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TESIS DOCTORAL

La Teoria de Juegos y la Sucesión en las Empresas Familiares

Shital Jayantilal

DEPARTAMENTO DE DIRECCIÓN DE EMPRESAS Y SOCIOLOGIA

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Conformidad com los Directores:

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RESUMEN

El paso del control executivo da empresa familiar por lo fundador a la generación siguiente es una fase critica. Esta tesis extiende el uso de la teoría del juegos para proveer un entendimiento del papel que tienen la familia, el fundador y el ambiente cultural en la selección del sucesor. Los juegos usados incluyen explícitamente, y por primera vez, los factores emocionales relacionados con la dimensión familiar de la empresa familiar.

En relación al impacto de la familia, la tesis se enfoca en la competencia fraternal que puede erosionar la armonía familiar y arriesgar la continuidad de la empresa. Los resultados destacan el costo emocional de conflicto, en importante para la definición del sucesor y esencial para explicar la ventaja del primer que se mueva.

Esta tesis contribuye demostrando analíticamente la importancia del fundador adoptar una aproximación activa en el proceso de sucesión. Los resultados muestran que eso es esencial para asegurar la continuidad intergeneracional de la empresa y la asignación de su candidato preferido como sucesor.

Los factores emocionales son determinantes para el resultado del sucesor y son evidentes en algunos ambientes culturales, como en India. Los resultados enfatizan que la discrepancia cultural entre las generaciones puede comprometer la sucesión y la armonía familiar.

La tesis complementa la teoría de juego con economía experimental, lo que es completamente original en esta área de sucesión da empresa familiar. Para incluir la deficiencia de comunicación, se usa un juego de información completa e imperfecta. Los resultados confirman que las conclusiones teóricas son verdaderas en el laboratorio.

Palabras Clave: Empresa familiar; Sucesión; Teoría de juegos; Economía experimental

Códigos UNESCO: 5311.99, 5307.19, 5307.05

ABSTRACT

The passing of the family firm's executive control from the founder to the next generation is a critical stage for the family firm. This thesis extends the use of game theory to provide insights on the role the family, the founder and the cultural setting have on successor selection in family firms. The games used explicitly include, for the first time, the emotional factors related to the family dimension of the family firm.

In terms of the impact of the family on successor selection, the thesis focuses on sibling competition which can erode family harmony and risk the firm's continuity. The findings highlight that the emotional cost of conflict, triggered by the succession race, plays a key role on the definition of the successor and is essential in explaining the first mover advantage.

This thesis contributes by analytically demonstrating the importance of the founder adopting an activist approach to the succession process. The results show that the founder's approach is essential to ensure firm intergenerational continuity and secure the appointment of his preferred successor candidate.

The emotional factors are determinant for the successor outcome and are even more evident in certain cultural settings, such as India. The results emphasize that the younger generation's cultural misalignment can jeopardize intergenerational succession and risk family harmony.

The thesis complements game theory with experimental economics, which is completely original in the field of family firm succession. A game of complete and imperfect information is used to extend the application to families with communication deficiency. The results confirm that the theoretical conclusions hold true in the laboratory.

Keywords: Family firm; Succession; Game theory; Experimental economics

UNESCO Codes: 5311.99, 5307.19, 5307.05

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Chapter 1

INTRODUCTION

1. INTRODUCTION

1.1. Introduction

Family firms are the oldest and most prevalent form of business in the world, representing 70 to 90 percent of the global Gross Domestic Product (GDP). Family firms worldwide range from micro and small firms to large conglomerates which dominate the global business panorama. Some of the well-known family firms include: Group LVMH, Benetton, Fiat, L'Oreal, Carrefour, BMW, Siemens and Inditex, in Europe; Oberoi Group, Kikkoman, Tata Group and Alkhorayef Group in the Middle East and Asia; Ford Motors and Walmart in the United States.

Family firms is an area of research which has drawn rising interest given the impact and influence that such firms have on the economy worldwide. The challenge of management succession is the ultimate test that family firms face. The way the firm addresses that challenge is dependent on the founder, and influenced by the family and by the cultural setting. It is necessary to adopt a more integrated vision of the successor selection process including all these factors to better understand the role they play.

The successor selection is a strategic decision making process characterized by the interdependence of both the founder and the potential successors. Therefore, it is essential to adopt a methodology which accentuates an integrated vision of successor selection, considers the role and interplay of the various factors influencing the successor selection, and also highlights the existent interdependencies.

1.2. Methodology

Game theory is the study of decision making by various rational players where decisions made by a player have repercussions on the outcomes of the other players. Strategic interdependence is the essence of game theory.

This thesis aims to shed a new light on one of the most researched topics in family business literature by using the solid analytical approach provided by game theory. The internal consistency and mathematical foundations of game theory makes it a forefront

strategic tool to study the complex decision-making process related to successor selection. The successor selection process is modeled as a game allowing to formally and systematically analyze the prevalent strategic interactions.

Experimental economics will be used to complement game theory. Experimental economics is a methodology which has proliferated in recent times, but has never been employed to study family firm succession. Experimental data contrasts observed behavior with the theoretical predicted outcomes. The results obtained by the use of game theory will be tested in the laboratory to study the robustness of Nash equilibrium and family optimal solution.

1.3. Justification

The family firm, initiated by the founder, is intertwined with the family and embedded in the national culture and, therefore, the successor selection is also influenced by all these dimensions.

The founder's centrality in both the firm and the family reflects on the manner he tackles the issue of succession. His choice of successor is dependent on the interplay of both the family and the business dimension. When he makes his decisions, he takes into consideration the economic factors but also the non-economic ones that stem from the family/business overlap. It is the enmeshment of the family and the business, so unique to family firms, that justifies that family elements are valued and influence decisions in the business (Chrisman, Chua & Steier, 2003).

There is a growing consensus that family firms purse not only economic but also non-economic goals which affect the decision making (Gómez-Mejia, Núñez-Nickel & Gutierrez, 2001; Klein & Kellermanns, 2008).

The "*nonfinancial aspects of the firm that meet the family's affective needs, such as identity, the ability to exercise family influence and the perpetuation of the family dynasty*" (Gómez-Mejia, Haynes, Núñez-Nickel, Jacobson & Moyano-Fuentes, 2007, p.106), also contribute to the utility function (Zellweger, Nason, Nordqvist & Brush, 2011) and explain the deviations in terms of value perception from the traditional

financial approach (Zellweger & Astrachan, 2008). Transgenerational continuity has been identified as a key aspect of emotional value of the family firm (Zellweger, Kellermanns, Chrisman & Chua, 2012).

The singularity of the overlapping spheres of influence between family and business existent in the family firm increases the potential for conflict given its permeability to both spheres. Research in family firms shows that conflict is pivotal in the family firm and hampers performance compromising family harmony and family cohesion (Eddleston & Kellermanns, 2007). Conflict in the family is a relevant emotional cost (Zellweger & Astrachan, 2008).

This thesis extends the use of game theory in family firm succession to include the emotional factors in the successor selection decision process. This extension is novel as, up to now and to the best of my knowledge, the few studies which have employed game theory have referred to the emotional factors (such as family harmony and legacy) but have not explicitly considered them in the payoff functions of the players.

The key emotional factors are firm intergenerational continuity and family harmony. The founder wants to secure the firm's executive control staying in the family (i.e. his legacy) but also wants to protect the family from conflict.

In terms of conflict, family firm literature pays no special attention to the conflict arising from siblings competing for the successor position, although the business arena has witnessed the fall of various firms triggered by such sibling rivalry. The thesis bridges this gap by extending game theory to include the emotional cost of conflict resulting from competitive behavior of siblings driven by the desire to become the new head of the family firm.

Other than the family, it is important to study the role of the founder in addressing family firm succession. The founder's reluctance to move forward with the succession has been referred to as culprit of family firm's high mortality rates (Harvey & Evans, 1994). This thesis also contributes to the literature by providing evidence of the impact of the founder adopting a proactive role regarding successor selection.

To promote an integrated view of successor selection in family firms, the analysis also includes the impact of national culture. The national culture envelopes the family firm, shaping it and influencing the way decisions are made. Although it has been acknowledged that differences do exist among family firms in different cultural settings, culture has remained widely ignored or understudied, especially in family firms (Zahra & Sharma, 2004). The need to consider the cultural setting is essential for a better understanding of these firms and the way they make decisions (Chirico & Nordqvist, 2010).

The research in family firms has privileged studies of firms located in America and Europe. This thesis, with its focus on the Indian cultural setting, also contributes to extend the field to developing countries, promoting a more global understanding of the family firm as was called for by various authors such as Gupta and Levenburg (2010).

The choice of India results from my personal interest in studying my birth country and is compounded by the importance that India is beginning to have in the world economy. India is becoming one of the major players of the global economic arena, making it imperative to understand the Indian culture and its impact on business, especially on family firms which remain the most prevalent form of business in India (Collinson & Rugman, 2007; Mathews, 2006).

Last but not least, the thesis also adds value to the existing literature by the methodology employed to study all the aspects presented. The use of game theory is not novel with regards to family firm succession but is still at an embryonic stage, whereas the use of experimental economics to test the results obtained in the games is, to the best of my knowledge, done for the first time.

1.4. Objectives

This research project general objective is to study the impact of the emotional factors on executive successor selection in family firms, focusing on intergenerational succession, using a game theory analysis. The emotional benefit related to intergenerational

continuity and the emotional costs related to sibling conflict and father/son conflict is considered.

The specific objectives are:

(i) Analyze the role of the family, specifically siblings competition, plays on successor selection;
(ii) Test if there is a first mover advantage for the child who moves first in the successor race;
(iii) Study and compare the successor outcome for a founder adopting an activist or reactive approach;
(iv) Identify the successor outcomes when the family acts as unit subordinating each person's individual goals for the family aggregate objectives and compare these to when each person is driven solely by their own goal;
(v) Identify the importance of intergenerational cultural congruence to promote firm continuity and family stability;
(vi) Analyze the impact that the Indian cultural setting has on successor selection;
(vii) Use game theory to study these issues;
(viii) Complement game theory by using experimental laboratory data to test the results obtained.

1.5. Structure

This thesis is structured in eight chapters as follows.

Chapter 1 introduces the importance of adopting an integrated view of the family firm, addressing the impact of the founder, the family and the national culture, on successor selection. The use of game theory as the methodology to study the strategic interdependence of successor selection and its extension to include key emotional factors is addressed. The justification and the objectives of this research project are presented. The chapter concludes with the structure of the thesis and a brief description of the content of each chapter.

Chapter 2 is centered on the family firm. It starts by defining the family firm and its distinctive traits. This is followed by the relevant literature review illustrating the role that family, founder and national culture play on the family firm. The key issues relating to family firm intergenerational continuity are presented in order to provide an idea of the state of the art.

Chapter 3 provides an introduction to the methodology used in the thesis: game theory. The chapter starts by presenting the different games (simultaneous and sequential) showing how they are modeled and used to solve problems and to predict players' decisions. The section on game theory is then concluded with the literature review pertaining to the use of game theory to study family firm succession. This is then followed by an introduction to the key issues pertaining to the complementary methodology used - experimental economics.

The family firm (Chapter 2) and game theory (Chapter 3) are the underlining common denominators of the thesis providing, respectively, the context and the methodology which is used in subsequent chapters.

Chapter 4 studies the role that the family plays in successor selection, focusing on sibling conflict which arises from the competitive behavior of siblings driven by the desire to become the new head of the family firm. This chapter starts by a literature review centered on conflict in family firms. This is then followed by the presentation of the sequential game used.

This game includes the emotional benefit of intergenerational executive succession and the emotional cost of conflict arising from that sibling competition. The first mover advantage is analyzed by altering the order of play in the sequential game and comparing the results. Lastly, the family optimal outcome is computed and compared to the results previously obtained, showing the impact on successor outcome when the players adopt a family stance, rather than an individual.

Chapter 4 was the basis for the article entitled "Effects of Sibling Competition on Family Firm Succession: A Game Theory Approach", having passed the second round of reviewing at the Journal of Family Business Strategy, awaits final decision. This

journal is indexed by Scopus and ISI, and has an impact factor of 1.318 (Thomson Reuters Journal Citation).

Chapter 5 studies the role that emotional factors play on the successor outcome as well as the impact of the founder's approach to successor selection. The game modeled in this chapter extends the emotional factors used in the games in Chapter 4 to include the cost of father/son conflict. The emotional cost considered arises when the children go against the father's expressed wishes by declining his invite to become his successor. The family optimal is also calculated for this case to understand what is the best outcome from the family perspective.

This chapter was the basis for the article entitled "Game Theory and Successor Selection: The Impact of Emotional Factors", which is under review in the Journal of Managerial Psychology. This journal is indexed by Scopus and ISI, and has an impact factor of 1.20 (Thomson Reuters Journal Citation).

Chapter 6 focuses on the role of national culture to analyze the impact of father/son cultural congruency in the Indian cultural setting. The chapter starts by presenting the main traits of Indian culture. This is followed by the game theoretic approach which ranks the player's outcomes and compares this across the different scenarios of cultural alignment.

This chapter was the basis for the article entitled "Cultural Dimension of Indian Family Firms – Impact on Successor Selection" published in Problems and Perspectives in Management, October 2015, Volume 13, Issue 3, p.116-123. This journal is indexed by Scopus.

Chapter 7 uses the methodology of experimental economics to test the theoretical successor outcomes predicted by the use of game theory. The chapter starts with the presentation of the game structure and the theoretic results. Subsequently, the experiment which was conducted is presented. This is then followed by the results and the data analysis.

Chapter 8 finalizes the thesis and reflects on the impact and limitations of the findings, and suggests future avenues of research.

Chapter 2

FAMILY FIRMS

2. FAMILY FIRMS

2.1. Introduction

Family firms are said to be the beginning of any form of business activity (Wakefield, 1995). These organizations dominate the economic landscape of all the major economies (Shanker & Astrachan, 1996; Heck & Stafford, 2001; Morck & Yeung, 2003; Dyer, 2003; Astrachan & Shanker, 2003; Chrisman, Chua & Litz, 2003), so much so that two thirds of all enterprises worldwide are said to be family firms (Gersick, Davis, Hampton & Lansberg, 1997).

Notwithstanding the importance of family firm worldwide there is no global consensus on what is defined as a family firm. This chapter of the thesis starts by presenting the various definitions used and by comparing the family firm to non-family firms.

In order to get a more complete notion of the family firm it is essential to consider the context it is rooted in, including both the micro and macro level. In this sense, and adopting the open-systems approach, as defended by Pieper and Klein (2007), it is necessary to study the internal and external systems which integrate and influence the family firm.

At the micro level are the founders, who gave birth to the firm. The founders of the organization play an important part for it is they who primarily define the organization, its role, and its objectives and therefore trigger the organization's identity and culture (Schein, 2004).

All organizations are systems which are in continuous exchange with their environment. As a result, they have a constant dynamic relation with their socio-cultural context (Katz & Kahn, 1987). The split between organizational structures, which appear as autonomous and with a life of their own, and human practices within organizations, which appear as part, thrown off-centre from the decision-making processes, is a contradiction at the very heart of everyday life in organizational settings.

Insulation which is defined as "(...) *the phenomenon in which organization member's personal characteristics and considerations are excluded from the organization's social milieu*" (Inzerilli & Rosen, 1983, p.281), should be readily dropped when analyzing any

organisation especially the family firm. In fact, the family firm is influenced by (and influences) its environment. The family firm is nested in the family and so the family also plays an important part.

And last but not least, at the more macro level, is the national culture in which the family firm is embedded, sharing similar values which differ across nations. These various levels dynamically influence the family firm and how it addresses the challenge of managerial succession (Chrisman et al., 2003; Le Breton-Miller & Miller, 2009; Villannueva & Sapienza, 2009; Steier, Chrisman & Chua, 2004).

This chapter starts by presenting the various definitions of family firm used in research and confronting the family firm to non-family firms. This is followed by a relevant literature review focusing on the role of the founder, the family and of national culture on the family firm. Subsequently, the key issues relating to family firm intergenerational continuity are presented in order to provide a global idea of the state of the art. This chapter concludes by identifying which, out of all the aspects presented, will be addressed in this thesis.

2.2. Definition of family firm

The European Commission (2009) indicates that family owned firms represent more than 65% of all organizations in the European Union and 40% to 50% of employment and are therefore considered to be "(...) *crucially important for Europe* (...)", by the President of the European Commission (Barroso, 2007).

In Australia, family firms account for more than 70% of all businesses and in Latin America 65% to 90% and over 95% in the US, contributing in 40% to the American Gross National Product (GNP). In the United Kingdom family firms account for 70% of all enterprises in the private sector responsible for more 50% of the employment. In Portugal and Spain these firms account for 70% and 75%, respectively, of the total of firms (International Family Enterprise Research Academy [IFERA], 2003).

The importance attributed to family firms results from their presence but also due to the impact they have on the macroeconomic variables. Studies, in different countries, have

shown that family firms play a key role in terms of economic growth as well as employment generation (IFERA, 2003; Anderson & Reeb, 2003; Neubauer & Lank, 1998; Poutziouris, 2001; Gallo, 1995).

Despite the fact that family firms are considered the world's most predominant form of business organization (Neubauer & Lank, 1998) there is still a lack of consensus as to their definition. What is considered a family firm can be so varied that depending on the definition used, a total of 65% to 90% of all firms worldwide can be defined as family firms (Shanker & Astrachan, 1996).

Westhead and Cowling (1998, p.40-41) used seven different definitions of family firms and applied them to a sample of 427 firms. Their definitions are presented in the table below:

Table 2.1.Westhead and Cowling definitions of family firms

Seven different definitions
1. The company was perceived by the Chief Executive, Managing Director, or Chairman to be a family business.
2. More than 50 percent of ordinary voting shares were owned by members of the largest single family group related by blood or marriage.
3. More than 50 percent of ordinary voting shares were owned by members of the largest single family group related by blood or marriage and the company was perceived by the Chief Executive, Managing Director, or Chairman to be a family business.
4. More than 50 percent of ordinary voting shares were owned by members of the largest single family group related by blood or marriage, the company was perceived by the Chief Executive, Managing Director, or Chairman to be a family business, and one or more of the management team was drawn from the largest family group who owned the company.
5. More than 50 percent of ordinary voting shares were owned by members of the largest single family group related by blood or marriage, the company was perceived by the Chief Executive, Managing Director, or Chairman to be a family business, and 51 percent or more of the management team was drawn from the largest family group who owned the company.
6. More than 50 percent of ordinary voting shares were owned by members of the largest single family group related by blood or marriage, the company was perceived by the Chief Executive, Managing Director, or Chairman to be a family business, one or more of the management team was drawn from the largest family group who owned the company, and the company was owned by second-generation or more family members.
7. More than 50 percent of ordinary voting shares were owned by members of the largest single family group related by blood or marriage, the company was perceived by the Chief Executive, Managing Director, or Chairman to be a family business, 51 percent more of the management team was drawn from the largest family group who owned the company, and the company was owned by second-generation or more family members.

Source: Adapted from Westhead and Cowling (1998)

They found that using the first definition more than 78% of the firms where defined as family firms but using the more restrictive definition (definition 7) only 15% classified.

The majority of definitions of family firm used by researchers have focused on family involvement, via ownership and/or management, or on firm intergenerational continuity. Some researchers of family firms have chosen parts or combinations of these approaches, whilst others have tried to develop alternative methods (like Astrachan, Klein and Smyrnios, 2002) or adopted for more practical solutions (such as self definition).

Table 2.2 presents the key theoretical and operational definitions used in various articles where researchers define family firm as those which are:

(i) Controlled and/or owned by family;
(ii) Managed by family (decision making is in the hands of family);
(iii) Presence of more than one generation;
(iv) Self proclaimed;
(v) A combination of the above.

Table 2.2. Family firm definitions

Criteria	*Definition*	*Reference*
Control / Ownership	Family's retention of voting control over the strategic direction of the firm.	Astrachan & Shanker, 2003
	Family ownership and control.	Upton, Teal & Felan, 2001
	Clearly controlled by one or more families with clear descendants.	Silva & Majluf, 2008
	The largest group of shareholders in a firm is a specific family, and the stake of that family is greater than either a 10% or 20% control of the voting shares.	Morck & Yeung, 2004
	Family business can refer to ownership without any involvement of the family in the management of the business, either day-to-day or strategically.	Marcus & Hall, 1992
	In all four participating firms, members of a kinship group privately hold the shares.	Haugh & Mckee, 2003,
	An existing business that is more than 50% owned and controlled by the respondent and one or more family members, including by blood, marriage, or adoption.	Levie & Lerner, 2009 (Definition developed with the Raymond Family Business Institute)
	All those in which a particular family has undivided property rights.	Gómez-Mejia et al., 2007

Criteria	*Definition*	*Reference*
	Members of a family have legal control over ownership	Lansberg, Perrow & Rogolsky, 1988
	Family members own at least 60% of the equity	Donckels & Fröhlich, 1991
	Majority of the voting shares are owned by members of a single family.	Tatoglu, Kula & Glaister, 2008
	If there were key managers related to the owner working in the business the firm is considered a family firm.	Daily & Dollinger, 1992
	Public corporations whose CEO's are either the founder or a member of the founder's family.	McConaughy, Matthews & Fialko, 2001
	Determined by the relationship between the owners and the CEO.	Gómez-Mejia et al., 2001
	Family influence in decision making.	Sharma, Chrisman & Chua, 1997
	Family with one or more members occupying managerial positions.	Fernández & Nieto, 2005
Generations	The intent to transfer the family firm to the next generation.	Stewart, 2003
	Family business is either the occurrence or the anticipation that a younger family member has or will assume control of the business from the elder	Churchill & Hatten, 1993, p. 52
	Leadership must pass from one generation to the next	Le Breton-Miller, Miller & Steier, 2004; Steier et al., 2004
Self Proclaimed	Definition of family firm left to the judgment of the person answering the questionnaire.	Gallo, Tàpies & Cappuyns, 2004
	A formal definition of family business based on Leach et al. [1990] was offered. Businesses, by referring to this definition, were invited to refer whether they were or not family firms	Wang, Ahmed & Farquhar, 2007
	Family firms were identified by a question, which required respondents to indicate whether or not they considered their firm a family firm. To validate their responses they were asked to indicate (with a "yes" or "no" response to four conditions) why they considered their firm a family firm. The four conditions were that family members were: (1) working directors in the firm; (2) employed in the firm; (3) not working but contributed to decisions; and (4) the firm was acquired from parents.	Kotey, 2005
	Empirical research has relied on convenience samples, such as the membership lists of professional associations or the mailing lists of family business consultants. Respondents that did not consider themselves family businesses were asked to return their questionnaires unanswered.	Chrisman, Chua & Sharma, 1998
	The data for this study was collected from 98 members of the Centre for Family Business (CFB).	Sharma & Rao, 2000

