

2022

## Worker Cooperatives And Globalization: A Case Study Of Fagor Electrodomésticos Utilizing Game Theory

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WORKER COOPERATIVES AND GLOBALIZATION:  
A CASE STUDY OF FAGOR ELECTRODOMÉMICOS UTILIZING GAME  
THEORY

by

Bradley C. Williams

A thesis submitted in partial fulfillment of the requirements  
for the Honors Interdisciplinary Program in Political Science  
in the College of Sciences and in the Burnett Honors College  
at the University of Central Florida  
Orlando, Florida

Spring Term, 2022

Thesis Chair: Dr. Kerstin Hamann, Ph. D.

## **Abstract**

The internationally recognized and flagship worker cooperative Fagor Electrodomésticos was founded in 1956 and was heralded as a success story before declaring bankruptcy in 2013. In this thesis, I examine the existing literature regarding worker cooperatives and provide historical background on Fagor Electrodomésticos. I then focus on one of the factors credited by the literature as contributing to its failure and other worker cooperatives broadly, the internal decision-making process. To analyze the role of the internal decision-making process I develop a game-theoretic model that sheds light on the dynamics of this process. This model contains three actors each of whom attempt to maximize their payoffs by advocating within a three-node game tree. This approach illustrates that in times of economic downturn actors with higher preferences for labor over profit will forestall employment cuts that are required for the firm to remain profitable or break-even and might operate at a loss to avoid necessary employment reductions. I then introduce costs when one or more actors employ their vetoes in a way that can prevent the delay of necessary unemployment reductions for firm survival.

## Dedication

To the friends, family, and mentors who have shaped who I am and whom I have yet to become.

You remind me that the relationships we facilitate and projects we pursue are meaningful because the life we have is finite. I do not know where I would be today without all of you.

## Acknowledgments

I would like to graciously thank my thesis chair, Dr. Kerstin Hamann, for her guidance and patience through this process. She has been endlessly supportive, a fantastic editor, and has greatly improved the quality of this project.

I would also like to thank my committee, Dr. Uluc Aysun for bringing a unique perspective throughout this project.

I would also like to extend my thanks to Dr. Eric Schmidbauer for his insight and feedback early in the project.

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## **Chapter 1**

### **Introduction**

Will worker cooperatives be able to adjust to the rise of globalization and continue to compete against capitalist firms? Fagor Electrodomésticos (“Fagor”)<sup>1</sup>, founded in 1956 under the name Ulgor, was a mainstay in the Spanish Mondragon Corporation<sup>2</sup> (“Mondragon”) and had become an international cooperative before its’ bankruptcy in 2013. While local qualitative research conducted by Errasti et al. (2017) including interviews of “Mondragon personnel and managers” pointed to factors such as poor market conditions, an oversized dependence on Spanish markets, competition from other firms, and a large debt burden from acquisitions the analytical work on the internal decision-making process has been lacking. This thesis reviews the theoretical literature surrounding worker cooperatives, the history of Mondragon and Fagor, and contains a game-theoretic model of the internal decision-making process of Fagor to provide an analytical tool to reinforce the results of interview-based research. Mondragon thus serves as a case study of the failure of a previously highly successful worker cooperative in the age of global financialization.

The Democracy at Work Institute defines worker cooperatives as businesses where “workers own the business and they participate in its financial success on the basis of their labor contribution to the cooperative” and “workers have representation on and vote for the board of directors, adhering to the principle of one worker, one vote” (*What Is a Worker Cooperative?*,

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<sup>1</sup> The individual firm, not to be confused with the broader Fagor group

<sup>2</sup> Literature refers to this organization as Mondragon, Mondragon Corporation, Mondragon Cooperative Corporation, and Mondragon, Humanity at Work.

n.d.). Similarly, the University of Wisconsin-Madison Center for Cooperatives states that “Worker cooperatives are owned and operated by their employees” (*Worker Cooperatives*, n.d.). A term commonly used to refer to those who are members of cooperatives is “worker-owners” (Rhodes & Steers, 1981; Pierce & Rodgers, 2004).

The fate of worker cooperatives in the age of globalization is of importance beyond just worker-owners and their dependents. Some researchers have considered worker cooperatives as instruments that could be used for community wealth development (Majee & Hoyt, 2011), while others consider worker cooperatives as a transitional stage from capitalism to socialism (Marcuse, 2015). Existing theoretical research contests the durability of worker cooperatives and calls into question their willingness to expand employment. While contributing to the existing research surrounding worker cooperatives through Fagor, this thesis aims to elucidate some of the challenges faced by worker cooperatives encountering economic pressures and uses a game-theoretic approach to engage with the question of the effects of internal democracy on firm decisions. The game-theoretic model adds to the existing literature by elucidating previous complaints of a decision-making process that is too slow and incapable of making choices deemed necessary for firm survival. In Chapter 2, I provide an overview of worker cooperatives including what they are, why people pursue them, and some theoretical challenges faced by them. Chapter 3 discusses the background of Ulgor’s founding, the growth of Ulgor into Fagor and Mondragon, and the reasoning behind selecting Fagor for this thesis. Then in Chapter 4, I propose and solve a game-theoretic model with various cases to analyze Fagor’s internal decision-making process. In Chapter 5, I conclude with a summary that rearticulates the major points of my thesis, my findings, the limitations of my model with suggestions for additional

research, and further implications and applications. And Chapter 6, as a mathematical appendix. I find that in times of economic downturn actors with higher preferences for labor over profit will forestall employment cuts that are required for the firm to remain profitable or break even and might operate at a loss to avoid necessary employment reductions. Additionally, applying costs to every actor's utility when one imposes a veto can protect a firm from becoming unprofitable and enforce necessary employment reductions.

