>
<tr>
<td>Observations</td>
<td>140</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-610.703</td>
</tr>
<tr>
<td>Akaike Inf. Crit.</td>
<td>1,231.405</td>
</tr>
<tr>
<td>Bayesian Inf. Crit.</td>
<td>1,246.114</td>
</tr>
</tbody>
</table>

*p<0.1; **p<0.05; ***p<0.01

Table C.9. OLS Model of Club Age Regressed on Rules

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Club age (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of rules</td>
<td>3.333*** (0.499)</td>
</tr>
<tr>
<td>Constant</td>
<td>4.253** (1.902)</td>
</tr>
<tr>
<td>Observations</td>
<td>164</td>
</tr>
<tr>
<td>R²</td>
<td>0.216</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.211</td>
</tr>
<tr>
<td>Residual Std. Error</td>
<td>10.131 (df = 162)</td>
</tr>
<tr>
<td>F Statistic</td>
<td>44.692*** (df = 1; 162)</td>
</tr>
</tbody>
</table>

*p<0.1; **p<0.05; ***p<0.01
BIOGRAPHY OF THE AUTHOR

Afton Hupper was born in Rockport, Maine on September 20\textsuperscript{th}, 1995. She was raised in Tenants Harbor, Maine and graduated from Oceanside High School in 2013. She attended the University of Maine and graduated in 2017 with Highest Honors, a Bachelor’s degree in Ecology and Environmental Sciences, and a minor in Sustainable Food Systems. She continued her education at the University of Maine in the Resource Economics and Policy program in the fall of 2017. Afton is a candidate for the Master of Science degree in Resource Economics and Policy from the University of Maine in May 2019.