Criteria	*Definition*	*Reference*
Control/Ownership and Management	Most of ownership and management lies in the hands of a family	Gallo & Sveen, 1991; Graves & Thomas, 2004; Claver, Rienda & Quer, 2009
	The family retains voting control of the business and multiple generations of family members are involved in the day-to-day operations of the firm.	Astrachan & Shanker, 2003
	Family voting ownership of 15% or more, or having family members holding critical leadership positions, or family control of the company's governing body.	Denison, Lief & Ward, 2004
	It is majority family owned and has at least one family member on the management team.	Graves & Thomas, 2008
	The family continues to have an equity ownership stake in firm; and family possesses board seats; and founding CEO is still the acting CEO or his descendent is acting CEO.	Anderson & Reeb, 2003
	Firms that are both family owned and managed.	Welsh & Raven, 2006
	Where policy and direction are subject to significant influence by one or more family units. This influence is exercised through ownership and sometimes through participation of family	Davis, 1983
	Family business involves management by family member(s), as well as ownership.	Aronoff & Ward, 1995; Handler, 1989
	If the majority of votes is in possession of the natural person(s) who established the firm(...), or in possession of their spouses, parents, child, or children's direct heirs; and the majority of votes may be indirect or direct; and at least one representative of the family or kin is involved in the management or administration of the firm; and the person who established or acquired the firm (share capital) (...) possess 25% of the right to vote mandated by their share capital.	European Commission, 2009
	There are family members on the board or in management posts, and/or the capital is divided among family members.	Basco & Rodríguez, 2009, p. 86
	One or several families hold a significant part of the capital; family members retain significant control over the company, which depends on the distribution of capital and voting rights among nonfamily shareholders, with possible statutory or legal restrictions; and family members hold top management positions.	Villalonga & Amit (2006); Allouche, Amann, Jaussaud & Kurashina, 2008, p. 316
	Owned and managed by a nuclear family.	Graves & Thomas, 2004
Control /Ownership and Self Proclamation	Ownership: one family or more have the control of the ownership of the business; and Self-definition: asked if their business could be considered a family firm.	Casillas, Moreno & Barbero, 2009
	Family ownership status was self-reported and, to be included in this study, a firm must be 100 percent family owned.	Brice & Richardson, 2009

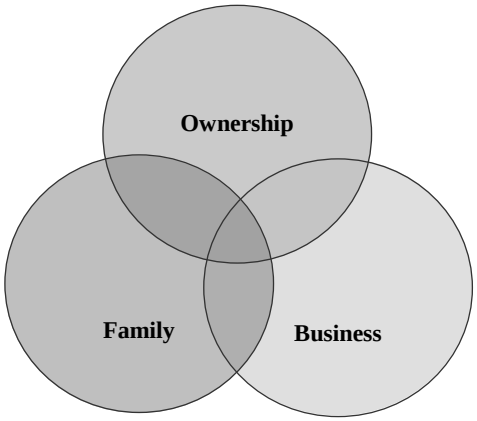
Criteria	*Definition*	*Reference*
	If more than 50% of ordinary voting shares was owned by members of the largest single family group related by blood or marriage and the company was perceived by the CEO/managing director/chairman to be a family business.	Westhead & Howorth, 2006
Control/Ownership and Generations	The ability to sustain the vision of the controlling family members across generations	DeMassis, Chua & Chrisman, 2008; Short, Payne, Brigham, Lumpkin & Broberg, 2009
	Businesses that report some identifiable share of ownership by at least one family member and having multiple generations in leadership positions within that firm.	Zahra, Hayton & Salvato, 2004
Control/Ownership and Management and Generations	Business governed and/or managed with the intention to shape and pursue the objectives of the business held by a dominant shareholder, members of the same family or a small number of families in a manner that is potentially sustainable across generations of the family or families.	Chrisman, Chua & Kellermanns, 2009; Chrisman, Chua & Steier, 2002; Dibrell & Craig, 2006; Chrisman, Chua & Sharma, 2005
	Ownership and control, decision-making, employment of family members and business acquired from parents. In addition, family ownership and family management were verified	Kotey, 2005
	The family business is governed and/or managed with the intention to shape and pursue the vision of the business held by a dominant coalition controlled by members of the same family or small number of families in a potentially sustainable manner across generations of the family/(ies)	Chua, Chrisman & Sharma, 1999
	Where the major operating decisions and plans for leadership succession are influenced by family members serving in management or on the board	Handler,1989
	Ownership, management, and an expectation of transgenerational management succession within the family.	Chrisman, Chua & Litz, 2004
	Where one family group controls the company through a clear majority of the ordinary voting shares, the family is represented on the management team, and the leading representative of the family perceives the business to be a family firm	Naldi, Nordqvist, Sjöberg & Wiklund, 2007
Control/Ownership and Management and Self Proclamation	One family group controls the company through a clear majority of the ordinary voting shares, this family is represented in the management team, and the leading representatives of the family perceive the business to be a family firm.	Hall, Melin & Nordqvist, 2001
	Self proclamation; firms whose equity was owned by a family.	Zahra, 2005
	Small business owners who characterized themselves as family businesses. The person completing the questionnaire should be a family member and a manager in the business.	Sorenson, Goodpaster, Hedberg & Yu, 2009

Criteria	*Definition*	*Reference*
Control /Ownership and Management and Self Proclamation and Generations	Perception of the firm to be a family firm; family ownership (100%) and family management; anticipating intergenerational transition in the near future.	Howorth & Ali (2001),

Source: Own elaboration

Although there is a lack of consensus with regards to the definition of family firm, the three cycles symbolic representation of the prevailing family firm paradigm (Moores, 2009; Tagiuri & Davis, 1996) has been widely accepted amongst scholars of family firms (Chrisman, Kellermanns, Chan & Liano, 2010; Distelberg & Sorenson, 2009; Heck, Hoy, Poutziouris & Steier, 2008).

Figure 2.1. Family firm systems



Source: Adapted from Tagiuri and Davis (1992)

The three-cycle model (Tagiuri & Davis, 1992) shows the family business compromising three sets which are: ownership, family and business. The idea is that in the family firm these three independent groups co-existent, interact and overlap.

This configuration shows, through the lens of the general systems theory, that the family firm has characteristics which are common to other business systems but is, simultaneously, different from other firms due to the role played by the family subsystem which impacts the firm's cultural configuration and goal setting (Churchill & Hatten, 1987).

Tagiuri and Davis contribute to the literature by showing that each set of people, in each group, have diverse goals, which can be non-economic as proposed by Astrachan and

Jaskiewicz (2008) and Gómez-Mejia et al. (2007), and this presents family firms with unique conflicts and challenges (Chrisman et al., 2010).

Various researchers have used the three system and built on it, aiming to:

(i) Better understand the members' roles in a family firm, as did Neubauer and Lank (1998), with the three circle and tie model showing 15 possible roles;

(ii) Study the unique attributes resulting from the overlapping of the circles, as did Tagiuri and Davis (1996);

(iii) Increase the scope by adding the community sphere, as did Astrachan (1988) and Donckels & Fröhlick (1991);

(iv) Complement the original model by separating business and management and including succession, giving rise to the five system model, as did Amat (2000).

"*The reciprocal influence of family and business dimensions on family firms makes them a complex research setting*" (Zahra & Sharma, 2004, p.335) but the family influence on business is an important and distinctive characteristic of family firms. Astrachan et al. (2002) constructed the F-PEC (Power, Experience, and Culture) scale to measure that influence.

The F-PEC scale's "(…) *primary contribution lies in the multidimensional and continuous operationalization of the family influence construct*" (Cliff & Jennings, 2005, p.343). The F-PCE scale compromises:

(i) Power – exercised by the family via ownership, management and/or governance;

(ii) Culture – overlap of family and business values and the family's commitment to the business;

(iii) Experience – number of members and generations present.

The scale was later validated (Klein, Astrachan & Smyrnios, 2005; Holt, Rutherford & Kuratko, 2010).

In this thesis, the interaction of the family and business dimensions of the family firm take centre stage. The notion of family firm adopted is the one presented by the European Union Expert Group on Family Business. The Expert Group was mandated to

study the key challenges that family firms in the single market face, as well as to identify best practices in the area and recognize existing networks. Their findings and expertise are important inputs for the European Commission on family business and SME relevant issues.

They started by addressing the need for a common agreed upon definition of family firm in the European Union. They stressed that the adopted definition should be comprehensive, operational and comparable across the European Union. The definition presented, which was later approved and has since been used by the European Union member states, reads (European Commission, 2009).

1. The majority of decision-making rights are in the possession of the natural person(s) who established the firm, or in the possession of the natural person(s) who has/have acquired the share capital of the firm, or in the possession of their spouses, parents, child or children's direct heirs.
2. The majority of decision-making rights are indirect or direct.
3. At least one representative of the family or kin is formally involved in the governance of the firm.
4. Listed companies meet the definition of family enterprise if the person who established or acquired the firm (share capital) or their families or descendants possess 25% of the decision making rights mandated by their share capital.

2.3. Family firms versus non-family firms

Chua et al. (1999) provide an alternative approach to family firm definition which relies not only on family involvement but also on what distinguishes family firms from non-family firms.

Chrisman et al. (2005) argue that just studying the components of family involvement is insufficient to define a family firm. They stress the importance of studying the distinctiveness of family firms, resorting to the resource based view and the agency theory as theoretical lens for such analysis. It is vital to analyze what is unique and

distinctive of a family firm to better define and understand it. Various researchers have studied family and non-family firms to understand the differences that exist.

Family firms tend to orient their activities to the long term, in contrast to non-family firms (Eddleston, Otondo & Kellermanns, 2008; Anderson & Reeb, 2003) and this orientation may influence the strategic decisions family firms make (Allouche et al., 2008; Zellweger, 2007; Le Breton-Miller & Miller, 2006; Dyer, 2003; Sharma et al., 1997; Kets de Vries, 1993).

The strategic behaviour of family firms tends to be more conservative and risk adverse (Chrisman et al., 2010; McConaughy et al., 2001, Matthews & Fialko, 2001; Dunn, 1996; Donckels & Fröhlich, 1991) exhibiting greater resistance to change (Naldi et al., 2007; Zahra, 2005).

Family firms tend to be more inward oriented (Dunn, 1996; Fukuyama, 1995; Wong, McReynolds & Wong, 1992) and therefore exhibit reduced resource to debt (McConaughy, et al., 2001; Gallo & Vilaseca, 1996). The lower level of indebtedness reinforces the family firm's orientation towards less risk to defend from loss of control (Zellweger, Meister & Fueglistaller, 2007; Blanco-Mazagatos, Quevedo-Puente & Castrillo, 2007) preferring internal sources and avoiding external long term debt (Upton & Petty, 2000; Davidson & Dutia, 1991).

Family firms are inclined to reinvest profits due to their long term orientation and risk attitude (Vallejo, 2009; Gallo & Vilaseca, 1996; McConaughy, Henderson & Mishra, 1998; Poutziouris, 2001; Donckels & Fröhlick, 1991; Gallo, Tàpies, & Cappuyns, 2004).

Family firms tend to be characterized by higher motivation, cohesiveness and commitment of the members comparatively to non-family members (Dunn, 1996; Fukuyama, 1995; Wong et al., 1992; Donckels & Fröhlich, 1991; Lee, 2006).

The employees of family firms have higher levels of identification with the values of the family firm and tend to be more involved also due to the higher degree of loyalty in family firms in comparison to non-family firms (Adams, Taschian, & Shore, 1996; Kets de Vries, 1993; Ward, 1988; Neubauer & Lank, 1998; Tagiuri & Davis, 1996).

Family firms have a better working atmosphere and greater levels of organizational harmony due to the higher levels of trust which exist between the members (Barnett & Kellermanns, 2006; Poza, Alfred & Maheshwari, 1997; Hosmer, 1995; Ward & Aronoff, 1991; Lee, 2006).

The values of loyalty, commitment and trust are shared values common to family firms (Astrachan, 1988; Kets de Vries, 1993). Trust is central to family firms and is a source of competitive advantage for family businesses (Sundaramurthy, 2008). In the early stages, family firms are seen as high trust organizations where trust is relational and interpersonal – based on family ties, experience, personal characteristics and history (Carney, 2005). In fact, on the basis on this trust, the family often contributes resources and capital to the firm, strengthening that trust which is a source of comparative advantage (Barney & Hansen, 1994).

In terms of performance, family firms tend to be associated with higher performance and valuation (Sraer & Thesmar, 2007; Fahlenbrach, 2009; Villalonga & Amit, 2006).

Agency theory has been used to argue that family firms are more efficient than non-family firms (Dyer, 2006; Dalton & Daily, 1992) because they incur in fewer agency costs (Jensen & Meckling, 1976) considering that the principal (owner) and the agent (manager) are usually one and the same, therefore, mitigating the information asymmetry and aligning managers' and owners' goals (Fama & Jensen, 1983).

Nonetheless, Morck, Shleifer & Vishny (1988) identified the potential for agency costs in family firms. Villalonga and Amit (2006) refer the case when major shareholders can use their position to obtain private benefits at the expense of minority shareholders. This minority expropriation is predominant in higher levels of ownership.

Altruism is an agency problem which may occur in family firms (Moores, 2009). Schulze, Lubatkin, Dino and Buchholtz (2001) introduced the problems of altruism and self control in the context of family business. Altruism makes it difficult for families to effectively monitor other family members who work for the firm. Parental altruism may lead family owners to have blind faith in their employed children (Lubatkin, Schulze, Ling & Dino, 2005).

Lubatkin, Durand and Ling (2007) provide a typology of five types of altruism, and refer that the three more commonly observed are:

(i) Family-based altruism;

(ii) Paternalistic altruism;

(iii) Psychosocial altruism.

The first of these occurs when parents unconditionally transfer normal goods (goods intended to gratify economic wants) to their children placing the children's interests before their own. Paternalistic altruism results from the belief that giving rewards will encourage children to act according to the parents' wishes and so parents transfer merit goods (actions and consumption patterns which parents consider will help their children to be happy). The authors defend that both this results in governance inefficiencies but psychosocial altruism, less common, which focuses on the transfer of norms and values rather than goods, is more likely to have a positive effect leading to governance efficiencies.

Adverse selection and entrenchment may lead to placing family members in positions they are not adequately qualified for (Burkart, Panunzi & Shleifer, 2003). In family firms, resulting from the mix of personal and professional relationships, decision making process tend to be more emotional rather than rational driven, when compared to non-family (Gómez-Mejia et al., 2001).

Sciascia and Mazzola (2008) found, from their empirical test of more than 620 family firms, that the concentration of ownership and management by the family doesn't produce enough positive effects to outbalance the costs resulting from non-economic goal orientation and family conflict resolution.

Family businesses are seen as being "*fertile ground for nepotism, self-dealing, entrenched management, and utility maximization by the family to the detriment of corporate profits and other shareholders*" (Poza, Hanlon & Kishida, 2004, p.99).

The underlining problem of parental altruism, nepotism and adverse selection is the result of over emphasis on the family at the expense of the business (Barnett, Eddleston & Kellermanns, 2009). Schulze, Lubatkin and Dino (2003) showed that the agency theory was, at best, incomplete. They argued that gains in agency costs are offset by

costs associated with altruism, free riding of some members, and other negative spill over effects of tensions and conflicts of the family to the family business (Dyer, 2006).

Consequently, family firms tend to perform at least in line with non-family firms and performance increases with ownership but just to a certain level after which it decreases (Kotey, 2005; Anderson & Reeb, 2003). Additionally, career role salience of business owners is positively and more strongly associated with performance outcome in family firms than in non-family firms (Barnett et al., 2009).

In the search to discover what sets family firms apart, Sirmon and Hitt (2003) argued that family firms differ from non-family firms in the way they acquire, shed, bundle and leverage their resources.

Habbershon and Williams (1999) introduced "familiness" to describe the uniqueness of family firms which arises from the integration of family and business (given that the three circle model cannot, in their opinion, capture the dynamics of the process). Familiness refers to the unique bundle of idiosyncratic resources and capabilities existing in family firms, which can be a source of competitive advantage (distinctive familiness) or disadvantage (constrictive familiness) for the business (Habbershon, Williams & MacMillan, 2003).

The familiness concept draws on the resource-based view (RBV) of the firm. Although there are various criticisms of RBV, Kraaijenbrink, Spender and Groen (2010) refer ways in which these can be addressed to ensure that this theoretical framework, which has been in use for over 20 years, maintains its relevance in the management field. Broadly, the RBV asserts that firms' performances may differ due to their different resource (tangible and intangible) endowments. For superior performance to persist overtime, the resources need to be valuable, rare, imperfectly imitable and nonsubstitutable (Barney, 1991).

Carney (2005) provides a foundation for the study of familiness by identifying 3 important sources of advantage family firms possess: parsimony, personalism and partcularism.

Pearson, Carr and Shaw (2008) defend that a family-owned and family-managed firm may not be considered a family firm if it lacks familiness (Habbershon & Williams, 1999) because this is the very essence of the firm.

2.4. Role of the family

It is recognised that the family plays a vital role in enterprises, especially so in family firms (Aldrich & Cliff, 2003; Rogoff & Heck, 2003).

The impact of the family and its culture on the business is even more apparent in family firms (Stafford, Duncan, Dane & Winter, 1999). "*The dominant culture of a family firm is very much a result of beliefs, values and goals rooted in the family, its history, and present social relationships*" (Hall et al., 2001, p. 195). The family firm's culture is the product of a combination of different behavioral patterns which result from the history of the family business, the social relations within it and the beliefs and values embedded in the family (Schein, 2004; Dyer, 1986).

Culture is essentially a process of reality construction that enables organizational members to understand events, actions and situations of organizational life in specific ways. Such a process, being social in nature, equally enables organizational members to produce and preserve shared responses and shared experiences. Consequently, members of a particular organization tend to hold certain common ideologies through collective experience and reproduction of social interaction (Tsai & Ghoshal, 1998).

In the specific context of family businesses, the interactions between the various individuals of the family and within the business lead to the internalization of the set of accepted behaviours, norms and values (Adler & Kwon, 2002; Hoffman, Hoelscher & Sorenson, 2006).

It is via this sharing and negotiating meaning that organizational members develop a sense of collectivity and feel that they belong to a specific organization with which they identify themselves. Through the social interaction people construct a sense of identity within the organization, based on the sharing of particular beliefs and traditions (Trice & Beyer, 1991). The construct of socialization is crucial for communication and

learning of shared values in family businesses. As a result, when "*families establish a business, beliefs and norms prominent in the family tend to carry over to the business*" (Sorenson et al., 2009, p.239).

The family is one of the most reliable social structures for transmitting cultural values through generations (Gersick et al., 1997). This allied to the family firms' resistance to change (Naldi et al., 2007), the importance put on maintaining control (Zellweger et al., 2007), and the long tenures of the founders and CEOs (Anderson, Mansi & Reeb, 2003; Gómez-Mejia, Larraza-Kintana & Makri, 2003), explains the important role that the family's culture plays in establishing and maintaining the family firm's culture.

Culture transmission usually occurs via instruction, imitation and also via socialization. Founders can also influence culture through the socialization used for the next-generation, in the heart of the family structure (García-Álvarez, López-Sintas & Gonzalvo, 2002). The researchers observed, that the founders who view the business as supporting the family will tend to display higher values of group orientation encouraging successors to join the firm early at lower positions; whilst those who view the business as an independent objective, will encourage higher education and experience to successors before joining the company at superior level.

Arregle et al. (2007) typology of family firms, which distinguished in accordance to owner-managers' attitudes towards their business, defend that the 'family in' cluster involves more family involvement. In these firms, the founder gears the children to the business and mentors them in the business. In these cases, the socialization process begins at an early age and the active presence of the founder, even after the succession process, prolongs the founder's value impact on the firm's culture. A family firm which puts more emphasis on the family system, viewing the business as a means to attain family goals will exhibit different shared values to a family firm which, in the most extreme, is family-depleting.

The conjunction of both these views leads Distelberg and Sorenson (2009) to conclude that the value orientation of the family business system is a weighed sum of values within it which determines the transfer of the resources to attain the family business goals.

When analyzing the family context as a pool from where future members are recruited, the family is seen as a force which can directly influence the organization. In that sense, the way in which family members are selected to become workers in the family firm can be used as a form of control, to filter those who are predisposed to the family firm's culture.

In fact, it is now common for companies to resort to a diverse array of recruitment and selection tools aiming to identify the individual's main motivations and characteristics and therefore opt in accordance to the organization's goals. Family firms also have adopted varied recruitment and selection mechanisms to align future members' goals to those of the firm's.

Chrisman et al. (2002) emphasize the need to pay more attention to the family dimension of the family firm because the family represents a critical and often-used resource of human capital and other forms of capital. Danes, Lee, Stafford and Heck (2008) concur that understanding the family context and its ethnicity is vital for the entrepreneurial process.

The family is one of the most important networks that the founder uses to support the firm (Steier & Greenwood, 2000). The notion of social capital refers to the networks which the family firm creates. The sharing of resources, including social networks, is a key factor of growth in the family firm (Rogoff & Heck, 2003; Steier, 2007).

Stewart (2003) examines the role of kinship in networks and lists various benefits including access to information and tacit knowledge as well as resources such as time and money. Some family members can be considered an asset for the firm, whilst others are liabilities (Zellweger, Eddleston & Kellermanns, 2010).

The household's financial health is another factor which needs to be taken into account (Rodriguez, Tuggle & Hackett, 2009). Entrepreneurs turn to family members many times as a lender of last resort after exhausting all other possibilities (Steier & Greenwood, 2000).

The trust which occurs naturally in the family context is a form of social capital (Steier, 2001; Sundaramurthy, 2008) and shared goal orientation inside the firm is crucial for

internal social capital (Adner & Helfat, 2003). Corbetta and Salvato (2004) depict family firms as high trust organizations. Family firms are a rich context for resilient trust (Pearson et al., 2008), which Leana and Van Buren (1999) refer to as a powerful link between the parties involved and based on frequent social interaction and common moral ground. This trust acts as a moderator for augmenting cooperation in family firms resulting from the internal social capital (Hitt, Ireland, Camp & Sexton, 2001). The interpersonal trust among family members - internal social capital- is founded on kinship, familiarity, common history, values and experience and facilitates action taking (Carney, 2005; Kets de Vries, 1993).

The high level of emotional involvement of family members and the intense social interaction, driven by trust, facilitates knowledge creation (Cabrera-Suárez, De Saá-Pérez & García-Almeida, 2001; Chirico, 2008) resulting from common experience and enhanced communication (Tagiuri & Davis, 1996).

The development of external social capital, also referred to as bridging social capital by Sharma (2008), is based on trust and on the assumption of reciprocity. This allows for an increase in the absorption of knowledge (Hitt et al., 2001) which enables the firm to reinforce its competitive advantage (Steier, 2001).

Trust is fundamental for successfully managing relationships and influences the degree to which these collaborations are fruitful (Larsen & McInerney, 2002). In family firms, trust is a source of competitive advantage and it is vital for the initial embedded trust to be guarded against conflict and strife which can destroy it (Sundaramurthy, 2008).

Prior research has stressed the pivotal role families play in the economic and entrepreneurial activity (Fukuyama, 1995; Nahhas, Ritchie, Dyer & Nakashian, 1997; Rogoff & Heck, 2003) yet there is no consensus among scholars whether the organizational context of family firms is supportive or not of entrepreneurial orientation and performance (Habbershon & Pistrui, 2002; Zahra, 2005).

Zahra et al. (2004) consider that the family can sometimes hinder family firm business success as they are reluctant in taking risks which might jeopardize the family wealth (Sharma et al., 1997; Schulze et al., 2003; James, 1999). As a result they tend to be, or become over time, conservative (Kets de Vries, 1993; Sharma et al., 1997), introverted

(Hall et al., 2001) and risk averse, remaining within the boundaries of their current strategy despite drastic changes in the environment which presents obstacles to entrepreneur behavior.

Also, firms with paternalistic cultures, where all key decisions are made in a non-participative atmosphere by one or few top family members, can result in family inertia which can, among other things, hinder entrepreneurial performance (Chirico & Nordqvist, 2010).