## Chapter 2

### **Worker Cooperatives**

#### **2.1 What Are Worker Cooperatives?**

While differing firm ownership structures exist besides the investor ownership model, this thesis focuses on worker cooperatives. When referencing worker cooperatives, I modify Vanek (1970, p.1) and broadly consider any firm that satisfies the principles of “collective ownership”, and “one worker, one vote”. Collective ownership can be satisfied by ownership of a firm’s non-labor inputs being equally distributed among some to all a firm’s employed persons. The “one worker, one vote” principle is generally satisfied using binding internal democratic structures that guide the direction of the firm such as managers being elected or workplace policy modifications via referendum. I use the term “worker-owner” for any person who works at a worker cooperative as defined above, possesses ownership rights as defined above, and has the right and ability to cast votes in binding elections that require management to abide by the result of said electoral processes. It should be noted that sole proprietorships are excluded on their single employment grounds because worker cooperatives require multiple humans, while firms with Employee Stock Ownership Plans (ESOPs) do not fully satisfy the requirements due to heterogeneity in the distribution of share ownership to employees and the distanced nature of their decision-making processes.

Worker cooperatives do not have a sole monopoly on cooperatives, and it is important to note that other types of cooperatives exist as well. The University of Wisconsin-Madison (UW) Center for Cooperatives’ article “Types of Co-Ops” (n.d.) delineates between producer,

consumer, worker, purchasing, and multi-stakeholder cooperatives. To summarize UW generally, producer, consumer, and purchasing cooperatives are one-type inter-actor alliances that provide benefits<sup>3</sup> to their respective members through a variety of functions such as aggregating members' output(s) or input(s) for better pricing or adding/saving on value via enabling vertical integration. In contrast, a multi-stakeholder cooperative simply accepts two or more actors as members; for example, the Mondragon supermarket chain Eroski accepts both workers and consumers as members making it a hybrid of a worker cooperative and consumer cooperative (“Quiénes Somos”, n.d. Retrieved 3/29/22)

## **2.2 Why Participate in Worker Cooperatives?**

The reasons for individuals to participate in worker cooperatives are varied and complex just like any set of human behaviors and include political, social, or economic reasons as well as combinations of these factors. Accordingly, some actors (Held 2006, p.285-286) pursue some form of democratic control over economic affairs and view it as essential to the protection of political democracy. Father José María Arizmendiarieta Madariaga contributed heavily to the founding of the firm Ulgor which grew into what is now known as Mondragon and aimed to achieve collective social liberations through technical education and cooperation (Whyte & Whyte 1991, p. 29).

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<sup>3</sup> See Gall and Schroder (2006) for an informative summary of some of the business-to-business relationship theory literature and how it meshes with types of agricultural producer cooperatives.

Individuals can also be pulled to worker cooperatives for improved employment and wage stability. Using data from Legacoop worker cooperatives in Ravenna, Italy, in combination with survey data of workers, Navaara (2016) finds that flexible wage contracts are used to avoid reducing employment by some worker cooperatives while other cooperatives maintain funds to smooth wages known as “asset locks.” Similar practices referred to as solidarity mechanisms in Mondragon were employed before and after the bankruptcy of Fagor with additional worker-oriented practices including optional early retirement for older workers or relocation to other firms. These additional practices known as “flexicurity” have been characterized as having mixed effectiveness in Mondragon owing in part to the sheer depth of the downturn following the bursting of the Spanish property bubble and the Great Recession of ’08 (Larrazabal & Basterretxea, 2021).

### **2.3 Theoretical Challenges**

The proportion of worker cooperatives relative to capitalist firms is relatively small across all industrialized countries. In the USA, a conservative estimate cites approximately 400 worker cooperatives in 2018 (Palmer 2019); Díaz-Foncea & Marcuello (2015) find that in 2009, just 1.49% of Spanish firms were worker cooperatives. Why are there so few worker cooperatives?

Numerous theoretical challenges and critiques have been levied at worker cooperatives to explain such low numbers relative to other models, worker cooperatives are sometimes referred

to in this literature as producer cooperatives<sup>4</sup> or labor-managed firms<sup>5</sup>. These critiques include the degeneration theses, the threat of demutualization, barriers to acquiring capital for expansion, increased competition resulting from globalization, and the unwieldiness of internal decision-making processes which I discuss in turn below.

The birth of the degeneration thesis comes from Webb and Webb (1920) in their book *A Constitution for the Socialists Commonwealth of Great Britain*. The authors critique “Democracies of Producers,” which they characterize as constantly failing while the ones that survive do so by becoming “associations of capitalists” that employ wage workers outside of their association to maintain profitability (p.155). These observations have since been followed by a variety of research comparing capitalist firms and worker cooperatives that generally find survival rates for worker cooperatives are overall similar if not better than traditional capitalist firms (Ben-ner 1988, Olsen 2013, Monteiro & Steward 2015). Additionally, Ben-Ner (1984) demonstrates theoretically that a worker cooperative pursuing maximum income for its members while paying a higher wage rate to members than non-members shall aim to employ the lowest ratio of members to non-members possible. Concurrently, Aoki (1984) demonstrates that worker cooperatives that only employ members, refuse to fire members, and aim to maximize the uniform wage rate paid to members, will keep employment fixed until conditions change such that the marginal productivity of labor is greater than the uniform wage rate paid.

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<sup>4</sup> Not to be confused with shared interfirm structures referred to as producer cooperatives.

<sup>5</sup> Labor-managed firms disallow the use of labor that does not possess voting rights reserved for worker-owners in worker cooperatives. As such, only certain worker cooperatives can be considered labor-managed firms.

Side by side with the concerns for degeneration are concerns about demutualization. Demutualization is a process whereby the ownership and/or the democratic nature of a cooperative is slowly abandoned by its members, sometimes through the sale of stocks with voting power, bankruptcy, or being acquired by a private firm as Battilani & Schröter (2011) note. One prominent example of demutualization was the Canadian poultry processor Lilydale Co-operative Ltd which after 65 years of operation voted in 2005 to demutualize to pursue capitalize-raising routes to combat its high debt-asset ratio (Hailu & Goddard, 2009)

The ability of businesses to acquire capital is fundamental for the expansion of firms. While traditional firms could reinvest profits, issue bonds, sell shares, take out loans, etc. some of these options can prove more complex for worker cooperatives. In the case of reinvesting profits or issuing bonds, the process would not gain additional complexity; however, selling shares and taking out loans could be. To sell shares and maintain voting power among members, only preferred stocks could be utilized as issuing common stocks would grant voting power to those outside the firm transforming it into a multi-shareholder cooperative. As discussed below, Ulgor attempted to solve the finance problem through the creation of a cooperative bank named Caja Laboral (1959) to handle the financing needs of itself and the other cooperatives generated (Whyte & Whyte 1991, p. 50).