It is undeniable that the family is a milieu from where the founder and other members stem but it is also an underlying force of the business and its culture (Dyer, 1986; Daily & Dollinger, 1992; Gómez-Mejia et al., 2001; Schein, 2004; Heck, 2004). The family firm can resort to specific governance structures to promote continuity and protect against strife and conflict. The main family governance structures are the Family Constitution and the Family Institutions.

The Family Constitution is also referred to as the Family Strategic Plan or Family Protocol. It is a statement of principle which governs the relationships between the family, the business and the firm's property, with the aim of securing intergeneration continuity in terms of management and control.

Palacios et al. (2012) characterize the Family Protocol as a voluntary self regulatory agreement which is tailored to each firm according to its specificities. It aims to anticipate issues that might arise due to the family and business interaction and present possible solutions and rules of conduct. The Family Protocol can be legally binding if the family so decides, otherwise it can also be seen as a Code of Conduct with no legal imposition. Given these characteristics there is no formal or uniform structure that such a protocol obeys. Nevertheless, the main issues concerning the family and firm relationship are addressed. These usually will include:

(i) The values and mission of the family;
(ii) The implementation, composition and functioning of the firm's governance bodies, such as Board of Directors, CEO selection, Executive Committee, Family Board and Family Assembly;
(iii) Rules to separate family and firm wealth;

(iv) Rules for recruiting, promoting and paying family members;
(v) Rules regarding the shareholders and capital distribution and passing of control over generations;
(vi) Dividend policy;
(vii) Ethic code to be followed in the firm and by the family members;
(viii) Promotion of family activities beyond the firm (ex. development programs for the successors);
(ix) Conflict resolution mechanisms;
(x) Revision guidelines of the Protocol to ensure it maintains its relevance.

Other than the Family Protocol the Family Institutions will help maintain family harmony and promote firm continuity.

Depending on their size, the complexity of their business, and their stage of life, family firms can also have institutions such as the Family Assembly and the Family Council.

The Family Assembly is where the family can discuss issues relating to the business and to the family. At the initial stage of the firm these can be more informal meetings where the founder presents what is being done and calls for suggestions and ideas for new business ventures and developments. As the firm evolves and the family grows the need for a more formally established forum for discussion becomes necessary. The Family Assembly informs and discusses issues relating to family and firm values, family employment and compensation, constitution of other family bodies and assemblies (if existent) among other issues which overlap family and the firm. It is usually head by a senior family member who also tends to be part of the Board of Directors, interconnecting the key family issues to the firm's strategic direction.

The Family Council is elected by the Family Assembly and has an executive role in deliberating on family related issues of the family firm.

Table 2.3 resumes the main characteristics of each of the Family Institutions.

Table 2.3. Family institutions

	Family Meeting	*Family Assembly*	*Family Council*
Stage	Founder stage	Second or Third Generation	Second or Third Generation
Membership	Usually open to all family members	Usually open to all family members	Family members elected by the family assembly
Number of Meetings	Depends on the stage of the business. Can be as frequent as once a week	1-2 times a year	2-6 times a year
Main Activities	Communication of family values and vision; Discussion and generation of new business ideas; Preparation of next business leaders.	Discussion and communication of ideas, disagreements and vision; Approval of major family related policies and procedures; Education of family members on business issues ; Election of family council and other committees' members.	Conflict resolution; Development of the major family related policies and procedures; Planning; Education; Coordination of management/board to balance business/family.

Source: Adapted from International Finance Corporation (2011)

The family firm's governance bodies can be complemented, if necessary, with other insitutitions and committies which focus on specific issues. For example, the Family Office, which provides investment and adminstrative support to the family members and is overseen by the Family Council. Commitees focused on family members' educational and training development, career development, social and recreational event organisation and social intervention, can also be established.

The family impacts, shapes and conditions the firm and its continuity. It is essential that the communication channels are fluid and there is a clear understanding of both the family and the firm's objectives to ensure firm sustainability and family harmony.

2.5. Importance of the founder

The founder of the family firm is the vertex between the family and the business system and plays a central role in both (Sundaramurthy & Kreiner, 2008; Litz, 2008; Tagiuri & Davis, 1992).

The beginning of the family firm is represented by the founder's impact at various levels such as the mission, the context in which the organization shall operate, the

choice of members and the basic functioning of the organization as a whole (Dyer, 1986). Therefore, organizational leaders are portrayed as culture creators (Jarnagin & Slocum, 2007; Martin, 2002).

There is a large consensus amongst researchers of family firms that the founders are key elements in the emergence of culture in the firms (Kets de Vries, 1996). Founders have a fundamental influence over how the organization initially defines and solves its external adaptation and internal integration problems (Schein, 2004; Harvey & Evans, 1994).

In the earlier phase of the family firm, the founder has a unique and very privileged position to impose on the organization his/her values and beliefs, creating the basis of the organization's cultural identity. The values and beliefs of the founders are "*based on their own cultural history and personality*" (Schein, 1992, p.213) and mirror the founder's education, life experience, family, and upbringing and background (Arregle, Hitt, Srimon & Very, 2007). Consequently, the founder's assumptions are reflected in how the organization functions and how the culture is enacted. Thus, the founders have an important role in influencing the direction of the organization and its configuration (Handy, 1993).

The dominant role of the founder can be witnessed not only at the earlier stages but also through time due to their active and long-term roles is management (Hall et al., 2001; Denison et al., 2004). The founders can, through the adoption of diverse tactics, prolong their impact on the firm's cultural identity. These tactics include:

(i) Writing and sharing their philosophy;
(ii) Using opportunities to demonstrate their philosophy;
(iii) Using systems of recruitment, reward and promotion aligned with their beliefs;
(iv) Avoiding and discouraging reviews and critics of their beliefs;
(v) Using artefacts to remind members of their purpose;
(vi) Creating systems, procedures and structures that mirror their core assumptions (Dyer, 1986).

Schein (2004) highlights the importance of leaders having a cultural understanding of the organization in order to enhance their ability to perceive its limitations and enable its evolution if and when it becomes necessary. The founder is vital not only as a source but also as a means of diffusion of culture in the organization. "*The clearer the leader is about what he stands for, the more apparent will be the culture of that company*" (Davis, 1984; p.8).

Sorenson (2000) suggests that family business leaders can have five different types of leadership styles: participative, autocratic, laissez-faire, expert and referent. He refers that the participative leader, values participation from all and tends to attain higher performances both at the family and business level, however the study was inconclusive regarding the other leadership styles (Sharma, 2004).

Vallejo (2009) proposes that Sorenson's participative and referent leaders are transformational leaders and these facilitate the diffusion of the family values in the firms. Also, Waldman, Siegel and Javidan (2006) highlight the importance of the leader directing his/her power to enhance the alignment of the members to the organization (socialized power motive). Leaders should be aware of their actions and how they may be interpreted by all stakeholders (Porter, Lorsch & Nohria, 2004) and should, therefore be intelligent in the way they use them (Ciampa, 2005).

The leader's charisma is a valuable asset in promoting the culture of the organization. The leader influences and inspires members and directs their loyalty to the firm's objectives (Aronoff & Baskin, 2005). Leaders have mechanisms through which they can embed their beliefs, values and assumptions on the firm in order to maintain and augment their influence in the family firm. Schein (2004) classifies these mechanisms into two major groups: primary and secondary embedding mechanisms.

Table 2.4 summarizes those mechanisms.

Table 2.4. Embedding mechanisms

Primary Embedding Mechanisms
What leaders pay attention to, measure, and control on a regular basis.
How leaders react to critical incidents and organizational crises. Crisis very important in culture creation and diffusion therefore an opportunity for leaders to signalise their beliefs, values, assumptions. Notion of crisis may vary depending on the culture of the organization.
How leaders allocate resources. Creation of budgets is also an important signal of what leaders value.
Deliberate role modelling, teaching, and coaching. Actions speak louder than words. Through their behaviours and attitudes leaders communicate their beliefs, values and assumptions especially to new members.
How leaders allocate rewards and status. If rewards, punishments and status are in line with the leader's values these will also act as important messages.
How leaders recruit, select, promote, and excommunicate. Who is selected, promoted, demoted, retired early, etc. shows what leaders value.
Secondary Embedding Mechanisms (these are more difficult to interpret by the members)
Organizational design and structure.
Organizational systems and procedures. Like structure, the process can be a way of formalizing the messages the leaders want to reinforce.
Rites and rituals of the organization. Rituals can lead to various interpretations but can help to reinforce what leaders consider important.
Design of physical space, facades, and buildings. This encompasses all that is visible.
Stories about important events and people. The story can be an event, a parable, a myth and works both as a reinforcing mechanism but also a way of teaching new members.
Formal statements of organizational philosophy, creeds, and charters. This is when leaders formally and explicitly state the core assumptions that form the basis of the company's culture. It is an important tool both for insiders as well as for the outside.

Source: Adapted from Schein (2004)

2.6. Role of national culture

As Thévenet (1986) suggests, organizational culture is shaped by the external culture (national culture) and the internal culture (resulting from the members). When analyzing the family firm, it is fundamental to consider not only the micro-context, in which the firm is based, but also a wider context, the national culture, which serves as a background and reflects on the organization and its members.

People enter organizations from the surrounding community and bring their culture with them. They are embedded in the wider societal context but they are also communities of

their own with distinct rules and values (Markoczy, 2000). In defining a country's culture, factors such as religion, history and education have been identified as important (Ronen & Shenkar, 1985; Chrisman et al., 2002).

In family firms, the family is embedded in the firm which in turn is embedded in the national culture therefore there is an interplay between family culture, family business culture and the national culture (Chrisman et al., 2002; Le Breton-Miller & Miller, 2009; Villannueva & Sapienza, 2009; Steier et al., 2004). More recently, the Culturally Sensitive Assessment Systems and Education Compendium project (CASE) based on a thematic content analysis of ten selected articles of family businesses of each cultural cluster, concluded that family businesses are culturally cohesive and contextually. Family firms are repositories of the cultural endowments where they are set (Gupta, Levenburg, Moore, Motwani & Schwarz, 2009).

Although various scholars are debating the convergence of cultures due to globalization there is strong evidence that cultural differences persist in values across the world (Hofstede 1991, 1994; House, Hanges, Javidan & Dorfman 2002; Trompenaars, 1994; Woldu, Budhwar & Parkes, 2006).

Understanding the cultural value systems of nations is essential for management because practices may change according to different needs and availability of resources but this doesn't necessarily affect the underlying values, which is the culture (Budhwar, Woldu & Ogbonna, 2008). The home country of the firm plays a key role in its identity and effectiveness (Carney, 2005) given that crucial elements of management vary from one country to another as a function of local culture but are quite stable within each society (Hofstede, 2007).

Lenartowicz and Roth (1999) suggest that a better understanding of nature and impact of national culture should become a central research focus and Bhagat, Kedia, Harveston and Triandis (2002) reinforce the need to systematically incorporate cultural variables in theory building. National culture has become increasingly important in the last two decades to study major business activities (Leung, Bhagat, Buchan, Erez & Gibson, 2005). The influence of culture is recognized and used to interpret differences in businesses across countries.

The study of national culture is essentially driven by cultural dimensions in order to cluster countries and cultures based on their similarities. The foundation for quantitive measures of cultural values was first proposed by Klukhon and Strodbeck in 1961. The values they identified have been used as a basis by various researchers (Boyacigiller & Adler, 1991; Dyer, 1986), including the most well known and frequently used cultural dimensions developed by Hofstede. He conducted a survey among employees of IBM in more than 70 countries and initially proposed four dimensions for the evaluation of cultural dispositions of a nation: power distance, uncertainty avoidance, individualism/collectivism and masculinity/femininity. Hofstede (1994) later introduced a fifth dimension of long-term orientation vs. short-term orientation especially relevant for Asian societies.

Although there are several critics of Hofstede's work who question the assumptions of his work, namely, whether culture is a cause and not the effect and if geographic boundaries are appropriate for clustering cultures (McSweeney, 2002) the fact remains that his cultural dimensions are the most used in cross cultural analysis. The impact of his work is unquestionable and according to the Web of Science it has been cited almost five thousand times and twice as much, based on Google Scholar (Steel & Taras, 2010).

Hofstede's cultural dimensions provide some insight on the contrasting attitudes and behaviors across different countries (Hamilton, Dana & Benfell, 2008). Table 2.5 provides a summary of those dimensions.

Table 2.5. Hofstede's cultural dimensions

Cultural Dimensions	
Power Distance Index (PDI)	The degree of equality, or inequality, between people in the country's society.
Individualism (IDV)	The degree the society reinforces individual or collective, achievement and interpersonal relationships.
Masculinity (MAS)	The degree the society reinforces, or does not reinforce, the traditional masculine work role model of male achievement, control, and power.
Uncertainty Avoidance Index (UAI)	The level of tolerance for uncertainty and ambiguity within the society
Long-Term Orientation (LTO)	The degree the society embraces, or does not embrace, long-term devotion to traditional or forward thinking values.

Source: Adapted from Hofstede (1994)

After the groundbreaking work of Hofstede a few others have developed other dimensions such as Smith, Dugan and Trompenaars (1996) and more recently the Global Leadership and Organizational Behavior Effectiveness (GLOBE) research project. This project collected data from 170 social scientists representing 62 countries and from 17.300 managers in more than 950 firms, to analyze the impact of cultural values on leadership. To study this, House et al. (2002) developed nine different cultural dimensions: uncertainty avoidance, power distance, institutional collectivism, in-group collectivism, gender egalitarianism, assertiveness, future orientation, performance orientation, and humane orientation.

Table 2.6. GLOBE's cultural dimensions

Cultural Dimensions	
Uncertainty Avoidance	The extent to which members of an organization or society strive to avoid uncertainty
Power Distance	The degree to which members of an organization or society expect and agree that power should be unequally shared.
Collectivism I	The degree to which organizational and societal institutional practices encourage and reward collective distribution of resources and collective action.
Collectivism II	The degree to which individuals express pride, loyalty and cohesiveness in their organizations or families
Gender	The extent to which an organization or a society minimizes gender role differences
Future Orientation	The degree to which individuals in organizations or societies engage in future-oriented behaviors such as planning, investing in the future, and delaying gratification.
Performance Orientation	The extent to which an organization or society encourages and rewards group members for performance improvement and excellence.
Humane Orientation	The degree to which individuals in organizations or societies encourage and reward individuals for being fair, altruistic, friendly, generous, caring, and kind to others.
Egalitarianism Assertiveness	The degree to which individuals in organizations or societies are assertive, confrontational, and aggressive in social relationships

Source: Adapted from House et al. (2002)

The influence of culture is recognized and used to interpret differences in businesses worldwide and family firm researchers also recognize that differences between firms could be due to cultural characteristics (Welsh & Raven, 2006; Khavul, Bruton & Wood, 2009).

Brice and Richardson (2009) used Trompenaar's dimensions to compare the values and beliefs of family-business members and professional managers in the Ukraine and the United States. The results showed that family firms in both countries had higher social flexibility and spirituality, and lower power distance but differed in the remaining four cultural dimensions: masculinity, social cynicism, reward for application and fate control.

The CASE project research team issued a worldwide call for papers and from over 200 papers received ten articles for each of the ten cultural clusters identified by the Globe clusters, were selected. The researchers then applied thematic analysis techniques on those articles and crossed them with the nine dimensions of family business presented by Gupta and Levenburg (2010).

The following table shows the nine cross-cultural dimensions of family business used by the CASE Project.

Table 2.7. CASE's cultural dimensions

Dimension	*Description*
Category I: The family interface	
Regulated boundary	Regulation of the criteria used by families to achieve or grant access to the family business's information, space, and resources
Business reputation	The relative roles and importance of the family's and business's reputations in terms of their relationships within the community; family resources are involved only if it makes business sense; the involvement of these resources is not guided by primarily family interests
Bridging relationships	The family business breaks out to access resources outside of the family's networks; it is not tied to only the family's networks for core resources
Category II: The business interface	
Organizational professionalism	The extent to which the family business employs professional managers and methods within the organization
Regulated family power	The extent to which the family business has a structure that protects it from the dynamics of family; family – as a collective or a divisive entity – does not create uncertainty for it
Competitive succession	The extent to which the succession process, including employment and leadership, is based on merit-based competence, as opposed to kinship alone does not entitle one to employment or the privilege of leading the family business

Dimension	*Description*
Category III: The joint family and business interface	
Gender-centered leadership	Women family members play visible and significant roles in family business; they are not merely invisible or silent members of family in business
Operational resiliency	Family business has access to the reservoir of family resources to weather temporary crises or to overcome more enduring challenges; it is not without patient and loyal capital
Contextual embeddedness	Family business evolution is founded on the specialized and dedicated spatial resources, such as deep experiences and localized endowments

Source: Adapted from Gupta and Levenburg (2010)

2.7. Management succession

Executive succession is one of the most important and hardest tasks in organizational life (Zahra, 2005). The numbers speak for themselves. Only 3 out of 10 family firms survive to the second generation and only 10% to 15% live on to the third (Kets de Vries, 1993).

Intergenerational management successions are one of the most challenging steps in the life of the family firm which demands appropriate analysis (Miller, Steier & Le Breton-Miller, 2003). Family firm leaders are often concerned with the long term and the continuity of the business (Miller, Le Breton-Miller & Scholnick, 2008).

The review of articles performed by Chrisman et al. (2005) found that succession is dominant research topic in family firms. Debicki, Matherne, Kellermanns and Chrisman (2009, p. 157) conducted a more comprehensive review (in number and scope of articles) and reiterated that "(…) *significant portions of family business research"* relates to succession.

After reviewing the literature on succession and keeping in mind the aim and scope of this thesis, some key themes were identified. These are:

(i) Resistance to succession;

(ii) Relationship founder/successor;

(iii) Relationship among family and business members;

(iv) Planning of succession;

(v) The succession process;
(vi) Selection of successor;
(vii) The daughter's role;
(viii) Preparation and integration of the successor;
(ix) Type of organizational culture.

2.7.1. Resistance to succession

The founder's inability to let go has been cited out as one of the major obstacles for succession (Sharma, Chrisman, Pablo & Chua, 2001).

Succession is often indefinitely postponed and neglected due to the strong link between the founder and the firm (Bachkaniwala, Wright & Ram, 2001). His personal sense of attachment (Bruce & Picard, 2006; Le Breton-Miller et al., 2004; Dyer, 1986) means that leaving the firm and death, is seen as one and the same (Barnes & Hershon, 1989). Consequently, to reflect on succession the founder has to accept his/her mortality, which can be strenuous (Lansberg, 1988).

The significance the founder places on the firm goes far beyond just the balance sheet and encompasses non-tangible aspects such as status, image and power (Dyer, 1981) which the founder may fear losing by relinquishing his position (Sonnenfeld & Spence, 1989).

2.7.2. Relationship founder/successor

The interaction, relationship, commitment and involvement of the founder are factors which influence the succession. Szulanski (1996) emphasizes intimacy and smooth flow of communication as vital. Handler (1989) and Lansberg (1999) concur and refer that the success of the transfer is contingent on the relationship between predecessor and successor.

The reality is that more often than not, father-son relationships tend to be tense and complex (Kets de Vries, 1996). The age gap has been presented a factor which contributes to the quality of the relationship (Davis, 1983).

The succession process can be traumatic for the founder who may suffer motivation problems and feel a sense of loss of status and power and, therefore, grow reluctant to let go. The founder might even try to undermine the successor's capabilities to make the firm more dependent on himself (Seymour, 1993; Morris, Williams, Allen & Avila, 1997; Lansberg, 1988; Sonnenfeld & Spence, 1989). In fact, many founders see the family firm as an extension of themselves which they want to control completely (Lansberg, 1999; Dyer, 1986).

Another problem arises when the founder stays in the firm retaining significant power, even after the succession process has supposedly been completed. This is described as the generational shadow (Davis & Harveston, 2001). The generational shadow refers to the negative effect of the founder. The founder staying in the firm can be quite positive if he adopts the role of mentor or consultant. Having a clear role definition is of vital importance for both parties (Lansberg, 1988; Sharma et al., 2001).

Miller et al. (2003) present three types of dysfunctional parent-child relationships which give rise to three distinctive succession patterns: conservative successions, wavering successions and rebellious successions.

Table 2.8. Types of successions

	Conservative	***Wavering***	***Rebellious***
Intergenerational family dynamics	Idealization, subservience	Conflicted, unresolved	Rejection, independence
CEO personality and managerial style	Conservative, risk averse, obsessive	Indecisive, suspicious, reactive	Dramatic, proactive, action oriented
Organizational context	Steady performance, strong culture and traditions	Politicized, divided, factionalized, conflictual	Unsettled, in crisis, deteriorating performance
Market context	Stable, protected, tradition bound	New challenges or market discontinuities	Turbulent, dynamic, competitive

Source: Adapted from Miller et al. (2003)

The quality of the relationship between predecessor and successor is very important for the transfer of tacit knowledge within the firm (Szulanski, 1996). It is essential for the successor to tap into the embedded knowledge in order to maintain and improve the performance of the company. To gain this knowledge many founders encourage successors to take a hands-on approach to the firm, starting with summer jobs and lower levels in the company and moving up (Cabrera-Suárez et al., 2001).

Janjuha-Jivraj and Wood (2002) found that greater communication between generations resulted in goal congruence and higher commitment to long-term strategy by the successor. Mutual trust has been considered a key factor for success, enhancing a good working environment for the business and in the family (Handler, 1989; Morris, Williams & Nel, 1996; Fukuyama, 1995).

2.7.3. Relationship among family and business members

The firm leader should try and safeguard the family firm from tensions (Olson, Zuiker, Danes, Stafford, Heck & Duncan, 2003) because, amongst other reasons, family harmony is important for the succession process (Churchill & Hatten, 1987; Malone; 1989). However, it is not usual for rivalries and competition between family members to surface and hinder the succession process (Kets de Vries, 1989). Also, conflicts with non-family members can hamper the succession process (Bruce & Picard, 2006).

Handler (1992) referred that relational influences affect the quality of the succession experience. Therefore, the successor needs to have, what Ciampa (2005) refers to as, political intelligence in order to manage these complex relationships for the success of the firm. He must also be able to earn the respect and trust of both family and non-family members (Goldberg & Wooldridge, 1993; Lansberg & Astrachan, 1994; Matthews, Moore & Fialko, 1999) including family members who may not be actively involved in the firm but are (often) very influential (Gillis-Donovan & Moynihan-Bradt, 1990).

The family relationship is different in diverse cultures, for instance in Latin America fathers are more authoritarian than in the United States, Japanese families legally adopt

sons-in-law, and the role of women is quite different. These different family relationships affect the way family firm address successor selection (Dyer, 1981).

2.7.4. Succession planning

Succession planning refers to the dynamic process which requires the current ownership to plan the firm's continuity and then implement the plan (Francis, 1993). The roles, responsibilities and ownership stakes of the predecessor after succession should be clear in the succession plan (Sharma, Chua & Chrisman, 2000).

The lack of succession planning is a major reason for the high mortality of family firms (Handler, 1989). Various studies have emphasized the importance of planning the succession (Kets de Vries, 1993; Handler, 1990, 1992) to avoid unnecessary conflict which might arise from unplanned succession and untimely death of the founder (Harvey & Evans, 1994). The lack of planning is directly related to the founder's resistance (Beckhard & Dyer, 1983; Lansberg & Astrachan, 1994; Lansberg, 1999). The founder's belief that the velocity at which change occurs coupled with his uncertainty regarding his children's career ambitions makes him reluctant to plan far too ahead.