A more recent shock for cooperatives is that of globalization which has introduced intensified competition among producers (Bretos & Marcuello 2017). Reduction in transportation costs, other non-tariff trade barriers, and tariffs have led to this intensification and as a result, poorly financed or unproductive firms have either gone bankrupt or downsized into niches. Fagor pursued numerous foreign acquisitions ranging from Poland to China financed

with large amounts of debt, and when the Spanish property bubble (2007-2008) collapsed, the debt in combination with intensified competition from more technologically advanced firms in Europe and firms with lower labor costs in Asia drove Fagor to bankruptcy in 2013 (Errasti et al. 2016).

The critique of worker cooperatives relevant to this thesis calls into question the fitness of the internal decision-making process. One strand of this critique notes the relatively large time required to inform all voters, vote, and then implement the decision made. In one case study of Fagor, Errasti et al. (2017) reported that "... some managers expressed frustration over being hamstrung by democratic governance in implementing necessary reforms."

Worker cooperatives suffer from the same problems as traditional capitalist firms but also face these additional problems. The problems previously outlined included the degeneration theses, the threat of demutualization, the ability to acquire capital for expansion, increased competition resulting from globalization, and the internal decision-making processes. All these problems have confronted Mondragon in Spain including the 2013 bankruptcy of my case study target Fagor.

## **2.4 Broader Market Implications**

The presence of worker cooperatives in an economy will have implications beyond just the direct interest of the worker-owners of said cooperatives. Accepting that worker cooperatives would preserve the employment of their members similarly to how an external union would

preserve employment at a non-worker cooperative we can use some of the existing research regarding the influence of unionization as a potential indicator for the effects of cooperatives.

Vedder & Gallaway, (2002) explore the economic effects of the presence of labor unions by presenting a model where there are two sectors of the economy, union and non-unionized, “borrowing from Ress (1953, 1963)” (p.108). They posit that the increase in wages in the union sector would lead to an equilibrium utilizing less labor with the resulting surplus labor shifting into non-unionized sectors (p.108) and demonstrated such shifting (p.113). This shifting they argued would decrease wages in the non-unionized sector resulting in deadweight loss (p.108). Using US GDP data from 1947 through 2000, they calculate that by 2000 there was a 3.5 trillion shortfall in real GDP (1992-1994 dollars) resulting from deadweight loss when compared with the actual GDP values reported (p. 113-114).

Nickell (1997) compares which factors influence unemployment and labor market rigidities and compares Europe to North America. While examining the roles of unionization when it comes to raising wages and subsequently increasing unemployment, he determines that countries with higher levels of coordination between unions and employers during the bargaining process experience less unemployment than those which have less coordination (p.68). Assuming the internal decision-making processes of worker cooperatives are more coordinated rather than less, a region with high cooperative density could escape these upward wage pressures and corresponding higher levels of unemployment.

## **Chapter 3**

### **Case Selection: The What and Why of The Mondragon Corporation and Fagor Electrodomésticos**

#### **3.1 Background on Founding of Ulgor**

Mondragon is a federation of workers' cooperatives that began with a single shop named Ulgor in 1956. Following the purchase of a bankrupt private firm in the Spanish town of Vitoria, the founders remained in that town for a year before moving back to the town of Mondragon, as the business license acquired was detailed as "extraordinarily broad in scope," and the sample of five graduates who had graduated for the technical college Escuela Politécnica Profesional founded by José María Arizmendiarieta wanted to return to the community that had provided the massive financial support required to make the purchases (Whyte & Whyte 1991, p. 31-35). To understand the spawning of Ulgor and the decisions that guided its growth into the firm Mondragon, a rudimentary understanding of the unique circumstances is required including the Spanish dictator Francisco Franco's repression and autarkic economic policies, the split in the Catholic Church, and support from Don José María for the cooperative, and the special position of the Basque people that enabled the formation of Ulgor and subsequent growth into Mondragon.

The Basque region is situated along the Bay of Biscay crossing the Pyrenees Mountain range, which separates Spain and France. The 1978 Spanish Constitution recognized established providences that were present during the Franco regime (years) and often even before Franco's rule and provided for the provinces to combine into 17 autonomous communities that created a

“federation of autonomous communities” although the structure of the Spanish state remains unitary rather than federal (Brennan & Pardo 1978, Section VII). Many of the Spanish Basques live in one such autonomous community, the Basque Country Autonomous Community (BCAC), which forms part of the broader Basque region.

The Basque autonomous community is constituted of the Araba/Álava, Biscay, and Gipuzkoa provinces spanning 7,234 km<sup>2</sup> or 2,793 miles<sup>2</sup>, containing approximately 2.22 million people. It is one of the most economically productive autonomous communities in Spain with a GDP per capita of \$38,096 in 2019 (“Basque Country 2021”). Most of the remaining Spanish Basques live to the southeast of Basque County in the northern parts of Navarre. Across the border, a large Basque population exists in the Nouvelle-Aquitaine administrative region, France’s largest administrative region. In his book *The Basque History of the World* (2011), American journalist Mark Kurlansky notes that “the 212,00 people in the French Basque provinces represent less than 9 percent of Basques” (p. 309) while including “that among them [French Basques] there exists a divide in which some are wanting the same cultural and economic opportunities” (p. 308) while other fear that emulating Spanish Basques may bring the same “menace and tragedy” (p. 308) as seen in the Spanish Basque communities.

While the Basque autonomous region was established during Spain’s democratic transition starting in 1975, the Basque people and region had few, if any, rights during General Franco’s dictatorship preceding the transition to democracy. Francisco Franco was born in 1892 and served as a general leading up to the failed coup attempt in 1936 that sparked the Spanish Civil War (1936-1939) where “...the Nationalist insurgents against the Republican defenders of representative democracy” of the Second Republic (1931-1936) were defeated (Hamann, 2012,

p.19). Despite no Spanish royal heading the state during the dictatorship. Franco was a monarchist and during the war, he led the nationalists' faction to victory against the sitting center-left Republican government. Following his victory, he led a campaign to bring all the existing institutions in Spain under the power of the state while simultaneously repressing those communities that fought against him. Such repression of diverse ethnic groups such as the Basques, the left, and organized labor included the outlawing of existing unions and the formation of the *jurados de empresa*, in which all workers and owners were forced to participate for the supposed purpose of unifying the productive forces of Spain and to overcome the division between employers and employees. The displacement of the existing unions also constituted a punishment for the left and organized labor groups that had opposed General Franco during the Spanish Civil War, other punishments included the use of physical violence by the police and incarceration, and many opponents were killed (Fishman, 1982; Whyte & Whyte 1991, p.13).

A notable wrinkle in Franco's campaign of consolidation and repression was the Catholic Church. Kissane & Sitter (2005) detail that the power of the Catholic Church was expanded over the labor market such that local priests had to approve work permits. Despite these measures, the institution of the Church was not a monolith. As José Cayetano Cobos Romero lays out in the article "The Role of The Catholic Church and Religion In The Basque Conflict," (2018) the Church was split during the Spanish Civil War with the majority supporting the Nationalist factions and Franco, while a significant part of the opposing minority and its support existed within the Basque region and supported the Republic. Romero also notes "the gap between the upper echelons of the Basque Catholic Church and its priests, especially those belonging to the rural and traditional spaces of the region" (p.4), and the heavy entanglement between

Catholicism and the development of the Basque identity and growth of Basque nationalism. The journalist Kurlansky (2011) notes that rural clergy functioned to preserve Euskera the Basque language and the larger Basque culture while providing language services and being denounced as “separatist clergy” by Franco (p.237).

Parallel to Franco’s attempts to modify and repress elements of the Catholic Church were his attempts to enact revenge on the Basque people for supporting the opposing side in the Spanish Civil War. While the nationalist faction received direct international support from Germany, Italy, and Portugal the Republican government was backed directly by Mexico, more covertly by the Soviet Union and France, and was supplemented by the international brigades. The Basque people were primarily comprised of “the Basque nationalists and socialists and communists” (Whyte & Whyte, 1991, p.13). As such, most of the Basque people opposed Franco, with a notable exception being those Basques who were embedded in the army before the conflict and who remained in Franco’s army during the Spanish Civil War (Whyte & Whyte, 1991, p.13).

While many of the Basque people living in the Basque region share a common language, that number dwindled after the war as Franco retaliated against the Basques. He suppressed their language by levying fines against the parents of children who spoke Basque in public (Whyte & Whyte, 1991, p.13), making them “targets of police surveillance” (Whyte & Whyte, 1991, p. 14), and completely disallowed any public gatherings not approved by the government. Such measures lead to the emergence of a Basque terrorist organization with “...the formation of ETA (Euskadi ta Azkatasuna; Basque Nation and Liberty) in 1959. ETA waged a small-scale violent

campaign against the Spanish government from 1959 to 2011 when they declared the cessation of its armed struggle.” (Romero & Löfquist, 2018 who cite UCDP retrieved 18/05/06).

While sharing their unique economic history, the Basque people have still been shaped by the surrounding Spanish economic history and mountainous geography. The presence of high mountains caused higher transport costs, which resulted in goods being funneled to the nearest ports. To contend with these high internal transportation costs, starting in 1848, a public-private partnership to construct a railway network to be completed over the next 50 years was launched that used a sizeable portion of the limited Spanish public funds available with the remaining portion that totaled over 80% of the total capital used being provided by private investors who retained control over the railroads; at the time, Great Britain was the only other European country with private investors controlling the railroads (Tirado et al, 2002). This shift in public funding priorities resulted in the closure of 5 out of the 6 technical colleges founded between 1851 and 1855 after 1867 with the remaining school funded privately (Tirago et al, 2002 citing Riera, 1993).

State investment in railroads was not the only change that occurred in Spain during this period – the Spanish financial system also experienced drastic changes. The Banking Act of 1856 led to the creation of a preliminary banking system whose purpose was to administrate public debt and finance the growth of the railroads, which experienced financial difficulties in 1864-1865 (Cuevas 2002). These difficulties precipitated a downturn in broader Spanish financial institutions and the eventual pairing down of institutions that could issue currency to just the Bank of España (1874) and the eventual Banking Act of 1921 which consolidated control of finance and monetary policy in the Bank of España’s hands (Cuevas, 2002). During this time,

Spain saw a drastic reduction from “84 different currencies in circulation” into a single currency in 1868 (Martinez-Galarraga, 2012, citing Martorell, 2001), leading to a “unified... Spanish monetary system” (Martinez-Galarraga, 2012).

Despite these changes, Spain was still underdeveloped compared to much of Western Europe in the early 20th century when the Spanish Civil War came about (1936-1939). One indicator of this fact was Spain’s comparatively high percentage of the population engaged in agricultural vs manufacturing labor, explained by “poor resource endowments, inefficient property rights, and the distortion of factor markets as a result of tariff protections” (Simpson, 1997, p.350).

The economic protectionism that existed before the Spanish Civil War persisted during the Franco regime and was continued until growing internal pressure resulting from poor economic outcomes and international pressure forced economic liberalization measures in the 1950s. One specific example of this protectionism occurred in the inter-war period in arms sales as “World War I strengthened the resolve of statesmen to develop strong domestic industries... needed for a long war of attrition” (Moravcsik, 1991), whereby European countries suffered from losses of competitive advantages in arms production. Concurrently, the UN General Assembly banned Spain from membership in the UN (1946) and the UN’s specialized agencies pending Franco being in power, while the US’s Marshall Plan (1948-1952), which offered material aid to Western Europe post-WWII originally excluded Franco’s Spain before US policymakers began to normalize relationships (1948-1950) due to Franco’s anti-communist stance with methods including international aide (1950), and support at the UN (1951) to lift boycotts (Solstein Meditz, 1990, p.51). Later internal pressures for change include the growth of

inflation noted by Whyte (1991); additionally, Harrison (1980) notes Clavera et al's (1978) 1946-1950 subperiod as including "economic stagnation and sharp price increase coupled with unemployment, underconsumption, and low productivity both in agriculture and industry", and a later period as theirs' as including "the rapid growth of the money supply" (p.266).