Whatever the reason, there seems to be a consensus that the lack of planning plays a pivotal role in what Danco (1982) denominates as corporeuthanasia.

Some firms opt for succession plans which are carefully developed with contributions of accountants, bankers and other experts. Researchers have found that successful transitions can occur even if there is only an informal succession plan (Morris et al., 1997). Santiago's (2000) model suggests that a family firm with a strong family orientation, single ownership structure, no professional managers combined with a single (not extended) family and where members have strong bonds of love and respect between them, can withstand a tacit planning.

Resulting from the enmeshment of the family and the business dimensions, the family firm tends to favor either one or the other (Gómez-Mejia et al., 2001; Haynes, Onochie & Muske, 2007; Sundaramurthy & Kreiner, 2008). The inclination towards the family or the business sphere can also have implication on how the succession process is

perceived. The family firms which are driven by family-first value orientation may not perceive succession as a priority but rather a resource to support family goals and once these have been accomplished the need for continuity decreases (Castillo & Wakefield, 2007).

2.7.5. Succession process

Succession is acknowledged as being a major challenge in family firms (Cabrera-Suárez et al., 2001). The succession process is described as a mutual role adjustment between the founder and the next-generation (Handler, 1990, 1992). It is a multistage and evolutionary course, characterized by the trade-off between the successor's growing involvement and the reduction of involvement of the founder culminating in the transfer of the baton, as Dyck, Mauws, Starke and Mischke (2002) put it. Mutual respect and understanding between the generations is essential for the process to run smoothly (Cater & Justis, 2009).

This process encloses various steps including the preparation of the successor for leadership roles, integration of the successor (forms and timings), and finally the transfer of power to the successor. Once the successor becomes the incumbent then the cycle repeats itself. Dyck et al. (2002) draw an analogy between the succession process and a relay race with success depending on sequence, timing, the passing of the baton and communication.

Palacios et al. (2012), divide the succession process into 4 main steps: incubation, successor selection, co-existence of successor and founder, and exit of the founder. The incubation phase encompasses the period when children have contact with the firm as they grow. This is followed by the successor selection. When making the decision of who will take over the management of the family firm, the founder takes into account the potential successors', attributes, availability, skills and preferences. This is then followed by a period of adaptation of the successor, with the founder acting as a mentor and facilitator and finally the exit of the founder.

2.7.6. Successor selection

The preference for a successor varies in family firms in accordance to their culture, tradition, family orientation, emotions, competence and preparation of the successor (Birley, Ng & Godfrey, 1999).

A successful selection can augment the family-firm's competitive edge by prolonging the use of the idiosyncratic know-how of the family members. This inside know-how which family members possess enables them to create and exploit the specific resources of the family firm and enhance the competitive advantage of the firm (Bjuggren & Sund, 2001).

Usually, in the family firm the choice is limited by the family members and this can pose a threat to the continuity of the firm (Tatoglu et al., 2008).

The choice of the eldest male son has remained the most frequently used (Dumas, 1989). Barnes (1988) suggested that the choice tended to be the eldest son in order to preserve family harmony which could be at risk if incongruity developed in the family as consequence of choosing a younger sibling. So, this choice does not necessarily reflect that in fact the eldest son is the most suited, but rather that the male primogeniture seems to be normal practice (Ayres, 1990). Additionally, the offspring's inclusion depends on his/her availability (Rubenson & Gupta, 1996; File & Prince, 1996; Sharma et al., 2000), commitment to the firm (Barach & Gantisky, 1995; Chrisman et al., 1998; Sharma & Rao, 2000; Sharma, 2004), ability (Brockhaus, 2004; Barach, Gantisky, Carson & Doochin, 1988) and his/her age (Davis & Tagiuri, 1989).

Bounded intergenerational reciprocity, can also drive the choice towards the person who is most likely to act as a steward of the business and pass it on to future generations (Janjuha-Jivraj & Spence, 2009). Depending on the prevailing culture, in-laws may or may not be considered for succession (Fiegener, Brown, Prince & File, 1994). Beckhard and Dyer (1983) refer that the founder can have total and complete control over the succession process or can consult and/or involve family members and professional advisors.

Motwani, Levenburg, Schwarz and Blanson (2006) found that the successor's decision-making ability, commitment to the business and interpersonal skills are the most valued attributes for a successor. Sharma and Rao (2000) replicating the study performed by Chrisman et al. (1998), concluded that founders from Canada and India both rate integrity and commitment as the two most important attributes in a successor but differ on other values such as blood and family relations which are higher in Indian than in Canadian owners.

Santiago (2000) studied eight family firms in the Philippines and concluded that a value alignment between the founder and successor is considered more important for a smooth transition than planning the succession. The values which founders want to transfer are business orientation, hard work, family, autonomy, entrepreneurship and growth (García-Álvarez & López-Sintas, 2001).

Cater and Justis (2009) mention strategic thinking as a key element for the successor. Other than strategic planning, the successor should have capabilities in fields of accounting, human resource management, operational management (DeNoble, Ehrlich & Singh, 2007), communication skills and the power to motivate, influence and inspire people (Waldman et al., 2006).

2.7.7. Daughter's role

The father-daughter relationship, unlike the father-son relationship, is characterised by a more complementary and less controversial status (Davis, 1983). In spite of this, founders tend to view sons as natural heirs (Haberman & Danes, 2007). Dumas (1992) suggests that fathers do not acknowledge their daughters' business potential. However, the daughter can be the most effective successor and a competent leader especially managing family tensions resulting from successions (Salganicoff, 1990).

The study by Kuratko, Hornsby and Montagno (1993) confirms this gender based discrimination in family firms.

2.7.8. Successor's preparation and integration

Lansberg and Astrachan (1994) found that cohesive families are committed to the continuity of the family firm and so plan and train the successor. The successor training is a key element for the successful continuation of the family firm (Cabrera-Suárez et al., 2001). This training needs to be two-fold enabling the successor to acquire both tacit knowledge of the firm and developing business and leadership skills (Ward & Aronoff, 1994). The successor will have to attain both educational as well as experience generated knowledge, what Tsoukas (1996) labels as articulated knowledge.

Barach et al. (1988) indicate that the most successful successors tend to join the company immediately after concluding their education.

The fact that successors from an early age, are exposed to the business in their family context, makes it easier for them to absorb tacit knowledge at home and also during the succession process (Szulanski, 1996). Hearing shoptalk at home with the parents discussing the reality of the firm, is many times their first approach to the business (Handler, 1994). Family gatherings also work as an opportunity for exposure, with family members counselling or encouraging them to learn more about the firm (Dyer, 1986).

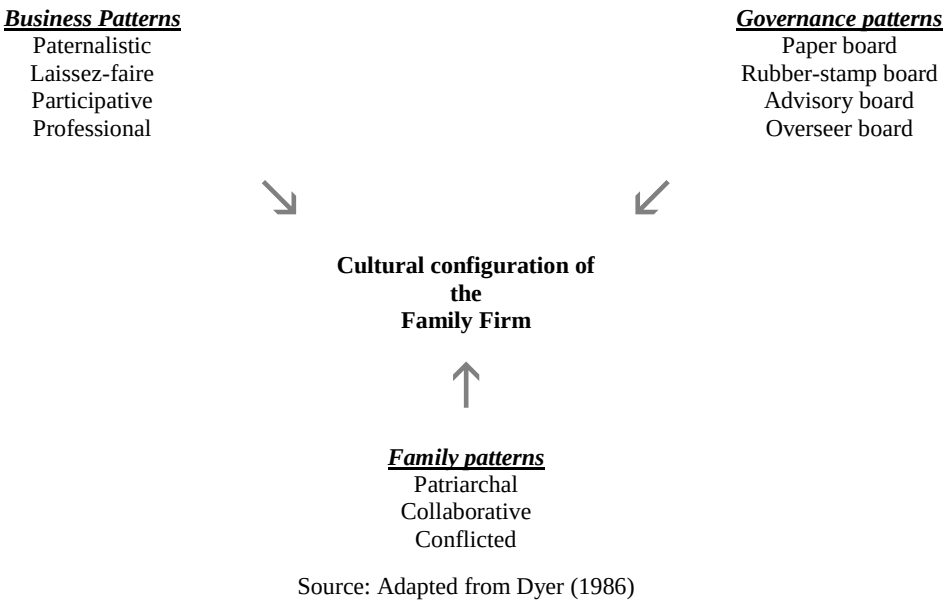
Morris et al. (1996) found that the majority of successors joined the firm after completing their education at a low level and then progressed. Early exposure is also important because it allows the establishment of a shared understanding between members and this process of early socialization favours the succession process (Grant, 1996). This explains why many join the firm at an early age taking part time or summer jobs which helps familiarize with the firm's culture and business particularities and also strengthens relationships within the family firm (Lansberg & Astrachan, 1994; Dyer & Handler, 1994). The successor becomes a student of the organization learning about its ways and peoples (Churchill & Hatten, 1987). The upbringing, observation, communication and childhood experiences provide the successor with experiential knowledge which is the main objective of the grooming phase (Royer, Simons, Boyd & Rafferty, 2008).

Alternatively, some gain outside experience working in other companies in similar (or different) markets. That exposure gives the successor a broader understanding of the business environment and also confers credibility when he enters the family firm (Barnes, 1988; Tatoglu et al., 2008).

2.7.9. Cultural configuration

Dyer (1986) underlines the importance of analyzing the culture configuration of family firms to study family firm succession. He proposed that the cultural patterns of the business, the family and the governance should be considered.

Figure 2.2. Cultural configuration of the family firm



Source: Adapted from Dyer (1986)

Business Cultural Patterns

He identifies four cultural patters found in the business sphere (paternalistic, laissez-faire, participative and professional) based on seven categories of cultural assumptions (Schein, 1985, 1991; Dyer, 1981) relating to how the organization views itself, society and the world.

Table 2.9. Business cultural patterns

Category of assumptions	*Paternalistic*	*Laissez faire*	*Participative*	*Professional*
Relationships	Lineal (hierarchical)	Lineal	Collateral (group-oriented)	Individualistic
Human nature	People are basically untrustworthy	People are "good" and trustworthy	People are good and trustworthy	People neither good nor evil – neutral stance
Nature of truth	Truth resides in the founder/ family	Truth resides in founder/ family, although "out-siders" given autonomy	Truth found in group decision making/ participation	Truth found in professional rules of conduct
The environment	Proactive stance	Harmonizing/ proactive stance	Harmonizing/ proactive stance	Reactive/ proactive stance
Universalism	Particularistic (nepotism)	Particularistic	Universalistic	Universalistic
Time	Present- or past-oriented	Present- or past-oriented	Present- or future-oriented	Present-oriented
Human activity	Doing orientation	Doing orientation	Being-in-becoming	Doing orientation

Source: Adapted from Dyer (1986)

Family Cultural Patterns

Dyer identifies three cultural patterns in families related to family firms, each being different with regards to handling authority, achieving goals, making decisions and managing conflict. These he grouped into three:

(i) Patriarchal/matriarchal family: the family leader is dominant and he/she sets the goals and rarely confides in his/her children or even, the spouse.

(ii) Collaborative: heads of collaborative families tend to take the opinions of children and spouses. Goals are set with the aim to maintain family solidarity and cooperation.

(iii) Conflicted: there is an atmosphere of conflict and mistrust and an absence of shared goals.

Cultural Patterns in Governing Boards

Dyer identifies four types:

(i) Paper board: have few board members (usually family members) listed on 'paper' just to comply with legal requirements because the founder and his close family are the ones who actually make the decisions.

(ii) Rubber stamp board: is a formal board which includes external members, who are generally friends of the founder, giving their support to the decisions of the founder and the family.

(iii) Advisory board: although the family controls the firm, the advisory board has some influence in decision making. The outside board is often seen as protecting the interests of nonfamily members/shareholders and providing valuable advice and know-how.

(iv) Overseer board: this board meets regularly and makes key strategy and policy decisions and can even run day-to-day affairs when necessary. The members are from outside which can create tension and conflict with the family.

Dyer concludes that first generation family firms tend to have a paternalistic business culture, a patriarchal family culture and a paper or rubber stamp board, and that this combination is the most detrimental for a successful succession which explains the high mortality rate of family firms.

The second generation family firms tend to have a participative business culture and a collaborative family culture allied to an advisory board, a combination which is very rarely found in the first generation.

2.8. Summary

The family is a part of the family firm, which in turn is part of a country. It is fundamental to recognize that the micro phenomena are embedded in macro contexts and these affect the family firms at various levels shaping the way they tackle the critical hurdle of executive succession (Chrisman, Sharma & Taggar, 2007).

The number of family firms which do not make it pass the first generation is alarmingly high and researchers have presented an array of reasons such as: founder's reluctance to let go (Handler, 1990); lack of planning (Janjuha-Jivraj & Woods, 2002; Dyer, 1981);

unstable relationship between founder and offspring (Venter, Boshoff & Maas, 2005; Kets de Vries, 1996); family rivalries (Lansberg & Astrachan, 1994; Kets de Vries, 1989, 1993; Friedman, 1991; Lansberg, 1988; Churchill & Hatten, 1987), amongst many others.

However, whatever the reason, it is essential, to be aware that the founder, the family and the macro environment, all play a role on family firm's continuity. Intergeneration continuity of the family firm is the central theme of the thesis.

This research project analyzes executive power transfers from the founder to the next generation. More specifically, it focuses on the selection of the successor, in management successions of family firms from the first to the second generation.

This chapter provided an overview of the relevant factors and issues at play in the succession process. The thesis adopts a multi-level view of the family firm to investigate how the family (Chapter 4), the founder (Chapter 5) and the national culture (Chapter 6) contribute to executive successor selection in family firm.

Chapter 4 studies the role that family plays on successor choice. The family dimension is incorporated in the game theory analysis and the spotlight is on the siblings' competition (which can lead to conflict and rivalry) to secure the CEO position in the family firm.

The impact of the founder on successor selection is the focus of Chapter 5. Family firm literature attributes a significant reasonability of family firm's high mortality rates to the founder's reluctance to move forward with the succession process. Chapter 5 places the founder's approach to succession at centre stage and uses game theory to study its impact on successor choice. Both the family and the business dimension are incorporated in the analysis, taking into consideration both economic and emotional factors.

Chapter 6 draws attention to the importance of the macro context on how the family firm addresses the hurdle of intergenerational executive succession. The impact national cultural setting plays on successor outcome is studied in the Indian context, concentrating on father/child cultural congruence.

Chapter 3

METHODOLOGY

3. METHODOLOGY

3.1. Introduction

Game theory is the methodology which is used in the thesis which is complemented by experimental economics. The use of game theory to study family firms succession is still in its very early stages and experimental economics has yet to be employed in this area. This chapter presents the main traits and uses of both these methodologies.

Game theory is the study of strategic decision making. Antoine Cournot's study of duopoly, in 1838, is considered one of the earliest example of formal game theoretic analysis. In 1921, the mathematician Emile Borel suggested a formal theory of games which was advanced by John von Neuman, in 1929, with his theory of parlour games. Only in 1944, with the publication of Theory of Games and Economic Behavior, by Morgenstern and von Neuman, game theory was established as a field in its own right. Their work demonstrated diverse possibilities of application of game theory in economics and the basic terminology and problem setup presented in that book, which is accredited to giving birth to game theory, is used to this day.

In 1950, John Nash introduced the distinction between cooperative and non-cooperative games. He developed an equilibrium concept for noncooperative games, known as the Nash equilibrium. Since then, game theory has been applied to various areas in economics and has expanded to subjects such as, and not limited to: political science, evolutionary biology, sociology, psychology, conflict management, design of auctions for resource allocation, problems of war and negotiation.

Nash, jointly with John Harsanyi and Reinhard Selten, was awarded the Nobel prize for economics in 1994, for "*their pioneering analysis of equilibria in the theory of noncooperative games"* (Nobel Media, 1994).

In 2002, the Swedish Nobel committee awarded the Nobel Memorial Prize in Economic Sciences to Vernon L. Smith and Daniel Kahneman. Kahneman was distinguished for having "*integrated insights from psychology research into economic science, especially concerning human judgment and decision making under uncertainty*" (Nobel Media, 2002). Smith was recognized for "*having established laboratory experiments as a tool*

in empirical economic analysis" (Nobel Media, 2002). This awarding was the official recognition of experimental economics as a methodological innovation.

Economics has traditionally been viewed as being unable to perform experiments, like chemists, but rather as relying on field data and "*like astronomers or meteorologists, [it] generally must be content largely to observe*" (Samuelson & Nordhaus, 1985, p. 8).

However, the last decades have witnessed an increased interest in testing economic assumptions and theories. The growing attention and importance of experimental economics is evident in the: volume of publications in renown journals; the appearance of specific journals devoted to experimental economics; publications of specific textbooks and integration into the syllabuses of major universities.

This chapter answers the call made by Roth (1991) to bring to the fore the empirical questions associated to strategic environments for game theory to continue to thrive.

The chapter begins with an introduction to the different types of games and how they can be used to model and predict solutions. This is then followed by the literature review pertaining to the use of game theory to family firm succession. Subsequently, the fundamental traits of experimental economics methodology is discussed. The chapter finalizes with the characterization of the games used in this thesis to address family firm executive succession and identification of the game used in the experiment.

3.2. Game theory

A game is formal description of a strategic situation. A game is defined by its players, their information set, the possible actions available to them, and their preferences and payoffs. The players are the agents (i.e. individuals, groups, firms) who make the decisions. A game is of complete information when players are aware of all the information pertaining to the game: the players; the timings of the decisions; their possible actions and resulting payoffs. In games of incomplete information part of that information is unavailable to the players.

Their payoff, also referred to as utility, is a numerical value which shows the desirability of an outcome for that player. The payoff of each player is influenced by his actions but also by the actions of the other players. The strategic interdependence of the players is the corner stone of any game.

Games can be cooperative or non-cooperative. Cooperative game theory focuses on the outcome individuals receive when acting as a group and analyzes the conditions which lead individuals to deviate from the agreed behavior. Whereas non-cooperative game theory analyzes strategic decision making by rational individuals acting on, and for, their own accord. These non-cooperative games can be sequential or simultaneous.

3.2.1. Types of games

3.2.1.1. Simultaneous games

In simultaneous games, players act at the same time, making their decisions in ignorance of the other players' decisions. These games are represented in normal form, listing each player's actions and the payoffs resulting from all the possible combinations.

The classic Prisoner's Dilemma game is a simultaneous game. In that game two suspects (Prisoner 1 and Prisoner 2) are arrested yet the police lacks any evidence to convict them, so they need at least one of them to confess. The suspects are held in separate cells and informed that if both stay silent they will be convicted for a minor offense and serve 1 year, if both defect then they will imprisoned for 3 years and if one defects he will walk free whilst the other will imprisoned for 5 years. This game can be presented in a 2 x 2 matrix as shown in Table 3.1. The pair of payoffs in each cell of Table 3.1 represents the payoffs of the Prisoner 1 and Prisoner 2 respectively.

Table 3.1. Prisoners' Dilemma

		Prisioner 2	
		Stay Silent	Defect
Prisioner 1	Stay Silent	1,1	5,0
	Defect	0,5	3,3

Source: Own elaboration

Dominance and equilibrium analysis are the two solution techniques used for non-cooperative games. Simple dominance identifies what the player will not do, and by applying this technique to all the players, and going back and forth in the players of the game, (i.e. using iterated dominance) all dominated strategies are eliminated which may lead to the solution of the game. Lets exemplify by applying this technique to the Prisoners' game presented above.

For Prisoner 1 Staying Silent is strictly dominated by playing Defect, in other words, he is always better off choosing to Defect, no matter what Prisoner 2 does. For this game, this also applies to Prisoner B so both prisoners will defect and be sentenced to 3 years. Notice that both would have been better off Staying Silent if they had both cooperated and acted as a unit, aiming to maximize their aggregate welfare (i.e. their joint interest which in this case would be to minimize their jail time). That outcome is referred to as the socially optimal outcome.

The dominance technique works under the assumption that all players are rational and that their rationality is common knowledge (all players know that each one knows that all are rational). Additionally, there can be games where successive elimination of strictly dominated strategies is not enough to predict the outcome. Then the Nash equilibrium is used as a solution technique.

The Nash equilibrium refers to the set of strategies of best response for each player where there is no incentive for any player to deviate from that strategy (self-enforcing). The Nash equilibrium always survives iterated elimination of strictly dominance strategies but the inverse it not true, so the Nash equilibrium is a stronger solution. Nash proved that any non-cooperative finite game always has at least one mixed strategy[1] Nash equilibrium. However, in some games there can be multiple Nash equilibrium[2] and the solution of the game can be found by identifying the most compelling solution or by introducing refinements to the Nash equilibriums.

[1] A pure strategy gives a complete definition of each player's Nash strategy, whereas a mixed strategy assigns a probability to each pure strategy.

[2] The Battle of the Sexes is a classic example of a game which has multiple Nash equilibrium. In this game a couple is deciding what do in the evening choosing between going to the opera or going to a football. The wife would rather go to the opera whereas the husband would rather go to the football match, but both would rather go together. This game has two pure Nash equilibrium and one mixed strategy Nash equilibrium solutions.

To exemplify how the Nash equilibrium is reached consider the following simultaneous game played by a son and his father. In this game the son needs to decide whether he wants to pursue a MBA or not, and the father has to choose between appointing his son to succeed him in running the family firm, or not. Table 3.2 represents the normal form for this game.

Table 3.2. Game representation in normal form

		Father	
		Appoint	Not Appoint
Son	MBA	3,5	1,-2
	no MBA	5,2	0,0

Source: Own elaboration

The pair of payoffs in each cell of Table 3.2 represents the payoffs of the son (S) and the father (F), respectively. The game is of complete information so all players are fully aware of the strategies and corresponding payoffs available to all. To find the Nash equilibrium it is necessary to identify each player's best response given the other player's best option.

If S pursues his MBA then F compares his payoffs from appointing S successor in this case, his payoff is 5 and not appointing S successor which is -2, and will opt to appoint him successor, as players are rational and so driven to maximize their payoffs. If S doesn't pursue an MBA degree then F best response is, also, to appoint him successor. Appointing S successor is a dominant strategy for F, as he is always better off doing that no matter what S does.

If F decides to appoint S successor then S best response is not to pursue his MBA (as 5>3). And finally, if F doesn't appoint him successor then S best response is to purse his MBA.

In the Nash equilibrium both players play their best response, which can also be a dominant stratergy and no player is better off by unilaterally altering his decision. In this case the Nash equilibrium, identified in Table 3.2 by the grey shaded cell, is for the son not to pursue his MBA and for the father to appoint him his successor. In this game, the socially optimal outcome would have been for the son to pursue his MBA and for

the father to appoint him successor, as this would mean that their aggregate payoff would be 8 compared to 7 in the Nash equilibrium.