Shifting our focus to the Basque region and the cooperative movement before the founding of Ulgor, the existence of agricultural producer cooperatives in oranges (Garrido 2014) and wine (Planas and Medina-Albaladejo 2017) with supportive rural credit cooperatives (Martinez-Soto 2012) predated Ulgor and existed at the same time as other organizations dedicated to the promotion of the cooperative movements. Taking from Whyte & Whyte (1991), who cite Olibarri (1984), "the cooperative movement in the Basque country developed in intimate association with the labor movement, political parties, and the Catholic Church" (p.18). One example Whyte & Whyte (1991) raise is the "Confederación Nacional Católico-Agraria (CNCA), which united 21 federations of 1,500 locals and a total of 200,000 members" (p. 19) after its founding by the Catholic Church.

The influence of the Catholic Church on cooperatives stretched beyond the CNCA mentioned before and included Father José María Arizmendiarieta Madariaga's efforts. After escaping execution following the civil war, Arizmendi – as referred to by the Whyte text – was assigned to work in the town of Mondragon where he devoted his time to building a social base around his parish. Included in the social base was the founding in 1948 of The League of Education and Culture which functioned as a technical school to further the education of local youth (Whyte and Whyte, p. 27-31, 1991). Five of the graduates of the technical school with community support in the form of financing and Arizmendi's support went on to found Ulgor.

The social base Arizmendi built was indispensable to the formation of the technical school and later the raising of capital required to found Ulgor.

In summary, The Spanish Civil War allowed Franco to transform his military power into broader political power that enabled him to engage in large-scale repression against the opposition. This large-scale repression ranged from directly subordinating almost all existing institutions to state control, attempts to fight the more rural portions of the Catholic Church sympathetic to the Basques while expanding to the Catholic Church certain freedoms, the displacement of existing labor unions with the *jurados de empresa*, and explicit targeting of the Basque people. These practices exposed a fracture in the Catholic Church, enflamed tensions with labor organizers, strengthened Basque nationalism and pushed these groups together.

### **3.2 Ulgor to The Mondragon Corporation: A Glow Up<sup>6</sup>**

Expanding from one location, paraffin heaters, and a handful of workers at the end of the 1950s to over 81,000 people employed in 2019 and multiple facilities outside of Spain, the Ulgor cooperative presented a success story for the growth of worker cooperatives. What once was a single small business has spawned a federation of interconnected cooperatives working in the fields of finance, industry, retail, and knowledge.

A major problem for cooperative formation, growth, and survival is that of financing. To solve the cooperative's finance problem, Arizmendi founded a cooperative bank named Caja

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<sup>6</sup> A transformation for the better

Laboral Popular in 1959 to support the founding of new cooperatives and the expansion of existing cooperatives and provide a private social security system. Leading up to the early 1980s, the main goal of the Caja was the founding of new cooperatives and the expansion of old firms. However, following an economic downturn, their focus shifted to the intervention and reorganization of existing cooperatives utilizing data collected from each cooperative (p.177-181). The private social security system was formed because Spanish law did not consider members of worker cooperatives as employees and would not allow them access to the national social security system. This portion of the Caja was spun off into a separate cooperative named Lagun-Aro in 1967 and was more cost-effective than the national system (Whyte & Whyte, 1991, p.52-53).

Following the founding of Ulgor in 1956, considerable growth led to the founding of four additional cooperatives, which were brought under the group name Ularco in the 1960s. While Ulgor produced final products such as “gas stoves and heaters” (p. 60), two of the cooperatives produced inputs for Ulgor, and two additional cooperatives were formed, one a combination of an acquired previously private foundry and Ulgor’s foundry, and another named Fagor Electrotécnica, which produced electronics. To facilitate the grouping, the formation of a Governing Council, General Management, and Central Social Council for Ularco was created with members of the Governing Council coming from each cooperative, General Management being picked by the members of the Governing Council, and members of the Central Social Council being picked by each cooperatives’ own Social Council. In addition to allowing members to be shuffled between cooperatives where labor was required, the group also

participated in the pooling of profits and losses among the cooperatives with the practice carried out to varying extents in the currently existing group (Whyte & Whyte, 1991, p.61, 62).

After the economic downturn and recovery in the 1980s, Mondragon faced the new problem of increased competition. Tariffs shield domestic manufacturers from external competition by levying taxes to increase the cost of foreign goods for domestic consumers. These added costs protect the profitability and survivability of domestic manufacturers at the expense of higher costs to domestic consumers. The autarkic nature of Spain's economy no doubt helped Ulgor grow in this manner, but Baldwin (1969) makes a spirited case against affording such protection to infant-industries. European countries have a long history of implementing tariffs and Spain was no exception during or after the Franco regime with tariffs and other non-tariff barriers protecting Spanish manufacturing set to end at the start of 1993 as Spain joined the EU's single market which seeks to further European economic integration (Whyte & Whyte, 1991, p.210).

### **3.3 What and Why of Fagor Electrodomésticos**

Fagor was one of the world's largest worker cooperatives and manufactured numerous home appliances. Evolving out of Ulgor, which was founded in 1956, Fagor functioned as the flagship cooperative of Mondragon, which was based in the town of Mondragon. This town is situated in the larger Basque Country in Spain. At its height in 2006, the Mondragon firm employed 10,543 people following several international acquisitions. Yet, by 2012, the number

of employees fell to 5,763 following the collapse of the Spanish housing market (2007-2008) and other factors before the company collapsed in 2013 (Basterretxea, 2019).

Anticipating globalization, Fagor and other Mondragon cooperatives engaged in a variety of deals starting in the 1990s, which resulted in the acquisition of numerous foreign subsidiaries. Such practices have resulted in the coining of the term “Coopitalist”, whereby the undemocratic multinational corporation model is merged with a worker cooperative core that holds control of the enterprise from a distance with a notable example being the experiment Fagor conducted with their acquisition in China (Errasti, 2015). While such a practice might be necessary for economic success, the lack of a shared understanding of cooperative values may lead to the threat of degeneration.

When analyzing the collapse of Fagor, numerous contributing factors become apparent. Errasti et al. (2016) conclude that a downturn in the business cycle, excessive dependence on Spain in the context of the burst in Spanish housing prices (2007-2008), resultant under-utilization of plants, pressure from companies with higher levels of technology, and others with lower costs in Asia, and a high debt burden that was used to finance expansion all combined to contribute to the failure of the company. In contrast, Basterretxea et al. (2019) noted perverse nepotism in the hiring process with no minimum educational requirement for new hires, alongside the failure to shift production to lower-cost countries stemming from the cooperative organizational design, as factors contributing to the company’s collapse.