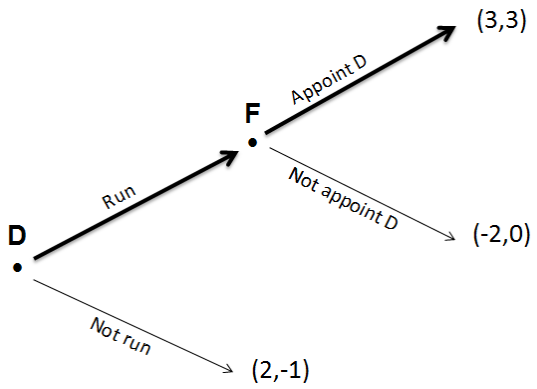
3.2.1.2. Sequential games

In sequential games, unlike simultaneous games, the players are called to play in a particular sequence. In a sequential game of perfect information the players move in sequence and are fully aware of the strategies available to each one, and observe all the moves before making theirs. Each player knows exactly who has made what move before making a decision. These games are expressed in extensive form and are defined by:

(i) The players of the game;
(ii) When each player has to make a decision;
(iii) What each player can decide at each point;
(iv) The payoff for the players resulting from each of the possible combination of chosen moves.

The extensive form is represented by a game tree which summaries all this information. Consider a sequential game with perfect and complete information, where the daughter (D) informs her father (F) also founder of the family firm, that she is interested and available to succeed him. F then decides whether or not he chooses her to head the family firm. Figure 3.1 represents the game tree for this simple example.

Figure 3.1. Game tree representation



Source: Own elaboration

This game has two players (D and F), and is two staged, with D deciding first and then followed by F. At each node the identified player is called to make a decision (an edge joins two adjacent nodes). In the example, the first node, also referred to as the root, represents D, who chooses between running or not to succeed her father as CEO of the family firm. At the second and terminal node, F knows the decision already made by D, and fully aware of her preferences, decides whether or not to appoint her as his successor.

The strategy of each player is the complete plan of action for that player for each contingency, specifying what the player will do at each node he is called to play. In this case, D has two possible strategies: Run or Not Run and the F also has two possible strategies: Appoint D or Not Appoint D. In this game, there are three possible outcomes, resulting from three possible paths. A path is the sum of decisions which leads from the root to the terminal node (graphically the path leads from the root to the terminal node). Each player's payoffs from the different paths is shown at the far right end of the tree. The first number corresponds to the payoff of D and the second to the payoff of F.

The Nash equilibrium for this game can be found by resorting to the normal form which is represented in Table 3.3.

Table 3.3. Nash Equilibrium

		Father	
		Appoint	Not Appoint
Daughter	Run	3,3	-2,0
	Not Run	2,-1	2,-1

Source: Own elaboration

In the game represented in Table 3.3 there are two Nash equilibrium:

(i) D - Not Run; F - Not Appoint;

(ii) D- Run; F - Appoint.

However, Not Run is not a reasonable equilibrium for D given that the players have complete and perfect information, D would never choose this option as she knows that if she decides to run then her father will prefer to appoint her as successor (as his payoff is higher than if he doesn't) and she too will be better off than if she were to choose Not

Run. As a result, Not Run is not a plausible prediction in terms of the game outcome although it is a Nash equilibrium. Also notice that Daughter-Run and Father-Appoint is the outcome which maximizes the aggregate payoff of both D and F, consequently it is a socially optimal equilibrium solution.

To filter only the reasonable equilibrium the subgame perfect Nash equilibrium (SPNE) is used. Whilst Nash equilibrium requires that each player act rationally, at the beginning of the game, given all other players' strategies, SPNE requires sequential rationality - that players behavior optimally at every node of the game (and not just on the equilibrium path) when they are called to play, given the other players' strategies.

To reach the SPNE, for sequential games with perfect information, backward induction should be used, i.e. the game should be read from right to left. This technique warrants each player to look ahead and think backwards, before making his decision. The underlining logic is that each player should figure out how each of the others will react to his move, and how he will respond to that, and so on, as a result he should anticipate the different players' reactions to his move and consider this when making his decision. Applying the technique means starting at the terminal node, and choosing the best option, and then proceeding to the next-to-last node, identifying the optimal action for the player, assuming he anticipates what will follow and continuing this procedure, moving backwards, until arriving at the root (Kreps, 1990).

In the example, at the terminal node F opts between appointing his D as his successor or not. This can be seen as a subgame of the game tree. A subgame is a subset of the extensive game which starts at a node and exclusively includes all nodes following it. The sequential game is a sequence of subgames. In this subgame there is only an individual's decision so all he needs to do is compare his payoffs in both situations. If he chooses D his payoff will be 3 else his payoff will be 0. Given he is rational and wants to maximize his wellbeing, he will appoint D as his successor. This is his best response as it is better for him in comparison to all his other options and is marked with a bolder line in the game tree in Figure 3.1.

D anticipating F will choose this option will then compare her payoffs between running or not running for the top position. Again, this can be seen as a subgame of the game

tree. She then compares the payoffs for running, which is 3, as she anticipates that in that case her father will appoint her as successor and she will get a payoff of 2 if she decides not to run. The best response for D is to run, marked with a bolder line in the tree in Figure 3.1.

As a result, the SPNE for D is to run and for F is to appoint D. The equilibrium path is shown in the game tree, in Figure 3.1, and refers to the conjunction of the best responses of both players, marked with the bolder line, which links the root to the terminal node.

3.2.2. Game theory in family firm succession

The selection of the successor of the family firm is essentially a strategic decision, involving the founder and the potential successors. The mathematic foundations of game theory provide a rigorous and objective analysis on one of the most demanding challenges that the family firm faces. Thus the use of game theory to study family firm succession is a natural option. Although not novel, the application of game theory to family firm succession is still in its early stages.

The application of game theory to research family firm succession has essentially focused on factors related to the business dimension. The various modelled games have not explicitly considered the non-economic factors, relating to the family dimension of the firm, in the payoffs of the players.

Michael-Tsabari and Weiss (2013) applied the Battle of the Sexes game to study succession in family firms. They proposed that each of the players (father and son) has an objective relating to the firm (passing of the firm and running for the position, respectively) but also each player values avoiding tension and conflict in the family. The outcomes of the players were ordered in terms of their preferences of moving forward with the succession and of avoiding tension and conflict. The authors emphasized the role of communication to ensure both players attained what they wanted without jeopardizing family harmony. They showed that deficient communication leads to disagreements and clashes between father and son. Although, they addressed the

issue of family harmony their game theoretic analysis did not involve defining the payoff functions of each player.

Earlier, Lee, Lim and Lim (2003) studied the importance of the potential successor's ability (offspring vs outsider) as well as the degree of idiosyncrasy of the business, on the choice of successor. They showed that in high idiosyncratic businesses, families tend to prefer a successor from inside the family. In their study, the payoff function compromised the value paid to the potential successor and his/her ability.

Burkart et al. (2003) model focused on the choice between leaving the public firm to the family or to a professional manager, and how that decision is shaped by the legal environment. Bjuggren and Sund (2001) also evidenced the role of the legal setting. They used game analysis to study alternative ownership succession options and the role legal and transactional costs played.

Blumentritt, Mathews and Marchisio (2013) provided an introduction to the application of game theory to family firm succession. They conceived a game where the children simultaneous chose whether to run or not for the CEO position, and then the father would choose his successor. The payoff functions of the children included the benefit they derived from becoming the CEO (referred to as desire), net of the cost of running for the position. The payoff of the father resulted from the weighed sum of the successor's desire and ability.

Their results showed that in the particular situation when both the children decided to run, then the father would compare each child's attributes. Founders who prefer having a successor who really wants the job to one who is more capable of maximizing the firm's potential but is not as interested, will choose the child endowed with greater desire in detriment to the most able. The authors refer that the value the founder places on a child's desire can be viewed as the importance the founder attributes to the firm's continuity. They also refer that family tension can result from sibling rivalry. Although they draw attention to these non-economic costs these are not explicitly considered in the payoff functions of the players.

More recently, Mathews and Blumentritt (2015) presented a sequential game where the children chose the level of effort to pursue the family firm CEO position, given the

father's preference for one of them. They identified the possibility of first-mover advantage for the child who decides first, and acknowledged situations where discord among siblings could occur, but did not explicitly consider sibling rivalry in their payoff functions as a cost.

In summary, the application of game theory to study family firm succession has adopted payoff functions which have included various economic aspects, related to the legal context, and to the successor's ability. All the researchers have made some reference to the importance the founder attributes to continuity and to preserving family harmony. However, none have as yet, to the best of my knowledge, formally integrated non-economic factors in the payoff functions of the players as this thesis aims to do.

3.3. Experimental economics

The recognition of experimental economics is relatively recent yet experimenting in economics dates back over half a century. Although it is difficult to pin point the very first experimental study, the interest in laboratory methods in economics historically stemmed from three main sources: market cooperation and competition, game theory and individual decision theory.

The experiment performed by Selten, a 1994 Nobel laureate, in 1959 focused on market cooperation, studying the price formation in oligopolies.

Whereas Nash, also 1994 Nobel Prize winner, used experimental economics to test the theoretic predictions proposed by game theory as early as 1954. Sociologists and social psychologists were unconvinced with the theoretic prediction of the Prisoner's Dilemma game which under the assumption of rational individuals, showed that the Nash equilibrium was not the best outcome for both players.

The close link between that game and the oligopoly coordination problems meant it also drew attention from economists. Additionally, in games with more than one equilibrium when it is assumed that the players will coordinate for the best solution for all (the Pareto-dominant equilibrium) experiments enabled a comparison between the outcomes chosen in the lab and the socially optimal results.

Finally, psychologists' skepticism regarding the basic assumptions of the homo economics, rational individual motivated by self interest, of von Neumann and Morgenstern's expected utility theory gave rise to the third stream of experiments referred to as individual decision theory experiments.

Davis and Holt (1993) refer that the main finding of experimentation in these various areas have shown that:

(i) Market predictions do not work under all contexts;
(ii) In many situations neoclassical price theory explains observed behavior well;
(iii) Some predictions of game theory describe behavior well whereas others have a more restricted range of application;
(iv) Some variables considered irrelevant to theory do affect outcomes;
(v) Understanding of individual behavior is (at best) incomplete as experimental results challenge the rational models.

3.3.1. Types of experiments

In an experiment, the environment consists of individual economic agents together with an institution through which the individuals interact. The environment refers to the structural characteristics (how traditionally economic problems were exclusively analyzed) and the relevant components are: the number of players, their payoffs and their information sets. The institution identifies the actions available to the agents and the resulting outcomes of the various combinations of the agents' actions. The agents are defined by their relevant attributes: preferences, technology, resource endowment and information access.

Experiments can be grouped according to their objectives and results. Smith (1982) refers to experiments which unravel empirical regularities which theory has little or nothing to say as heuristic experiments. In contrast, his nomothetic (or behavioural) experiments are useful in mapping the range of applicability of the theory and testing its robustness.

Davis and Holt (1993) classify experiments, according to their institutional complexity, into 5 groups:

(i) Theory Tests;
(ii) Components Test;
(iii) Stress Test;
(iv) Field Tests;
(v) Search for empirical regularities.

Theory Tests are essentially experiments which put the theory to the test. If it fails, then a Component Test can be performed to study which components of the theory fail. If on the other hand, the theory works in the simpler environment of the experiment then its robustness can be tested through Stress Tests. The results of a stress test can either cast doubt on the theory's usefulness or, when successful, lead to tests which deviate even more for the theoretic assumptions, Field Tests can be done in extreme cases. Last but not least, experiments can be conducted to find patterns of behavior which might not be related to any specific theory. These experiments which Search for Empirical Regularities contribute to theory development.

Kagel and Roth (1995) classify experiments in accordance to their objectives. Testing the predictions of the formal theories, as well as, observing unpredicted regularities they refer to as 'Speaking to Theorists'. These experiments are intended to provide feedback to theoretical literature fostering dialogue between theorists and experimenters. 'Searching for Facts' are the experiments which study the effects of the variables that the existent theoretic framework has little to say. These can be motivated by earlier experiments and designed to isolate the cause of some observed regularity. Experiments which foment dialogue between experiments and policymakers are referred to as 'Whispering in the ears of prices'.

In summary, laboratory experiments enhance the attention to behavioral parameters, and purpose to test the theory's robustness. Experimentation usually finds that not always behavior matches theory, which in itself is not a surprise given than economic theory (as all theory) is an approximation of reality. Experimental confirmation that theory doesn't completely predict reality is helpful if it contributes in improving the underlining theoretic framework (Friedman & Sunder, 1994).

3.3.2. Advantages and limitations

The ability to reproduce the experiment and independently verify the outcomes is an important advantage of laboratory experiments. The lack of replicability[3] is a common drawback of all non experimental sciences. Laboratory procedures implement control enabling the test environment to be duplicated by other researchers (Davis & Holt, 1993). Independent verification contributes to the credibility of the results and permits testing in what measure the outcomes result from the particular parameters in analysis. Kagel and Roth (1995) defend that the relative ease with which experimental methods allows investigators to reexamine each other's conclusions is an important contribution to the vitality of the experimental enterprise.

An experiment takes place in a controlled environment. One of the greatest advantages of using experimentation is the ability it provides to control inputs (Samuelson, 2005). The manipulation of the conditions in the laboratory addresses complex issues in a manageable way, providing dependant variables which are easy to interpret and directly address the theories being tested. "*Control is the essence of experimental methodology*" (Smith, 1976, p.275).

The induced-value theory proposed by Smith (1976) identifies the conditions which are sufficient for experimental control. Those conditions induce pre-specified characteristics in the subjects so that their innate attributes become largely irrelevant. The four conditions are:

(i) Monotonictiy,
(ii) Salience,
(iii) Dominance;
(iv) Privacy.

He shows that these conditions can be secured by using monetary incentives as rewards for the agents. To ensure monotonicity the subjects should prefer more reward to less and never be satisfied. Salience is assured by rewards being indexed to the subject's actions, according to institutional rules, which the subject understands. Dominance is

[3] Replication allows to test for the robustness of the experimental results to changes in the experiment's setup, whereas repetition is doing the exact same to check the reliability of what was presented by the experimenter.

when changes in the subject's utility from the experiment come from the reward so that other influences are negligible. Privacy is the reason for paying the subjects privately at the end of the experiments.

Using monetary rewards allows the fulfillment of the conditions presented by Smith but also means that in the experiment the agents will be driven to maximize their profit as they tend to do in the real world. Additionally, monetary rewards lead to agents exerting more effort and maintaining their concentration which results in more statistically reliable data (Smith & Walker, 1993). Paying the subjects is the feature which sets experiments practices in economics apart from those used in psychology and has fueled much debate (Hertwig & Ortmann, 2001).

The relative simplicity of laboratory experiments compared to reality is pointed as reservation of experimentation. The question on parallelism between experiment and reality, known as the artificiality critique, applies to all induction as even theory is a simplification of reality.

Sugden (2005) recognizes the triangular relationship between experiment, theory and the real world, and refers that experimenters defend that experiments resemble theory so the artificiality is rooted in the theory (and doesn't originate in the experiment). The laboratory provides the conditions to test the theory and if the theory fails to work in the simple experiment then there is little reason to believe it works in the complex real world. A lab experiment should be judged not by its fidelity to reality but rather by its contribution to an improved understanding of the underlining phenomenon.

Smith (1982, p.936) defends that parallelism holds when "*propositions about behavior of individuals and performance of institutions that have been tested in laboratory apply also to nonlaboratory where similar ceteris paribus conditions hold*".

Another objection to experimentation is that theory doesn't need to be tested as it describes how people should behave and doesn't predict how they do actually behave. Additionally, as theory is internally consistent then it is correct and has no mistakes making experimentation unnecessary. Economic theory is normative and indeed should be internally valid yet it should have some explanatory power too. Laboratory

experiments add a critical dimension by bridging theory and data, aiming to evaluate the behavioral (and not structural) assumptions of economic theories.

Finally, the common use of students as subjects[4] in laboratory research is pointed as another reservation. Students are traditionally used because they are a convenient and readily available subject pool. However, critics have voiced concerns that the use of students can jeopardize the external validity of the experiment, given that they are a very specific population segment. Students tend to have higher levels of literacy in terms of language, mathematics and even statistics than the general population. Nonetheless, students need to get used to the lab and make decisions in one/two hours whereas in real life situations people tend to have a long time to acclimatize themselves with the situations and longer to make decisions.

Another criticism regarding this subject pool refers to the student's lack of professional experience, which might affect the results. Various researchers have shown that the results obtained from pool of students were similar to those of professionals (DeJong, Forsythe & Uecker, 1988).

Also Guillén and Veszteg (2006) showed that experience and education make no significant difference in terms of results. Professionals are used to working in certain moulds and can find it difficult to adjust to the design requirements of a different frame of reference which results in suboptimal behaviour (Burns, 1985). As people participating in the experiment are usually paid slightly above their opportunity cost (approximately their hourly wage), the use of students enables a better cost management of the experiment.

In summary, the advantages of cost and convenience in using students are so large it is not justifiable to abandon them as a main subject pool (Friedman & Sunder, 1994).

3.3.3. Experimental design

Davis and Holt (1993) defend that it is essential to be meticulous when designing, documenting and implementing the experiment to ensure replicability and control.

[4] People participating in an experiment are referred to as subjects.

Guala (2005) provides a guide to the methodology of experimental economics. To ensure the success of the experiment it is important to understand all the different phases and what needs to be addressed in each.

3.3.3.1. Preliminary phase

This phase is prior to the experiment and encompasses the aim and scope of the experiment. The question which triggered the experiment and the specific issues to be investigated should be clear. The level of institutional complexity should be chosen accordingly.

In this stage it is essential to address the following key issues:

(i) Aim of the experiment

Clearly define what motivates the experiment and what is to be tested. That, in turn, will define the type of experiment which will be undertaken and its institutional complexity. For those who are beginning to employ experimental economics in their research it is best to start with a simple experiment and then embark on more institutionally complex one.

(ii) Physical environment

The experiments are usually run in an economic laboratory equipped with separate computer booths for each subject. The use of computers supports standardization which enhances replicability. A simple environment promotes saliency and reduces ambiguity in terms of result interpretation. A description of the environment should be kept to allow replication.

(iii) Software

In order to perform the experiment with the computers a software program must be designed. There are some programs which have been used by experimental labs but even existing software will need some adjustment to conform to the needs of a specific experiment. The choice of lab and of software, if possible, can be done together,

facilitating the implementation of the experiment. The cost incurred with the programming should be considered in the budget. To ensure replicability copies of the software used, as well as any other materials should be kept.

(iv) Subject pool

When recruiting subjects, who are usually students (as previously explained), it is important to avoid selection bias else their behavior might not be representative. The number of students which is necessary for the experiment should be defined according to the objectives and the available budget. Usually more than the necessary number is recruited so there are replacements available in case someone does not turn up. The subjects should fill in a (brief) questionnaire with basic information such as: gender; age; and their faculty/course. When students have experience in participating in laboratory tests then it is important to control for this, as learning affects behavior. This can be controlled, for instance, by using only experienced subjects (control as a constant) or by using two different groups, one with and another without experience (control as a treatment). Additionally, the interactions of players during intervals between sessions might also affect their behavior and so non-institutional interaction should be controlled.

Ensuring that a good sample is produced is essential to draw reliable conclusions from the subsequent data analysis and to avoid (or at least minimize) sampling errors. The two main ways of ensuring a good sample is either through random sample or balanced samples (in this latter observations are drawn from the different segments of the population proportionally to the relative weight of each population segment).

(v) Incentives

All subjects should be paid a fixed amount (which works as an incentive to show up and also avoids problems which might arise related to bankruptcy and negative payoffs) plus a variable amount which is indexed to the payoffs they receive resulting from their actions. The payoffs can be computed in experimental tokens and then converted in real money according to the predefined exchange rate. The value the students get paid should exceed (even if slightly) their opportunity cost. The exact value to be paid will depend on various factors such as: the available budget, expected payoffs, subject's

opportunity costs and compliancy to university regulations. To avoid wealth effects (which might result from wealth being accumulated during the experience) subjects are usually paid only for a set number of predetermined games of a given session.

(vi) Instructions

Instructions should be clear and opt for neutral terms when addressing the subject's roles and possible actions (i.e. use Player A rather than Prisoner A; Choice A rather than Defect/Confess). The instructions should be provided to each subject and also read out loud to reinforce everyone's awareness.

The instructions should avoid any morally charged terms (i.e. terms like egoism) or other terms which suggest certain behaviour (i.e. terms like conspiracy) as this could induce the subjects to behave in a way they think the experimenter wants them to behave.

Technical terms as well as economic jargon shouldn't be used nor should the experimenter explain to the subjects how they should act to ensure their maximum profit. The objective of the experiment, when possible, should not be communicated to the subjects although enough economic context should be provided to ensure they understand the incentive structure. It is best to resort to standardized and often used instructions and adjust to the purpose of the experiment. Dry runs or quizzes can be used to verify subjects' understanding.

The procedure of role allocation of each subject should also be presented and care must be taken to avoid sessions which are too long as subjects can get bored and tired which will affect the outcomes.

(vii) Pilot test and adjustments

A pilot test is a pre test, on a smaller scale, of the experiment. The aim is to test all the fundamental aspects of the experiment such as environmental adequacy; software glitches and instruction clarity. This pre test is not paid and can be done with colleagues and fellow researchers as subjects. Their suggestions will help improve the experiment.

Running the pilot test will give an idea of the time it takes to run the experiment, which can then be adjusted if need be. The data provided in the pilot experiment will enable a clearer understanding of the level of payoffs which can be used to make the necessary adjustments to conform to the budget. The results obtained should also be used to analyze whether the behaviour adopted by the subjects emerged in the analysis (testing the appropriateness of the software).

3.3.3.2. Formal experiment & Data analysis

The way the subjects were recruited and selected should be recorded to meet the replicability standard.

The subjects should be registered and allocated a seat. The sessions do not have to be conducted by the experimenter, reducing the likelihood of demand induced effects[5].

The subjects should be given the instructions (which should also be kept in documentation of the experiment to allow replicability). If there are questions it is important that they are answered (if possible) publicly. The experimenter must keep in mind not to reveal any private information (the subjects should also be reminded to take care in that) nor guide subject's actions. If this is not possible then it is best to defer answering the query.

All the data regarding the experiment including the performance data, the experimental procedures, conditions and occurrences should be accurately recorded as it is essential for the analysis. Also to help reduce the risk of measurement errors, appropriate laboratory protocols should be employed.

The subjects should be paid individually and privately at the end of the experiment.

The data analysis stage starts after the experiment has been concluded and all the data collected. The first analysis of the experimental data should be descriptive relying on

[5] Some experimenters use a double blind setting where the sessions are conducted by assistants. On the one hand the assistant does not know (so can't say) the experiment's objective and on the other hand, the students do not relate to the assistant whereas the experimenter, who can also be their teacher, can induce them to behave in a manner they believe the experimenter wants.

graphs and summary statistics. This is then followed by a more quantitative approach resorting to inferential statistics in order to answer the research questions.

Table 3.4 summarizes the key elements of the experimental design.

Table 3.4. Experimental design

Preliminary	Aim of Experiment	Define the objective and appropriate institutional complexity of the experiment
	Physical Environment	The experiment is usually run in an economic laboratory equipped with separated and individual computer booths
	Software	A software program needs to be designed for the experiment
	Subject Pool	Number of students recruited according to objective, budget and capacity of the lab Subjects to fill in socio demografic questionnaire before starting the experiment
	Incentives	Payment of fixed value (incentive to turn up and avoids problems with negative payoffs) and a variable value (indexed to the payoffs) Payment of a predetermined set of games (avoids wealth effects) Expected value paid is dependant on: opportunity cost; available budget and university regulations Subjects paid individually and privately
	Instructions	Should be provided to all subjects Should be clear and opt for neutral terms to address subject roles and actions
	Pilot Test	Tests all the fundamental aspects of the experiment It is not paid Done with fellow researchers and collegues whose suggestions help improve the experiment
Formal Experiment	All the data regarding the experiment including the performance data, the experimental procedures and the results should be accurately recorded To help reduce the risk of measurement errors appropriate laboratory protocols should be employed Collected data should be analyzed	

Source: Own elaboration

3.4. Summary

Game theory can help understand and predict the outcomes of strategic decision making regarding successor selection in family firms.