The primary reasons for choosing Mondragon and Fagor as the case study for this thesis include the longevity of the organizations and their growth, the plethora of existing research

done on the failure of Fagor, and the unique challenges that worker cooperatives face more broadly. These challenges are addressed in Chapter 2.3 of this thesis, with the addition of the degeneration implication of how Fagor chose to expand. When reviewing Fagor while many of the causes of pressure leading to failure came from external factors, internal factors shaped the options available to the Fagor team to respond.

## Chapter 4

### A Game-Theoretic Approach to Worker Cooperative Decision Making

#### 4.1 Introduction

In this chapter, I model the internal decision-making process of Fagor to engage with criticism and the observation that the internal decision-making process of Fagor contributed to its bankruptcy. I put forth three actors with differing utility preferences for profits vs labor employed and evaluate the model. With roughly similar firm conditions but one homogenous actor who maximize for income per worker, Aoki (1984) theorizes the maximization of income per worker will occur at the point when “the marginal value product of labor is equal to the average earning per worker” (p. 55).

#### 4.2 Variables Table

Included below is a comprehensive variable chart for reference while reading through this chapter (Table 1).

Variable:	Description:
$p$	Price (Market Clearing)
$R$	Capital Rent Rate (Fixed)
$U$	Utility
$V$	Veto Cost (Fixed)

$w$	Wage Rate (Uniform)
$x$	Labor Employed
$y$	Output
$z$	Scaling Parameter for Production Function
$\alpha$	Preference Parameter for Profit or Labor
$\pi$	Firm Profit Level

**4.3 Actors, Payoffs, Firm Characteristics, and Their Process**

Fagor consisted of/included numerous bodies which I boil down to the Management Council (MC), General Council (GC), Social Council (SC), and General Assembly (GA) to facilitate the modeling (Whyte & Whyte, 1991, p.61, 62). The GA was composed of all the firm’s worker-owners and held elections to populate the GC and SC with differing considerations for candidate fitness regarding desires for profitability and labor. Further, I fold the MC into the GA and refer to the single new actor as the GA, as both bodies possess similar interests and goals when producing a modification of the existing business plan to present to the decision-making process, which differs meaningfully from the GA, and SC’s preferences. While I consider these actors as part of the same firm and posit that all knowledge is public knowledge, these actors do strive to maximize their utility without regard for each other’s preferences.

These differential preferences for profitability and labor inform the nature of our payoff function. As such, the payoff each actor receives is dictated by the below formula whereby  $\pi$  indicates the firm profit level,  $x$  represents employment quantity, and the marginal utility effect

of profit as  $\alpha$  bound such that  $(0 \leq \alpha \leq 1)$  with the corresponding marginal utility effect of a unit of labor represented by  $(1 - \alpha)$ . Further, consider individual actor's  $\alpha$  written as  $\alpha_{GC}, \alpha_{GA}, \alpha_{SC}$ , and ordered such that  $\alpha_{GC} > \alpha_{GA} > \alpha_{SC}$ . I choose this order because I posit the SC members who are elected out of the GA care more about employment levels than the average GA member. The form of the payoff function is listed below.

$$U = \alpha(\pi) + (1 - \alpha)(x)$$

With the help of economic theory, we can populate  $\pi$  and  $x$  to evaluate the relationship between  $\alpha$  and  $x$  to determine it is initially positive then negative, and then restrict it to the negative regime (6.3).

I follow Miyahzaki & Neary (1983) and utilize one of Ward's (1958) Illyrian firms (p.6) to produce our firm characteristics, which share some overlap with Aoki (1984, p. 55). The three actors' firm operates in the short run and produces one homogenous output,  $y$ , that sells at a competitive market-clearing price,  $p$ , produced according to the production function  $y = f(x)$  which is subject to diminishing marginal labor productivity, with  $x$  representing homogenous labor inputs, paid a fixed and universal wage,  $w$ , while the plant utilized is rented at a fixed fee,  $R$ <sup>7</sup>. As such, the firm's profit function is constructed below.

$$\pi_t = py - wx - R$$

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<sup>7</sup> The choice of Ward's specifications comes down to modeling convenience, the reduction in mathematical complexity from the general Cobb-Douglas case, and similarities with Aoki (1984)

Using the prior noted general payoff function and above payoff function, we can construct the universal form of the utility function and examine it at  $\alpha$  at both maximum and minimum (6.4).

The structure of the decision-making process is visualized by the game tree included below (fig.1) whereby each of the three actors: GC, SC, and GA possess their own unique node in the  $n = 1$  iterations of bargaining that can occur. Faced with a decrease in favorability in business conditions through a price decrease, the GC proposes a business plan which modifies the existing production mix. The SC then decides to either accept the new mix and implement production at the new level or veto it. In the case of a SC veto of the new mix, the GC's plan advances to the GA. The GA then decides to either accept the new production mix and thus, implement it, or veto it and reuse the prior production mix for the calculation of each actor's utility.

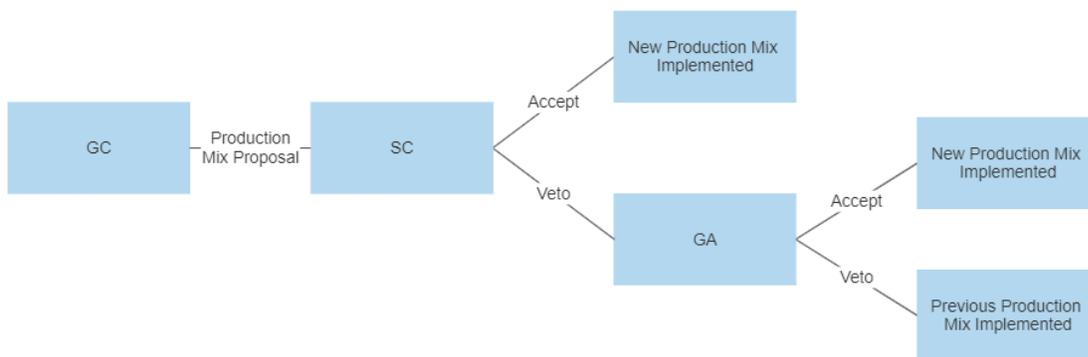


Figure 1: The Game Tree

To solve the following games, I will employ backward induction to find subgame perfect Nash equilibrium. Aumann (1995) proves that given common knowledge of rationality with perfect information, backward induction outcomes are reached. Backward induction works by

starting at the last actor in the decision tree and positing they will pick the decision that maximizes their utility, then working your way back up the tree positing that each new actor will pick the decision that maximizes their utility given the choice of the prior actors evaluated until the first actor to move is reached. The collection of optimal decisions found this way constitutes a subgame perfect Nash equilibrium.