This thesis extends the use of game theory in family firm succession explicitly considering, for the first time, the emotional factors in the payoff functions of the players. The games presented and analyzed in each chapter, 4, 5, and 6, contribute to a better understanding of the role of the family, the founder and the cultural setting has on successor selection, respectively.

In Chapter 4 a sequential game of perfect and complete information is used, to study the impact of the family, specifically of sibling competition, on the successor selection. The game starts with the elder child choosing to run (or not) for the successor position, then the younger child decides to run (or not) and finally the father chooses his successor. The impact of altering the sequence of the game is used to compute the first mover advantage in the successor race. The analysis of the outcomes which maximize the aggregate payoff (denominated family optimal outcome) closes the chapter.

In addition to the variables incorporated in the payoff functions in the game presented in Chapter 4, in Chapter 5, the emotional factors related to father/son conflict are included. The game used is also sequential three period game of perfect and complete information with the same three players. In that game the founder plays first and decides whether or not to move forward with the successor selection, by inviting one of his children to take over. Then the child who is invited can either accept or decline the invitation and the other child then chooses to run or not run for the CEO position in the family firm. To study the impact of the founder's approach on successor selection this game is compared to the one presented in Chapter 4. The family optimal outcome is computed and compared to the Nash equilibrium.

Chapter 6 studies the impact of the cultural backdrop and uses a modified version of the game presented in Chapter 4. The game starts by the children simultaneously deciding whether or not to run for the successor position, which is then followed by the father making his choice. In this chapter the payoffs are presented in terms of rankings for each player. The impact of cultural misalignment of the younger generation to the fundamental traits of the national culture, on successor selection in Indian family firms is studied.

Chapter 7 resorts to experimental economics to test the results obtained through game theory. The game which was the basis for the analysis of Chapter 6 is used. The experience studies if the theoretical conclusions hold true in the laboratory. The use of experimental economics is completely original in this field and answers the call made by some authors, such as Mathews and Blumentritt (2015), for family firm succession research to progress into this area.

Chapter 4

FAMILY: SIBLING COMPETITION

4. FAMILY: SIBLING COMPETITION

4.1. Introduction

The family is the underlining common denominator of the family firm. It is in the overlap and interaction of the family and the business that resides the family firm's singularity. That interconnection between the family and the business, each with its own issues and possible conflicts means that the family firm is especially exposed to conflict.

Conflict in the family firm has the potential to harm the firm's performance, stability and even its continuity and simultaneously threatens family cohesion and harmony. Moments of change in the family firm or difficulties in the family can lead to added stress and thus trigger or exasperate conflict in the family firm. In this context management succession of the family firm can be seen as a conflict catalyst.

The succession process in the family firm can contribute to escalate or revive old animosities between siblings with serious repercussions in both the family and business dimensions.

An epic example is the succession process at Reliance Industries. The founder, Dhirubhi Ambani passed away in 2002 without naming his successor or leaving a will. His elder son, Mukesh, was appointed chairman and younger son, Anil, vice-chairman. Soon after power struggles began, with one brother trying to push the other out of the firm, and rapidly the rivalry escalated. Their mother stepped in to solve the conflict between the two brothers by promoting the demerger of the conglomerate in 2005. Mukesh retained Reliance Industries, including oil and gas, petrochemicals, and textiles operations, while Anil took over Reliance Infocomm, Reliance Capital and Reliance Energy. However, the fighting continued in the courts and in the press, until 2010 when their mother, made both sons sign a noncompeting agreement to put an end to years of legal fights. Since 2013 there have been signs that two of the richest and most successful business men in India have began to put their differences behind them and rekindle their family ties.

Although the business arena has witnessed various instances of family firm succession beset with dispute between brothers[6] this is not always the case. However, given the negative impact that sibling conflict can have on the firm and the family it is imperative to improve the understanding of the role it plays in the context of family firm succession.

This chapter focuses on the impact of the family on the family firm, specifically expanding the limited literature on conflict in family firm to include the impact of sibling competition on the choice of the successor. The focus is on the sibling competition which arises from the competitive behavior of siblings driven by the desire to become the new head of the family firm.

This chapter was the basis for the article entitled "Effects of Sibling Competition on Family Firm Succession: A Game Theory Approach", having passed the second round of reviewing at the Journal of Family Business Strategy awaits final decision. This journal is indexed by Scopus and ISI and has an impact factor of 1.318 (Thomson Reuters Journal Citation).

This chapter extends the use of game theory to include the emotional cost resulting from sibling competition. This chapters answers two questions; one related to the impact of the emotional cost of conflict which can result from sibling competition on successor selection, and the other which evaluates the first mover advantage in successor race. The results show the impact of that cost on the choice of the successor, and also highlight its importance in terms of advantage for the child who moves first. Lastly, the results show that adopting a family stance, subordinating individual goals to the aggregate, increases the propensity of the family firm's intergenerational succession.

This chapter begins with a review of the relevant literature which is then followed by the presentation of the modeled game and discussion of the results. A summary of the key conclusions finalizes the chapter.

[6] For more cases refer to Grant, G. and Nicholson, N., (2008), *Family Wars: Classic Conflicts in Family Business and How to Deal with Them.* London: Kogan Page.

4.2. Conflict in the family firm

The family is a key part of the firm and the firm is also important to the family (Pieper & Klein, 2007).

The overlap of the family and the business spheres is a distinctive characteristic of the family firm and has been defined as the firm's familiness (Habbershon & Williams, 1999). While the permeability of the firm and the family (Basco & Rodríguez, 2009) can be a source of competitive advantage (distinctive familiness) it can also lead to problems and instability (constrictive familiness) for the business (Habbershon et al., 2003).

This distinctive characteristic is also the main cause for conflicts escalating and becoming more personal (Frank, Kessler, Nosé & Suchy, 2011). Kellermanns and Eddleston (2004) suggest this occurs due the psychodynamic effects that are singular to the family firm such as: sibling rivalry and role conflict.

Role conflict relates to the degree of incongruity of expectation associated to the dual roles family members need to manage in the family and in the firm (Croci, Doukas & Gonenc, 2011). The potential of role conflict is increased in family firm due to the intertwining of the family and the business dimensions which also contributes to relationship conflict in the family firm (Harvey & Evans, 1994; Memili, Chang, Kellermanns & Welsh, 2013).

Consider, for instance, a father who is nurturing and supportive of his children but in the firm, as the head, he is demanding and assertive with his team, which might include one of his children. This may lead the child to resent his father. In other words, role conflict can lead to relationship conflict, which involves negative emotions. This type of dysfunctional disagreements tends to generate animosity and rivalry resulting in disharmony (Eddleston & Kellermanns, 2007). Beckhard and Dyer (1983) defend that the failure to adequately resolve conflict in the family firm can pose a serious risk to the firm's continuity.

Not all conflict has negative effects, some can be positive for the firm. Kellermanns and Eddleston (2004) suggest that task and process conflict, which refer to what needs to be

done, by whom and how, may lead to improvements and enhance organizational performance. However, relationship conflict seems to be the most prevalent in family firms and because it imbues the family firm with negative emotions, it can reduce the potentially positive effects of process and task conflict.

Relationship conflict creates negative effect on family and business as it involves and fuels negative emotions and should be avoided (Sharma 2004; Sorenson 1999). Eddleston and Kellermans (2007) demonstrate that relationship conflict undermines altruism and stewardship, thereby deteriorating family firm performance and compromising family harmony and cohesion.

The way the firm deals with critical issues and faces challenges can exasperate conflict. Managerial succession is critical for the family firm's continuity. Deciding on who will succeed is one of the most important challenges that the founder of the family firm faces. The way the process is handled, how expectations are managed, and how the final choice made can sparkle hostility in the family, especially among siblings.

Sibling rivalry is natural and to some extent exists in all family contexts. Grote (2003) analyzes rivalry in the family firm from a psychological viewpoint resorting to Rene Girard's theory of triangular desire, and defends that sibling rivalry is common and is fueled by jealously. In infancy and childhood siblings fight for their mother's attention or their father's approval and this continues in adulthood and, to some extent, persists in the family firm context (Friedman, 1991).

In extreme cases sibling rivalry can lead to the stagnation of the family firm succession process (Miller et al., 2003) and to the total failure of the succession process resulting in the dissolution (Avloniti, Iatridou, Kaloupsis & Vozikis, 2014) and disintegration (Griffeth, Allen & Barrett, 2006) of the family firm.

The family firm has been identified as a fertile field for conflict (Harvey & Evans, 1994) due to the influence of the family in the firm (Sorenson, 1999). Sibling competition which occurs when siblings race against each other for the successor position in the family firm, can lead to affective conflict and produce harmful effects on both the business and the family (Friedman, 1991).

Conflict is seen as a factor which influences the emotional value of the family firm. The value of the family firm is the sum of the financial and the emotional value (Astrachan & Jaskiewicz, 2008). Where the emotional value results from the interaction of the family and the business in the family firm and the financial value is the traditional discounted cash flow valuation of the firm. The emotional value includes the emotional benefits net of the emotional costs.

The main non-economic benefits refer to continuity and legacy (Chrisman, Chua, Pearson & Barnett, 2012) whereas the key emotional cost is the cost of conflict (Zellweger & Astrachan, 2008). The emotional valuation is increased by affective commitment.

Founders value both the family and the business dimension of the family firm and tend to place different importance to each (Schulze et al., 2003). Family-first type of firms will tend to value the family dimension of the firm more than the business dimension (Castillo & Wakefield, 2007). In contrast, family firms which are business-first type of firms, will tend to subordinate the family objectives to the business goals.

The existing literature on family firm succession using game theory is quite disparate in terms of the role attributed to conflict between siblings. Most authors disregard the impact of conflict on successor selection focusing essentially on the process and context of successor selection (as is the case of Lee et al. (2003), Bjuggren and Sund (2001) and Burkart et al. (2003)).

The authors who refer to sibling conflict and its negative impact do not explicitly include that cost in the payoff functions of the players. This is the case of, Blumentritt et al. (2013) who mention, in their analysis of successor selection, that when both children run for the top position this leads to conflict between the siblings and harms family harmony. Although they refer the importance of this emotional cost, it is not explicitly included in the payoff functions of any of the players.

Michael-Tsabari and Weiss (2013) defend that the players have a double objective: one related to the business sphere - managerial succession - and the other related to the family sphere - avoiding tension and conflict. The role of conflict in their game is very important but they focus on father/son conflict and not conflict between siblings.

Although, they address the issue of conflict, their game theoretic analysis did not involve sibling conflict nor did they define the payoff functions of each player.

More recently, Mathews and Blumentritt (2015), in their sequential-move tournament game identified the possibility of first-mover advantage and acknowledged situations which could lead to conflict but, once again, did not consider this emotional cost in the payoff functions.

Most of the existing research on the use of game theory to study family firm succession recognizes conflict as being detrimental for both the family and the firm but none has, as yet, explicitly considered the emotional cost of conflict between siblings as a factor in the payoff functions of the players.

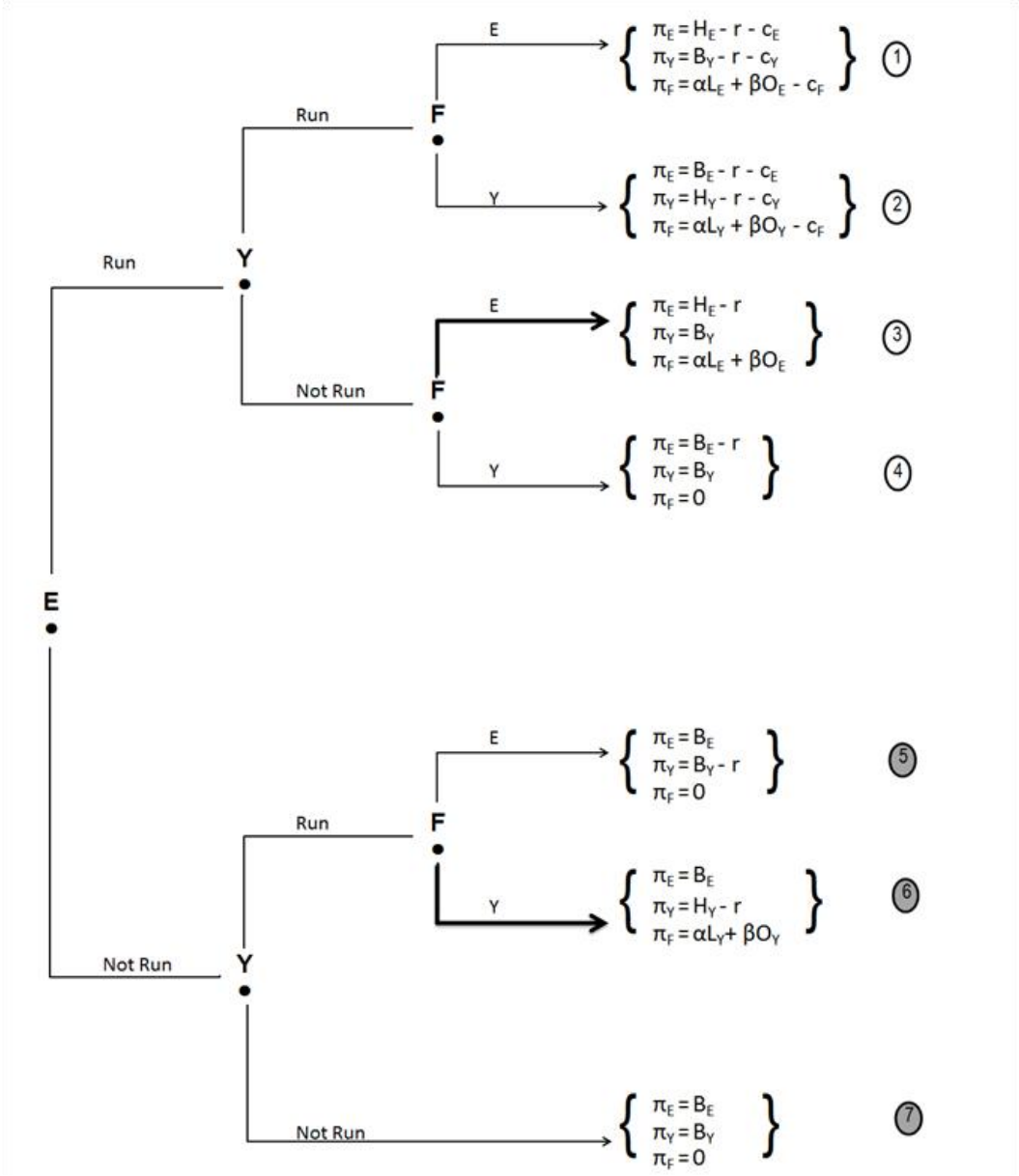
4.3. Model

This chapter considers a sequential game of complete and perfect information, which means that the players move in sequence and are fully aware of the strategies available to each one, and observe all the moves before making theirs.

This game is expressed in extensive form, as a tree, in Figure 4.1. The game has three players: the Father and Founder of the family firm (F), the Elder child (E) and the Younger child (Y).[7]

[7] The aim is to improve the understanding of intergenerational succession so all other options such as selling the firm and/or hiring professional management have been excluded.

Figure 4.1. Game tree representation



Source: Own elaboration

The first node represents the first move, which is played by E. He decides between running for the CEO position in the family firm and pursuing a career outside the family firm. Then Y decides whether or not he wants to run for the position too and lastly F chooses his successor. If E does not run for the position then the game moves to the lower part of the tree and at the following node Y must decide what he wants to do. And finally F will make his move. The payoffs of the players are numbered and presented at the end of the tree and include the variables considered in the game.

L_i (i= E and Y) denotes the child's leadership skills and refers to the child's ability to maximize the firm's performance (L_i>0). Under leadership skills are considered all the necessary managerial skills, competencies and know-how that will allow the child to maximize the firm's value. Each child is defined by his business related ability and by the way he views the firm's family serving purpose. The child's level of family orientation (O_i>0) indicates the extent the child perceives and values family involvement in the family business (Lumpkin, Martin & Vaughn, 2008). L_i relates to the business dimension whereas O_i refers to the family dimension. The extent to which a founder values the business sphere is given by α (α>0) whereas β refers to the value he attributes to the family sphere (β>0). A business-first type of founder will tend to have higher values of α whereas a family-first type will tend to have higher values of β. The founder's payoff resulting from the successor outcome is the weighed sum of both the family and the business related attributes of his successor.

The children value heading the firm, given by H_i (H_i >0) but sustain a cost of running for the position, given by r, (r ≥0).[8]We assume that the value they place for heading the firm surpasses the cost they incur for running for the position (H_i >r). The children also take into consideration their career options outside the family firm. B_i (B_i>0) refers to the payoff for the child's best career option outside the family firm (net of any costs he might incur in securing it).

Sibling competition refers to the situation when both the children run for the top position in the family firm. This can lead to affective conflict between the siblings. Given the negative impact that sibling conflict has, it is a relevant emotional cost which each child registers in their payoff functions. The sibling conflict has a negative spill over effect on the founder, who will also include this cost in his payoff function. The cost of conflict is represented by c_j (c_j ≥0, j= F, E, and Y).

The emotional factors relating to the value the children place in heading the family firm (H_i) and the cost of conflict (c_j) are influenced by the affective commitment to the firm and the family, respectively.

[8] Different costs of running for each child imply no significant differences on the conclusions but adds complexity in terms of results.

Table 4.1. Summary of all the variables of the game

Variables	Represents	i= {E,Y} j= {F,E,Y}	Conditions
L_i	Leadership Skills - Child's ability to head the family firm		$L_i>0$
O_i	Family Orientation - Extent child values family serving attribute of the firm		$O_i>0$
α	Degree Father values the business sphere of the family firm		$\alpha>0$
β	Degree Father values the family sphere of the family firm		$\beta>0$
H_i	Value the child places in becoming successor and heading the family firm		$H_i>0$
B_i	Value the child places in his best career option outside the family firm		$B_i>0$
c_j	Emotional cost resulting from sibling rivalry		$c_j \geq 0$
r	Cost of running for top position		$H_i > r \geq 0$

Source: Own elaboration

This game has seven possible outcomes each with different payoffs for each of the possible game paths numbered in the far right of the tree. For instance, when E runs for the position, and Y also runs for the position and F chooses E, this set of decisions are identified as path 1, and the resulting payoffs of the players are: $\pi_E = H_E - r - c_E$, $\pi_Y = B_Y - r - c_Y$ and $\pi_F = \alpha L_E + \beta O_E - c_F$.

4.4. Results

In a sequential game, the game tree allows the visualization of the course of the game and should be read from left to right. To reach the subgame perfect Nash equilibrium solution, for sequential games with perfect information, backward induction should be used, i.e. the game should be read from right to left. This technique warrants each player to look ahead and think backwards, before making his decision. The underlining logic is that each player should figure out how each of the others will react to his move, and how he will respond to that, and so on, as a result he should anticipate the different players' reactions to his move and consider this when making his decision (Kreps, 1990).

Using backward induction and focusing on the top part of the tree, when E has decided to run and Y also decides to run, then, starting at the terminal node where F is called to play, he chooses between his children who to appoint his successor. He compares his payoffs resulting from path 1 and path 2, and will opt for which ever maximizes his payoffs.[9] He will appoint E as successor if $\alpha L_E + \beta O_E - c_F > \alpha L_Y + \beta O_Y - c_F$ else he will opt for Y. In other words, a founder who values Leadership Skills more than Family

[9] If the founder is indifferent between both children then he will opt for the elder.

Orientation, expressed by $\alpha(L_E - L_Y) > \beta(O_Y - O_E)$, will choose E whereas a founder who values Family Orientation more than Leadership Skills will opt for Y. It is the founder's preference that determines how he chooses between his competing children. A business-first type of founder will value leadership skills relatively more than family orientation, on the contrary a family-first founder will value family orientation more, as L_i refers to the business sphere and O_i to the family sphere.

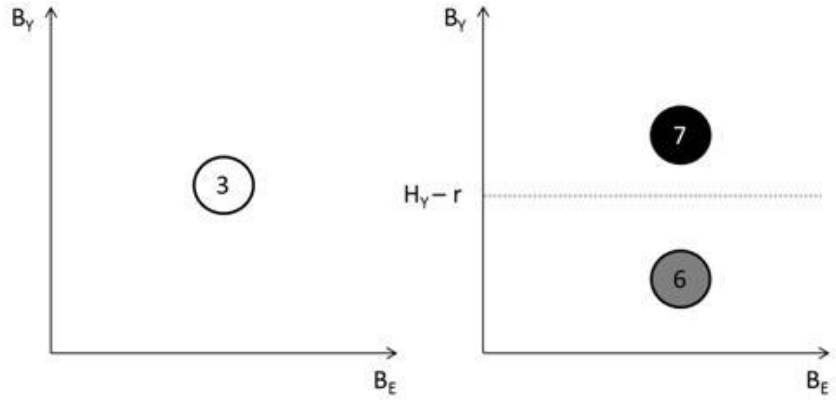
Now focusing on the node, where F is called to play, given that E has decided to run and Y has decided not to run for the position (refers to path 3 and 4). As the assumption is that F values passing on the firm's control to his children, his payoff is higher when he appoints E as successor (path 3). He will always prefer this option (marked with thicker line in the game tree) so path 4 will never be played.

When both siblings run for the position and F values Leadership Skills more than Family Orientation, i.e. $\alpha(L_E - L_Y) > \beta(O_Y - O_E)$, he will opt for E (path 1). The younger sibling anticipates this and prefers not to run, in that situation (path 3), as this maximizes his payoffs. When E does not run and Y runs for the CEO position in the family firm, then F will appoint Y as his payoff resulting from path 6 is higher than that resulting from path 5. Path 5, like path 4, will never be played as path 6 is always preferred (marked with a thicker line in the game tree).

Continuing to move backwards in the game, Y must decide what to do when E decides not to run. He will choose the path which enables him to maximize his payoffs. In the case of a founder who values Leadership Skills more than Family Orientation, i.e. $\alpha(L_E - L_Y) > \beta(O_Y - O_E)$, then if E runs then Y will not run (i.e. he will opt for path 3, Figure 4.2 illustrates this case in the plot on the left). If however, E does not run, Y will run (path 6) only if his payoff is greater than his payoff for pursuing his career outside the family firm (i.e. $B_Y > H_Y - r$) and in that case intergenerational succession will not be secured (path 7).[10] Figure 4.2 illustrates all the above conditions. The plot on the left shows Y's options is the case when E runs and when E doesn't run Y's options are shown on the plot on the right.

[10] If any child is in indifferent between running or not running for the successor position, he will opt to run for the position.

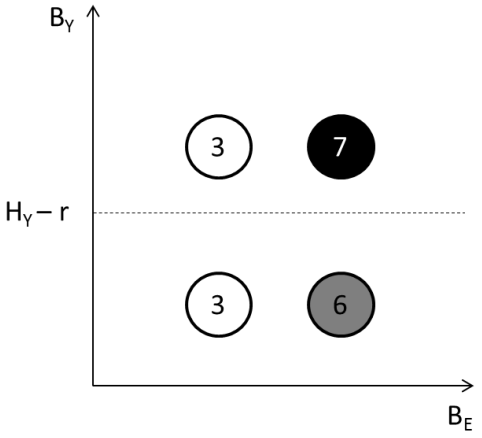
Figure 4.2. Founder prefers Leadership Skills: Y decisions in each node



Source: Own elaboration

Continuing to employ backward induction we arrive at the root (first node). At this point it is E who needs to make his move. Considering a founder who favors the business dimension rather than the family dimension then E anticipates that if he runs then Y will not run and so his payoff will be H_E –r, and if he doesn't run his payoff will be B_E. Consequently he will run if H_E –r > B_E and in this case the equilibrium path will be path 3. If he doesn't run, the equilibrium path being 6 or 7 will depend on Y decision of pursuing his career outside the family firm or not.[11] This is illustrated in Figure 4.3.

Figure 4.3. Founder prefers Leadership Skills: E options



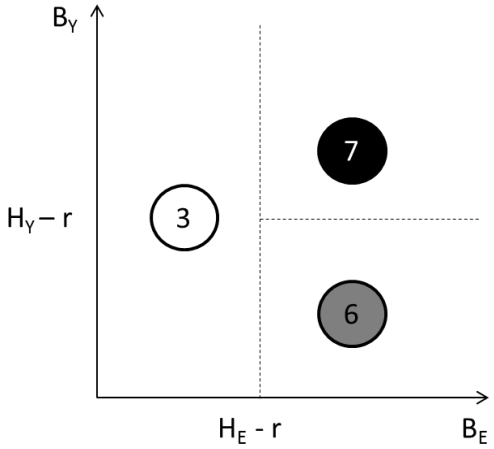
Source: Own elaboration

[11] In this case the subgame perfect Nash equilibrium strategy, which refers the complete plan of action for each player for each contingency specifying what he will do when he is called to play. When B_Y>H_Y-r and B_E>H_E-r, the equilibrium path is 7 and the equilibrium strategy is for F - F choose E if E run and Y run; F choose E if E run and Y not run; F choose Y if E not run and Y run; for Y – Y not run if E run; Y not run if E not run; E not run.

In order to make his decision E compares his payoffs between each of his options, presented in Figure 4.3. Between path 3 and path 6, and path 3 and path 7, if H_E-r>B_E he prefers path 3 so he will run for the successor position. When he doesn't run then the equilibrium path being path 6 or 7 will be determined by Y running or not (respectively).

This is illustrated in Figure 4.4.

Figure 4.4. Founder prefers Leadership Skills: E decisions

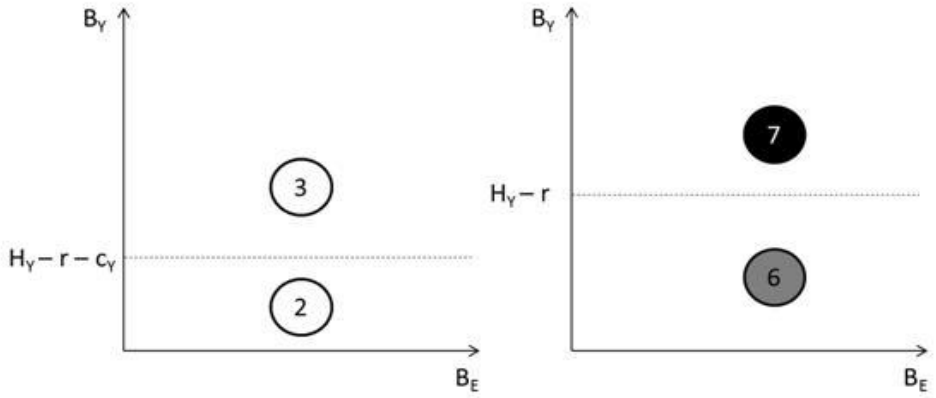


Source: Own elaboration

If F values Family Orientation more than Leadership Skills, i.e. $\alpha(L_E - L_Y) < \beta(O_Y - O_E)$, then he will choose Y when both children run for the position, therefore if E runs, Y will also run as long as $B_Y < H_Y - r - c_Y$ (paths 3 vs. path 2). Y will not run if he values his career option outside the family firm more than pursing the successor position.

These conditions are illustrated in Figure 4.5, where the plot on the left presents Y decisions when E runs and when E doesn't run Y's decisions are presented on the plot on the right.

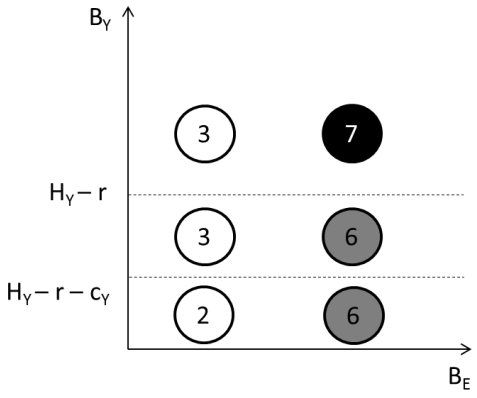
Figure 4.5. Founder prefers Family Orientation: Y decisions in each node



Source: Own elaboration

Continuing to employ backward induction and considering a founder who favors the family dimension more than the business dimension, E takes into consideration what F and Y will do before making his decision. Figure 4.6 shows what options E faces.

Figure 4.6. Founder prefers Family Orientation: E options

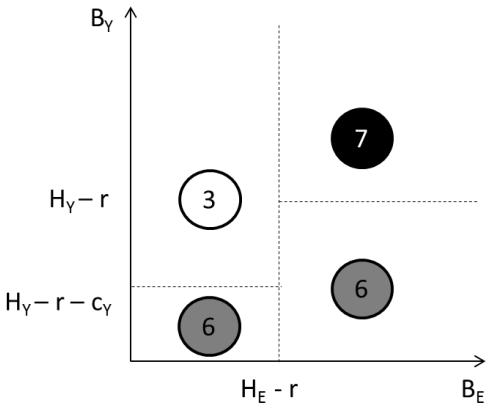


Source: Own elaboration

E chooses the option which will maximize his payoff. As a result, when he compares his payoff resulting from path 2 and path 6 he will opt for path 6, and so decide to run for the position. When comparing path 3 to path 6, or path 3 to path 7, he will chose path 3 only when H_E-r>B_E. [12] This is illustrated in Figure 4.7.

[12] In this case the subgame perfect Nash equilibrium strategy, which refers the complete plan of action for each player for each contingency specifying what he will do when he is called to play. When B_Y>H_Y-r

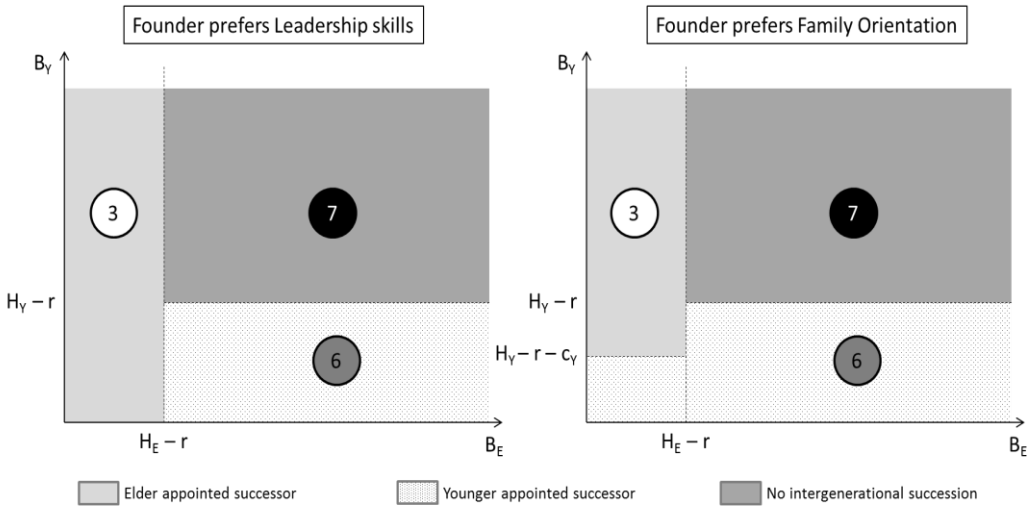
Figure 4.7. Founder prefers Family Orientation: E decisions



Source: Own elaboration

Figure 4.8. summarizes the equilibrium paths and succession outcomes according to the founder's preference.

Figure 4.8. Equilibrium paths and successor outcomes



Source: Own elaboration

When both children prefer to pursue their career outside the family firm, then intergenerational succession is not secured (i.e. when $B_i > H_i - r$). In the situations that only one of the children wants to take over the executive control of the family firm, then that child will end up being appointed successor, given that the founder values the firm staying in the family to any other possible scenario.

and $B_E > H_E - r$, the equilibrium path is 7 and the equilibrium strategy is for F - F choose E if E run and Y run; F choose E if E run and Y not run; F choose Y if E not run and Y run; for Y – Y not run if E run; Y not run if E not run; E not run.

Notice that when neither son runs or when only one of them does, then the successor outcomes are not dependent on the founder's preferences. The pattern in terms of successor outcome varies only when both his children are available to head the family firm. In that situation it is the founder's predisposition regarding the family or the business dimension which determines the successor outcome. If the founder prefers the business dimension, i.e. $\alpha(L_E - L_Y) > \beta(O_Y - O_E)$, he will choose E (as previously explained), else he will prefer Y. However, even in the case of a founder who is more family inclined, Y still faces an added constraint in being named successor which results from the emotional cost Y incurs in running against his brother (c_Y). The more averse Y is to conflict the greater the propensity of E becoming successor, as Y is more resistant to fight against his brother for the top position.

The possibility of intergeneration succession not being secured is dependent on the children's availability to take over the firm's executive control and also on the cost they incur to secure the position. When they have to make a lot of effort to run for the position (high values of r) then there is higher possibility of the family firm falling victim of the statistics which show that only a minority of family firms continues to the second generation (Aronoff & Ward, 1995).

4.5. Discussion

4.5.1. Sensitivity analysis

The analysis of the impact that changes in the variables can have on the equilibrium results will allow a deeper understanding of the factors at play. The children's endowment of leadership skills and family orientation, allied to the founder's predisposition for either the business or the family dimension of the family firm plays a pivotal role in determining the successor. If, for instance, the elder child completed a MBA degree this would reflect in an increase of L_E. Considering that all other variables remained unchanged, then this could increase his propensity of being appointed successor. The possibility of the elder child becoming the next head of the family firm could also be augmented if the founder became more inclined to having a successor who is more business rather than family oriented (i.e., increase in α). Conversely,

increases of O_Y or β will tend to enhance the propensity of the younger child being successor, all other factors remain unchanged.

The cost of conflict resulting from sibling competition (c_j) is crucial in the definition of the equilibrium paths but only c_Y has a direct impact in terms of successor outcome. If, for some reason, the younger child becomes more averse to this conflict then, all things being equal, this diminishes his possibilities of becoming successor and, simultaneously, augments his brother's. Changes in this emotional cost have no impact in terms of ensuring that the firm's executive control remains in the family. Whereas an increase of the value the child places on the firm's continuity, net of the cost of running, ceteris paribus, will enhance the firm's intergenerational sustainability and also raise the propensity of that child being appointed successor.

4.5.2. First mover advantage

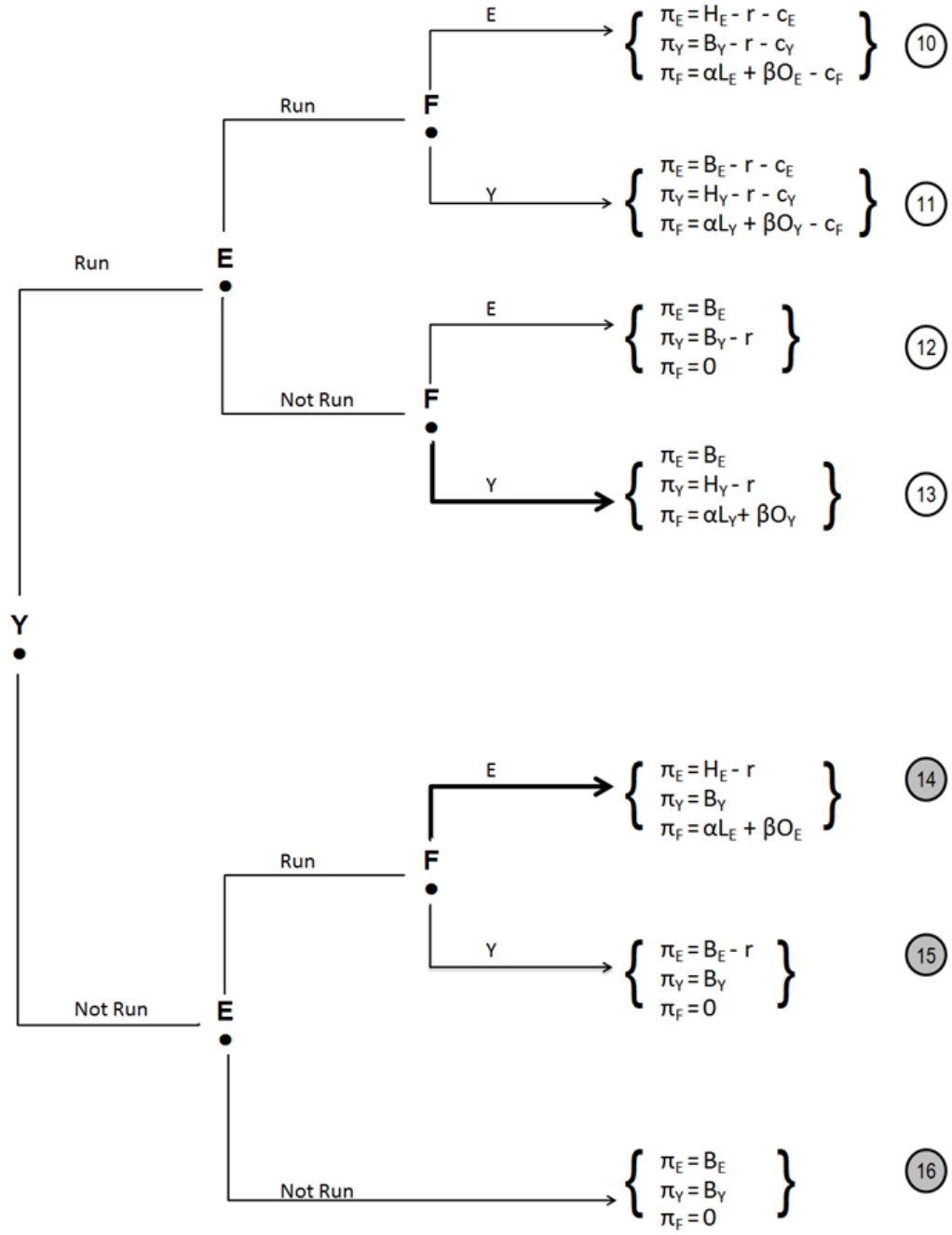
The first mover advantage is an occurrence which has been studied in the various fields of economics and management. The first mover tends to refer to the first firm who enters a market and being the first allows it to reap higher than average profitability and even market dominance. The study of this phenomenon in the successor race of the family firm was analyzed by Mathews and Blumentritt (2015). In their game, they used tournament theory and focused on the effort levels for the pursuit of the CEO position of each of the two children. Their results showed that in certain conditions there was a first mover advantage for the child who decided first. However, their model did not explicitly consider the emotional cost of sibling competition as a variable.

In the game presented, the elder child moves first and the extent to which the younger child prefers to avoid conflict is directly linked to the elder child's propensity of being appointed successor. In fact, the emotional cost of conflict which the younger child incurs (c_Y) is determinant in terms of successor outcome whereas the c_E has no direct impact in terms of the definition of the new head of the family firm.

This raises the question regarding the possible advantage the child who moves first in the game has in being appointed successor. To analyze whether there is indeed any

advantage for the first mover it is necessary to remodel our game changing the order of play and then comparing the results. In our original game the elder child moves first, and is then followed by the younger child and finally the founder chooses his successor. Altering the sequence and starting with the younger child as the first mover, Figure 4.9 presents the game tree for this case.

Figure 4.9. Game tree representation for Y moving first



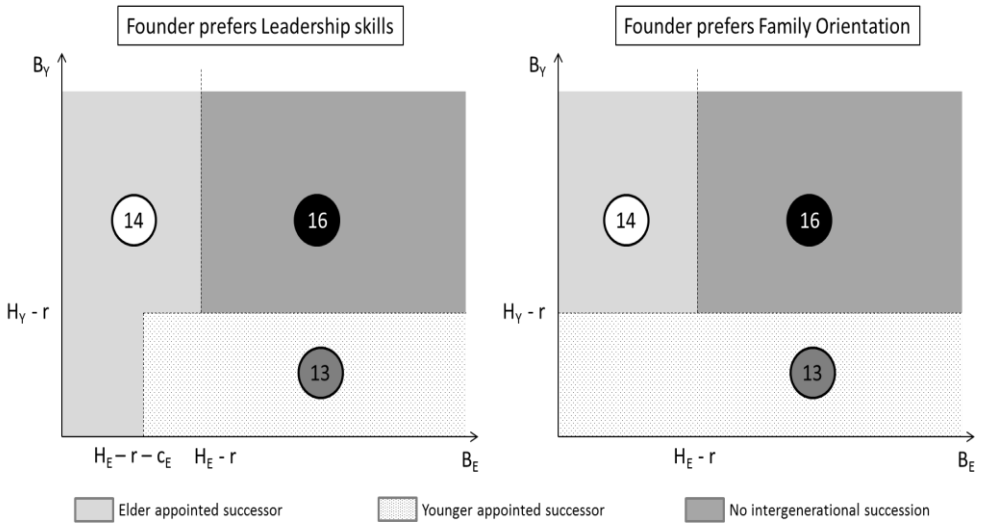
Source: Own elaboration

The younger child moves first and decides whether or not he wants to run for the successor position in the family firm. If he decides to run, the game moves to the upper part of tree, else it moves to the lower part. Then it is the elder child's move and he can either run or not run to become CEO of the family firm and finally the founder chooses his successor. At the far end of the tree are all the possible outcomes for this game for all the players resulting from the different paths.

Notice that the payoffs are all in all the same as the ones obtained in the game where the elder child moves first (Figure 4.1) but result from different paths. For instance, the outcomes for path 3, which results from the following sequence of decisions: E run/Y not run/F appoints E, is the same as the outcome from path 14,which results from the following sequence of decisions: Y not run and E run and F appoints E.

To obtain the subgame perfect Nash equilibrium results for the game in which Y moves first it is necessary to apply the same technique of backward induction as previously used.

Figure 4.10. Equilibrium paths and successor outcomes for Y moving first



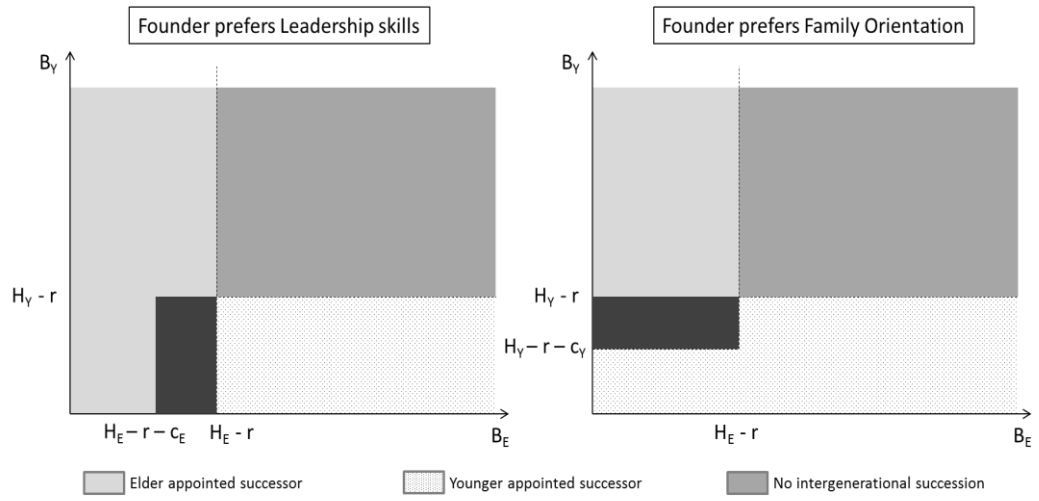
Source: Own elaboration

The subgame perfect Nash equilibrium shows that a F who values Family Orientation more than Leadership Skills, i.e. $\alpha(L_E - L_Y) < \beta(O_Y - O_E)$, will choose Y as successor as long as he is available ($H_Y - r > B_Y$) else he will opt for E (if he is available). Conversely, a founder who values Leadership Skills more than Family Orientation will

prefer his elder child to be his successor. In the case when E does not move first he incurs in the emotional cost of running against his sibling (c_E) so he will only be available if $B_E<H_E– r – c_E$. If both children value their career options outside the family firm more than heading the family firm, net of the cost of running, then intergenerational succession will not be secured. When both children are available it will be the founder's predisposition that will determine the successor outcome.

Figure 4.11, by overlapping Figure 4.8 and 4.10, compares the successor outcomes for when E moves first with those resulting when Y moves first.

Figure 4.11. First mover advantage



Source: Own elaboration

It is evident that the emotional cost of conflict which occurs when both children run for the successor position is more relevant, in terms of succession outcome, for the child who moves in second. Thus, there is a clear advantage for the first mover, which is illustrated by the darker shaded rectangles in Figure 4.11. Consider, for example, a founder who prefers Family Orientation to Leadership Skills, i.e. $\alpha(L_E – L_Y)< \beta(O_Y – O_E)$, then he is more inclined to choose his younger. However, the dark shaded rectangle shows that E has an increased propensity of being named successor instead of Y, even when F would have preferred Y, simply because E moved first.

The emotional factors justify the first mover advantage. The cost of conflict is of fundamental importance. The higher the cost of conflict of the child who moves in

second place, the larger the advantage the child who moves first has in being appointed successor. Consider, for example, a founder who is a business-first type, even then Y's propensity of becoming successor is increased simply by moving first, as is illustrated by the dark shaded rectangle in Figure 4.11. The dimension of this advantage is dependent on how much he values becoming successor, net of the cost of running, on one hand, and on the degree that the elder sibling wants to avoid conflict, on the other.

The emotional factors are of crucial importance in determining the first move advantage. In more cohesive and collectivist family settings, members are more inclined to have higher affective attachment to the family and the firm and consequently, in such cases, the emotional factors will be more important than in other family contexts. For those types of families the first mover advantage will tend to be higher than in other family settings.

The existence of the first mover advantage means that from the children's perspective, the more averse a child is to conflict the greater will be the benefit for his sibling to move first. From the founder's perspective, he prefers that his desired successor be the first mover.

4.5.3. Family optimal analysis

The subgame perfect Nash equilibrium results from each player making his decisions in order to maximize his own individual payoff. However, if instead we consider the family as acting as unit, then the successor outcomes would result from the maximization of the joint payoff of all the players. The outcomes are denoted as family optimal and will refer to them as such herein. The family optimal can be understood as the family members cooperating and coordinating their decisions, subordinating their personal goals to the communal good. Unlike the Nash equilibrium where each player maximizes his own individual utility, in the family optimal, all the players focus on maximizing the aggregate family payoff.