#### **4.4.1 The One-Shot Games**

To model a single round of Fagor bargaining we employ a one-shot game. We recall that all information is public, each actors  $\alpha$  are ordered  $\alpha_{GC} > \alpha_{SC} > \alpha_{GA}$ , and expect that any new mixed proposed is subject to  $\pi \geq 0$ . When observing an exogenous decrease in  $p$ , we observe the following reactions first in the case where disagreement results first in no payoffs, then with payoffs equivalent to the prior production mix. In both cases, we also explore applying costs to different actors when a veto occurs.

##### ***4.4.2 Case 1: Disagreement Resulting in Payoffs of Zero***

We first evaluate a scenario where disagreement results in payoffs = 0 for all actors and there are no veto costs. Here the GC possesses complete control over setting the new production mix and the production mix will be implemented. Working backward, the dominant strategy of the GA will be to accept the new production mix to avoid receiving no payoff as any payoff is better than the zero which would occur if they employed a veto. Knowing the GA will accept any

offer it vetoes, the SC will be indifferent between accepting or vetoing the proposed production mix as payoffs, either way will be equivalent. However, a marginal cost incurred to the SC for vetoing will induce it to always accept<sup>8</sup>. In this case, the firm will operate at the most profitable (or least costly) level of employment.

#### ***4.4.3 Case 2: Disagreement Resulting in Payoffs from Prior Production Mix***

When disagreement results in payoffs taken from the old production mix the GC will have no control over setting the production mix because no mix the GC could propose will provide more utility than the prior production mix to either the SC or GA. Starting from the end again, the GA is now in the position to employ a veto in the case that  $U_{GA} \text{ Veto} > U_{GA} \text{ Accept}$ , and the SC will employ a veto when  $U_{SC} \text{ Veto} > U_{SC} \text{ Accept}$ . We remember the decrease in  $p$ , and  $\pi \geq 0$  constraint on any production mix proposal and realize there are no cases where the GA or SC would approve any proposed production mixes as they would produce less utility for themselves. In this case, the firm's production level will remain above the most profitable (or least costly) level of employment, and the firm will operate unprofitably assuming the presence of financial resources to do so.

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<sup>8</sup> Employing veto costs when disagreements result in payoffs of zero can only modify the SC's behavior, so veto costs for this type of case are not explored later

#### 4.4.4 Case 3: Veto Costs for All

The two prior examples require the presence of no costs when vetoes are applied, but what if there were costs incurred for employing a veto? We know in the Fagor case a significant number of people had to be assembled in the GA to discuss their options before votes were cast. We now consider the prior scenario where disagreement over implementing the new production mix resulted in the prior production mix bringing employed with the addition of discounting all actors' payoffs by  $V^9$  when the SC employs a veto, and  $2V$  when both the SC and GA employ their vetoes. This utility reduction could represent the financial cost of assembling the following agent to have them vote, the additional time spent not producing, or some other reasoning.

Reexamining Case 2 with the addition of shared costs when a veto or two are employed, there do exist sufficiently large veto costs which induce the SC and GA to avoid employing one or more vetoes when they would normally which opens the possibility of a new set of production mixes the GA can propose which would be approved were previously vetoed. Starting from the GA once more, we observe the original veto condition and modify it such that a veto will occur when  $U_{GA} - 2V \text{ Veto} > U_{GA} - V \text{ Accept}$ , or the simplified form of  $U_{GA} - V \text{ Veto} > U_{GA} \text{ Accept}$ . This allows us to envision a set of production mixes that would in Case 2 generate a GA veto and employment of the previous production mix, but in Case 3 would generate a GA acceptance of employment of the proposed production mix. Concurrently the SC's veto condition is also modified such that the SC will veto when  $U_{SC} - V \text{ Veto} > U_{GA} \text{ Accept}$  when

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<sup>9</sup> While our veto cost is fixed and does not scale with the size of the firm, an expanded model could consider veto cost scaling with labor employed

expecting no veto from the GA, or will veto when  $U_{SC} - 2V_{Veto} > U_{GA}$  *Accept* when expecting a GA veto.

## **Chapter 5**

### **Conclusion**

#### **5.1 The Question and Case Study**

In this thesis, I call attention to the low rate of worker cooperatives and explored numerous critiques of worker cooperatives including the degeneration theses, the threat of demutualization, barriers to acquiring capital for expansion, increased competition resulting from globalization, and the unwieldiness of internal decision-making processes. Cataloging these critiques helps to answer the broad question of why worker cooperatives might fail, but a narrower approach is pursued. I strive to explain why the internal decision-making processes of a worker cooperatives may lead to failure by examining the worker cooperative Fagor as my case study.

Fagor went bankrupt in 2013 following adverse business conditions due to the Spanish property bubble popping (2007-2008) and decreased its employment from over 10,000 people in 2006 to under 6,000 by 2012. The primary motivations for picking Fagor include the longevity of the organization and its growth, and the plethora of existing research conducted on the failure of Fagor. Additionally, Fagor possessed formalized internal decision-making processes that worker-owners interact with and are a part of due to its size that allows for modeling.

### **5.3 Game-Theoretic Model, Findings, Implications, and Limits**

I modeled Fagor's internal decision-making process as a game tree composed of three actors with various preferences for profit and labor in a one-shot game and examined three different cases. In Case 1, I posited that disagreement over implementing the new production mix resulted in payoffs of zero which resulted in the GC having a monopoly over setting the new production mix and would not be vetoed. In Case 2, I introduced that disagreement over implementing the new production mix resulted in payoffs being taken from the prior production mix which resulted in the SC and GA always vetoing the new production mix. And in Case 3, I implement veto costs applied to all actors when one employs a veto which opens the possibility of a set of new production mixes the GC can propose that will not be vetoed depending on the size of the veto costs.

Upon review, the introduction of veto costs in Case 3 provides a hint at a mechanism for moderating SC and GA employment protections and raises the important question of self-imposed decisions rules to preserve the profitability of worker cooperatives in times of economic downturn. One potential rule could require certain caps on the amount of excess labor employed during sustained downturns adjusted to the size of currency reserves available to the firm. These potential rules in conjunction with higher levels of intra-firm cooperation in wage-setting a la Nickell's (1997) previously explored work may smooth out the decision-making process.

This study is primarily limited in three major ways which could be improved upon in later papers. The first major limit is the nature of each actor's utility functions with one obvious modification being that GA members don't consider their individual income in their utility

calculations or the possibility that they might be the ones to be fired. Additionally, no actor considers firing their fellow worker-owner as a disutility. The second limit is the inability to consider how the issuing of loans by Mondragon and the Basque Government (Errasti, 2017) might have modified future expectations around the ability of Fagor to continue to operate at a deficit. The third major limit is the timescale, as I only model a one-shot game. An iterated game with the previously mentioned modifications or the inclusion of other modifications such as liquidity constraints for worker-owners or the entire firm might induce different behavior from each actor. Additionally, the case of an increase in price rather than a decrease might be considered with the current model when considering recoveries from recessions or simply normal economic growth.

This analytical model of Fagor's internal-decision making process contributes to the existing research on worker cooperatives broadly and the more specific interview-based research on Fagor's failure. We have learned via a new approach that the structure of the process itself can contribute to the inability to shed sufficient labor to minimize losses when faced with a recession and specifically illustrates the potential need for decision rules to protect against bankruptcy. While Fagor indicates certain types of worker cooperatives may be more sensitive to failure when experiencing recessions due to their internal decision-making processes than other firm styles, the context of the sheer depth of the Great Recession (2007-2008) and additional factors complicate the matter. Regardless, the knowledge developed in this thesis can be applied beyond Fagor to analyze other worker cooperatives that possess similar decision-making processes, and the SC can be subtracted from the model for adaptation to represent smaller worker cooperatives with only minor modifications.



## Appendix

### Mathematical Appendix

Here is a collection of functions employed and various math results supporting the text. The goal is to simplify the math there and catalog and engage with it here. See Table 1 for variables employed.

#### 6.1 Miscellaneous Functions

The following three functions

utility

$$U = \alpha\pi + (1 - \alpha)x$$

profit

$$\pi = yp - (wx + r)$$

and production

$$y = x^z$$

form the base which I build my model from.

Nesting the functions from production into profit then into utility, we constitute

$$U = \alpha(px^z - (wx + r)) + (1 - \alpha)x$$

and take the derivative  $\frac{dU}{dx}$

$$x = \left( \frac{w + 1 - \frac{1}{\alpha}}{zp} \right)^{\frac{-1}{1-z}}$$

such that we produce the labor demand function for utility maximization.

## 6.2 Relationship Between $x$ and $\alpha$

As we increase the value of  $\alpha$  from 0, we observe the relationship between  $x$  and  $\alpha$  to be initially positive before becoming negative after

$$0 = w + 1 - \frac{1}{\alpha}$$

so we employ the constraint

$$0 < w + 1 - \frac{1}{\alpha}$$

to maintain a negative relationship between  $x$  and  $\alpha$  as seen below.

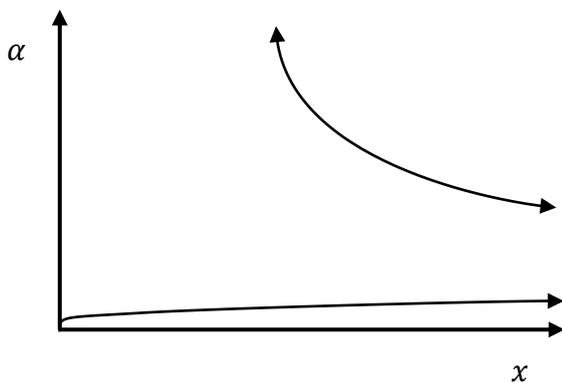


Figure 2: Graph of  $x$  and  $\alpha$

### 6.3 Examining $\alpha$ for Profit or Employment Maximization

Here we populate the previously nested function with the derived labor demand function to produce the utility maximization function

$$U = \alpha \left( p \left\{ \left( \frac{w + 1 - \frac{1}{\alpha}}{zp} \right)^{\frac{-1}{1-z}} \right\}^z - \left( w \left( \frac{w + 1 - \frac{1}{\alpha}}{zp} \right)^{\frac{-1}{1-z}} + r \right) \right) + (1 - \alpha) \left( \frac{w + 1 - \frac{1}{\alpha}}{zp} \right)^{\frac{-1}{1-z}}$$

and evaluate it for different values of  $\alpha$ .

One aspect of this utility function is that in the GC utility maximization case when  $\alpha = 1$  and profit is the only variable considered we simplify to get

$$U = \left( p \left\{ \left( \frac{w}{zp} \right)^{\frac{-1}{1-z}} \right\}^z - \left( w \left( \frac{w}{zp} \right)^{\frac{-1}{1-z}} + r \right) \right)$$

which produces the unitary relationship  $U = \pi$ .

Exploring the other extreme of  $\alpha$  might give us the job maximization case whereby  $\alpha = 0$ ; however, on further examination, we run into the problem that  $\frac{1}{\alpha}$  exists in our utility function and returns as undefined where  $\alpha = 0$ , the second being the previously mentioned positive relationship between  $\alpha$  and  $x$  in the lower regime. As such we maximize

$$U = \alpha \left( p \left\{ \left( \frac{w + 1 - \frac{1}{\alpha}}{zp} \right)^{\frac{-1}{1-z}} \right\}^z - \left( w \left( \frac{w + 1 - \frac{1}{\alpha}}{zp} \right)^{\frac{-1}{1-z}} + r \right) \right) + (1 - \alpha) \left( \frac{w + 1 - \frac{1}{\alpha}}{zp} \right)^{\frac{-1}{1-z}}$$

subject to

$$0 < w + 1 - \frac{1}{\alpha}$$

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