The aggregate family payoff is seen as the sum of the payoffs of the father and both his children, for each path. For instance, the aggregate family payoff for path 2 is: $\pi_E + \pi_Y + \pi_F = B_E - r - c_E + H_Y - r - c_{Y+} \alpha L_Y + \beta O_Y - c_F$.

Table 4.2 identifies the family payoffs for each path.[13]

Table 4.2. Aggregate payoffs

E moves First	Y moves First	Family Payoff
Path 1	Path 10	$H_E - r - c_E + B_Y - r - c_Y + \alpha L_E + \beta O_E - c_F$
Path 2	Path 11	$B_E - r - c_E + H_Y - r - c_Y + \alpha LY + \beta OY - c_F$
Path 3	Path 14	$H_E - r + B_Y + \alpha L_E + \beta O_E$
Path 4	Path 15	$B_E - r + B_Y$
Path 5	Path 12	$B_E + B_Y - r$
Path 6	Path 13	$B_E + H_Y - r + \alpha L_Y + \beta O_Y$
Path 7	Path 16	$B_E + B_Y$

Source: Own elaboration

As the aggregate family outcomes are the same in both games, for simplicity herein the paths resulting from the game when E moves first will be used.

The family optimal outcome denotes the successor outcomes which will maximize the payoffs of the family as a unit. Analyzing Table 4.2 it is evident that the family payoff resulting from path 3 is higher than that resulting from path 1. Similarly, the family outcome in path 6 is higher than that resulting from path 2, as is the outcome of path 7 higher than the ones from path 4 and path 5. Consequently, it is necessary to analyze in what conditions path 3, 6 and 7 are more desirable from a family perspective in order to identify the family optimal solutions.

Table 4.3. Identification of conditions for family optimal outcome

More Desirable from Family Stance		Conditions
E First Mover	Y First Mover	
Outcome 3 than Outcome 6	Outcome 14 than Outcome 13	$B_Y + (H_E - H_Y) + \alpha(L_E - L_Y) + \beta(O_E - O_Y) > B_E$
Outcome 3 than Outcome 7	Outcome 14 than Outcome 16	$H_E + \alpha L_E + \beta O_E - r > B_E$
Outcome 6 than Outcome 7	Outcome 13 than Outcome 16	$H_Y + \alpha L_Y + \beta O_Y - r > B_Y$

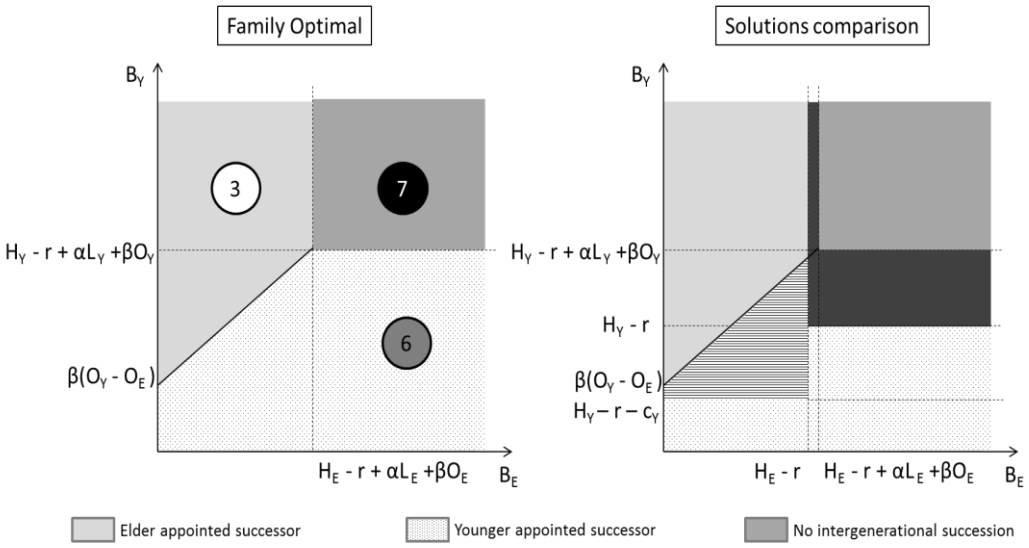
Source: Own elaboration

Table 4.3 highlights that family optimal outcomes may, under certain condition, differ from the subgame perfect Nash equilibrium. Using an example will help make this

[13] Notice that from a family stance it is indifferent which of the children moves first, as the family payoffs are the same in both games but result from different paths.

clearer. Consider, for instance, that both children equally value heading the family firm (H_E=H_Y), and they both have identical endowments of leadership skills but the younger child is more family oriented than the elder child (L_E= L_Y and O_E<O_Y), and also presume that H_Y-r>β(O_Y –O_E)>H_Y-r-c_Y . Figure 4.12 shows the family optimal successor outcomes for this situation.

Figure 4.12. Family optimal outcomes



Source: Own elaboration

These successor outcomes, when the family makes decisions driven by maximizing the family aggregate payoff rather than the individual payoff of the family members, differ from the subgame perfect Nash equilibrium results presented in Figure 4.8. Focusing on the example presented, when adopting a family (rather than an individual) stance the propensity of intergenerational succession being secured increases. This increase is marked in Figure 4.12 by the dark L shaped area. The family optimal solution augments the possibility of the founder's preferred successor, in our example Y, being appointed in detriment of E, comparatively to the subgame perfect Nash outcome. This substitution of E by Y is illustrated by the triangular striped area in Figure 4.12.

Although these results refer to the specific example the analysis was extended to include all possible cases.[14] The complete family welfare analysis presents the same pattern of

[14] These results are presented in the Appendix I.

results, and the comparison to the subgame perfect Nash equilibrium the marked areas in Figure 4.12 are always present in all cases, varying only in dimension. [15]

In practical terms, the family optimal analysis shows that when all the family members cooperate and act as a unit, with the objective of maximizing the family's aggregate payoff (rather than individual payoffs), then there is greater propensity of intergenerational succession being assured and an increased possibility of the founder's preferred successor being appointed.

4.6. Summary

Family's impact on the business is what distinguishes the family firm. The family, and more specifically the impact of sibling competition on successor selection, using game theory was the focus of study of this chapter.

The results show that the successor outcome will depend on the founder's predisposition (for the business or the family dimension) and also emphasize the importance of the cost of conflict. The findings demonstrate that the emotional cost of conflict incurred during the succession race due to sibling rivalry is essential in explaining the first mover advantage.

In practical terms, the more averse a child is to conflict the greater the first mover benefit for the other sibling. Consequently, for the founder, he has an added impetus to motivate his preferred successor to take the initiative and be the first to run for the top position in the family firm. Additionally, to avoid possible conflict the founder could provide alternative roles for the other sibling. The family optimal analysis highlights the importance of founders, practitioners and consultants working with family firms to help promote greater cooperation and more cohesiveness between family members, as this will help ensure family firm intergenerational succession.

[15] Additionally when Y is the first mover, for the very particular case when $H_Y\text{-}r > \beta(O_Y - O_E) > H_Y\text{-}r\text{-}c_Y$ then the family optimal will be E rather than Y (as proposed by subgame perfect Nash equilibrium).

Chapter 5

FOUNDER: ACTIVIST AND REACTIVE APPROACH

5. FOUNDER: ACTIVIST AND REACTIVE APPROACH

5.1. Introduction

The ultimate challenge of the family firm is the passing of control from one generation to the next. This is a crucial period in the life of the family firm and, inevitably, also affects the family.

The international business arena has witnessed various family feuds resulting from intergenerational executive succession. That was the case of the battle among brothers which begun at the Indian business giant, Reliance Industries, after the death of their father. This sibling rivalry ended in the splitting of the firm and of the family. The tumultuous row in the Pritzker family has torn apart one of the wealthiest families in the US. The family held the renowned Hyatt hotel group and had a stake in the Royal Caribbean cruise fleet, among other varied business interests. The family feud resulted in the breakup of the multibillion dollar business empire.

These cases, sadly, are not the exception in the family firm context but rather just a few examples of the negative impact that family feuds have both on family stability and on family firm continuity. Ensuring the firm's continuity in the family and safeguarding the family from tensions and conflicts which might result from the succession process are factors which are valued by the founder.

This chapter forms the basis for the article entitled "Game Theory and Successor Selection: The impact of emotional factors", which is under review in the Journal of Managerial Psychology. This journal is indexed by Scopus and ISI and has an impact factor of 1.20 (Thomson Reuters Journal Citation).

This chapter focuses on the founder, studying the impact the founder's approach to succession has on successor selection in family firms. The founder who adopts a proactive stance and decides to move forward with the succession, by inviting one of his children to succeed him, is denoted as having an activist approach (Michael-Tsabari & Weiss, 2013). On the contrary, a founder who doesn't take that initiative but instead reacts when his children show interest in succeeding him (as presented in game in Chapter 4) is denoted as having a reactive approach.

These approaches should be understood in the family setting where father and children communicate and express their views and desires. In this sense, when the father invites one of his children, it results from the father's knowledge of his children's abilities, personalities, interests and desires.

In the case of the founder who is more reluctant to address the succession process, one of his children can inform the father of their interest in heading the family firm. The child's manifestation should be understood not as a isolated and abrupt stance but rather a step-by-step process. Progressively he acquires the necessary skills and competencies, through training experience and learning, to be able to head the family firm, at which point he can express that desire to his father. The other child can either pursue an alternative career path or express his desire to also head the family firm, in which case the father will need to choose between his competing children (analyzed in Chapter 4).

In line with the games presented in the previous chapter, this chapter extends the application of game theory to family firm succession to include the non-economic factors contributing to a more complete vision of the succession process.

This chapter studies how these emotional factors affect the way the firm faces the ultimate test of intergenerational continuity. The role that key emotional factors, such as the importance of legacy, the costs of both father/child conflict and sibling competition, play in the choice of successor will be analysed.

This chapter answers two key questions; one related to the role that the emotional factors play on successor selection, and the other regarding the impact that the founder's approach to succession has on that selection.

The results analytically provide evidence that the founder adopting an activist approach to succession increases the propensity of ensuring family firm continuity, even in the presence of conflicts. Furthermore, this approach assures a higher propensity of the father's preferred successor being indeed appointed. In practical terms, the results provide an added impetus for family firm leaders, who value intergenerational continuity, to be less reluctant and more proactive in their succession planning. The findings illustrate that the non-economic factors are determinant in terms of the successor choice.

This chapter begins with a review of the relevant literature, which is then followed by the presentation of the model and discussion of the results and closes with a summary of the key findings.

5.2. Founder's approach

There is growing evidence that founders pursue not only economic but also diverse non-economic goals and this affects their behaviour and outcomes (Gómez-Mejia et al., 2007; Basco & Rodríguez, 2009; Klein & Kellermanns, 2008). These non-economic motivations are related to the family sphere, and encompass providing jobs for the family; the family's well being; pursuit and preservation of socioeconomic wealth among others (Zahra, Hayton, Neubaum, Dibrell & Craig, 2008; Dyer & Whetten, 2006; Eddleston & Kellermanns, 2007).

Astrachan and Jaskiewicz (2008) propose that the total value of the family firm to its owner is a sum of the financial value and the emotional value. The financial value refers to the traditional firm valuation through the sum of discounted cash flows and discounted financial benefits resulting from private ownership. It can be understood as the value produced by the firm's performance as a business unit, whilst the emotional valuation refers to the value created by the singularity of the family firm, resulting from the infiltration of the family dimension in the firm's.

The emotional value is the emotional returns the business offers its owner net of the emotional costs. The emotional benefit of continuity and legacy are very significant and in terms of emotional costs, family conflicts, family tension and sibling rivalry are the most relevant (Zellweger & Astrachan, 2008). As a result, for the founder, value creation is seen as a sum of both economic and non-economic goals (Klein & Kellermanns, 2008).

The importance the founder attributes to his role as a steward for the business (Miller et al., 2008) on the one hand, and his altruism towards the family (Eddleston & Kellermanns, 2007), viewing the firm as family serving, on the other, will determine the way he makes decisions and faces the challenges in the family firm.

One of the most crucial challenges facing family firms is managerial succession. Passing the firm's executive control over to the younger generations is a major concern for the founders. It is a critical juncture for the family firm as only a small minority of family firms survive to the second and third generations (Mitchell, Hart, Valcea & Townsend, 2009).

Various studies have emphasized the importance of planning the succession to avoid unnecessary conflict which might arise from unplanned succession and untimely death of the founder (Harvey & Evans, 1994; Kets de Vries, 1993). Family harmony has been identified as a non-economic goal (Chrisman et al., 2012).

Founders, who value family harmony and the firm's family serving role, will tend to safe guard both the family and the firm from conflict and tension which might arise from the lack of a succession plan. Founders who want to avoid the risk of incurring in such emotional costs associated to family conflict might be tempted to postpone the succession. However, to increase the odds of the family firm's control remaining within the family (an important non-economic benefit) the founders must be willing to risk incuring in some cost of conflict.

A successful selection will ensure the firm's continuity and sustainability. The choice of the successor depends on various factors such as the cultural context (which will be addressed in Chapter 6) and the successor's ability. The skills and competencies valued in a successor are, but not limited to, technical capabilities in fields of accounting, human resource management and operational management; communication and motivational competency (DeNoble et al., 2007) and decision making ability (Motwani et al., 2006).

Founders who value the business dimension more than the family dimension will opt for a successor who will maximize the financial value of the firm. However, factors related to the family dimension can influence the founder's decision and lead to adverse selection (Barnett et al., 2009) and to the choosing family members for positions which they are not adequately qualified for (Burkart et al., 2003). This behaviour can be emotionally driven (Gómez-Mejia et al., 2001) but shouldn't be considered irrational.

The founder is rational but different from non-family firm owners as he aims to maximise the sum of emotional and financial values. The trade-off will depend on the founder's predisposition to value business performance or emotional value more. This predisposition will condition how he faces challenges and makes decisions.

Intergenerational management succession is one of the most challenging steps in the life of the family firm and demands appropriate analysis (Miller et al., 2003). Studying family firm succession using the strong analytical foundation provided by game theory enables a better understanding of the strategic behaviour of the founder and potential successors. It allows for an integrated view of all the players, taking into account their interactions and resulting mutual impacts.

The application of game theory to research family firm succession is not novel but has essentially focused on factors related to the business dimension. All the researchers have made reference to the importance the founder attributes to continuity and to preserving family harmony. However none have, as yet, formally integrated these non-economic factors in the payoff functions of the players (as discussed in Chapter 3).

5.3. Activist approach

5.3.1. Model

We start by presenting a founder who adopts an activist approach with regards to the succession. A sequential game of complete and perfect information is used. In the game, the founder/father (F) starts by deciding whether or not he wants to initiate the succession process by inviting one of his children to head the family firm. The chosen successor can accept or decline the position. Then the other child decides whether or not he/she runs for the position.

The variables in this game are the same as those previously presented in Chapter 4, therefore only the additional variables which are included in this game, both in the founder's payoff function as in the children's will be presented.

Table 5.1. Summary of the variables of the games

Variables	Represents	i= {E,Y} j= {F,E,Y}	Conditions
L_i	Leadership Skills - Child's ability to head the family firm		$L_i>0$
O_i	Family Orientation - Extent child values family serving attribute of the firm		$O_i>0$
α	Degree Father values the business sphere of the family firm		$\alpha>0$
β	Degree Father values the family sphere of the family firm		$\beta>0$
H_i	Value the child places in becoming successor and heading the family firm		$H_i>0$
B_i	Value the child places in his best career option outside the family firm		$B_i>0$
c_j	Emotional cost resulting from sibling rivalry		$c_j \geq 0$
I	Emotional benefit father has when the child he invites accepts		I >0
a_i	Emotional cost child incurs for declining the father's invite		$a_i>0$
N	Emotional cost father incurs when he proactively wants to move forward with the succession but none of the children are avaliable		N >0
r	Cost of running for top position		$H_i>r \geq 0$

Source: Own elaboration

The founder's payoff function is the weighed sum of the successor's ability to maximise the firm's potential (business dimension) and the successor's valuation of family involvement in the firm (family dimension).

In the situation that there is conflict between his children resulting from both running against each other to be appointed successor, the founder incurs in the emotional cost resulting from that sibling rivalry (c_j), as previously discussed.

Additionally, in this game as the founder invites one of the children to succeed him. He registers an increase in his payoff when his chosen successor accepts his invitation (I>0). This can be seen as the emotional benefit that F derives from being obeyed.

The founder registers a negative payoff of N (N>0) when neither his chosen successor accepts his invite to succeed him nor his other child runs for the position. When none of his children are available then intergenerational continuity, a key aspect of socioemotional value, isn't secured, and the father registers this as a relevant emotional cost (Zellweger et al., 2012). Founders who attribute high significance to passing on the firm and family legacy will tend to have higher values in this parameter.

The variables of the payoff function of the children are those presented in Chapter 4 with the inclusion of an additional cost denoted a_i that the child incurs when going against the father's expressed wishes.

When the child declines the founder's invite and prefers to opt for career outside the family firm, this will cause tension in the family. Going against ($a_i>0$) the father's

wishes will generate tension between the child and his father and this is a relevant emotional cost.

The relationship between the founder and the successor plays an important role on the loss children realize from going against their father's expressed wishes.

A child who idealizes the father and is subservient towards him, characteristics of what Miller et al. (2003) define as a conservative succession pattern, will tend to have higher levels of a_i. This type of child will find it harder to pursue a career outside the family firm if he is invited by his father to succeed him.

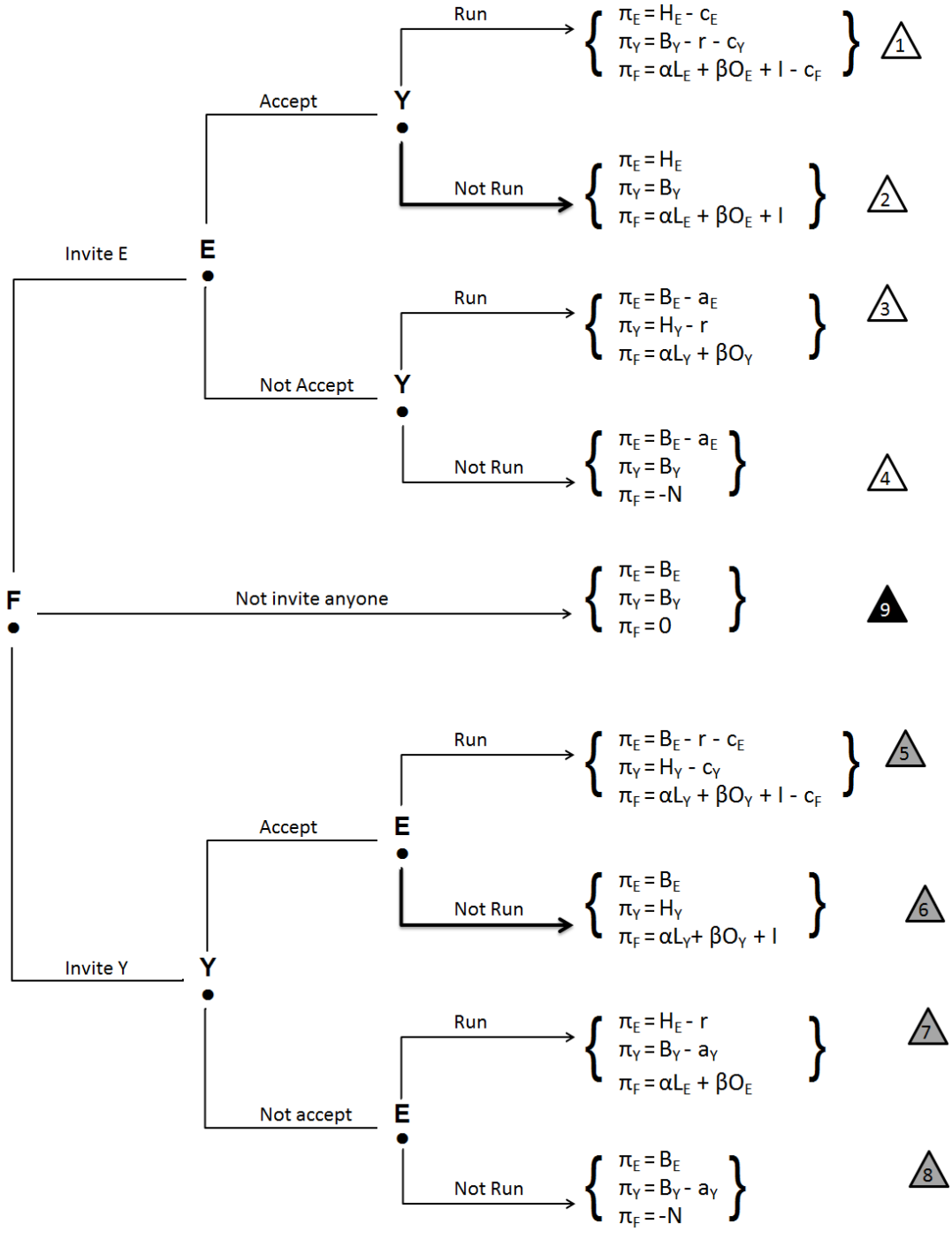
Figure 5.1 represents the three players (Father, Elder child and Younger child) and the three staged game.

The first node (also referred to as the root) represents the first move and refers to the father's (defined as F) decision.

He decides between inviting one of his children to succeed him and not inviting anyone (i.e. not moving forward with the succession). If he chooses not to move forward with the succession the game finishes. If he invites his elder child (defined as E), then the game moves to the upper part of the tree and at the next node E is called to make his move. He can choose to either accept or decline the invite.

Finally the younger child (defined as Y) is called to play and decide whether he wants to run for the CEO position or not. If F invites his younger child then the game moves to the lower part of the tree and at the following node Y accepts or declines the invitation. Finally E decides whether or not to run for the top position in the family firm.

Figure 5.1. Game tree for activist approach



Source: Own elaboration

A path refers to the set of decisions that leads from the root to the terminal node. The game has nine possible outcomes, resulting from nine possible paths, each with different payoffs for each player. For instance, path 1 refers to the following set of

sequential decisions: F invites E, and E accepts and Y runs for the position. The payoffs for each player resulting from path 1 are: $\pi_E = H_E\text{-}c_E$ $\pi_Y = B_Y - r - c_Y$ and $\pi_F = \alpha L_E + \beta O_E + I - c_F$.

5.3.2. Results

Applying backward induction technique to this game, and focusing on the upper part of the tree, starting at the terminal node where Y is called to play, he can choose between running or not running. When he knows that F has invited E and that E has accepted, he looks at his payoffs resulting from path 1 and compares his payoffs to those resulting from path 2. The payoff of Y for not running is the value of his best option outside the family firm (B_Y) and this is always higher than his payoff for running ($B_Y\text{-}r\text{-}c_Y$). In this case, Y best response, given that F has invited E, and E has accepted, would be to not run. This is to say, that path 1 will never be played as Y will always prefer path 2 to 1 (marked by a bolder line in the game tree).

Now focusing on Y decision to run or not, given that F invites E and E declines the invitation to become CEO (refers to path 3 and 4). In this case, the payoff Y gets for running is $H_Y\text{-}r$, and for not running is B_Y. He will decide to run (path 3) for the position if the value he attributes to becoming the successor, net of the cost of running, is greater than his best option outside the firm, else he will not run (path 4). [16]

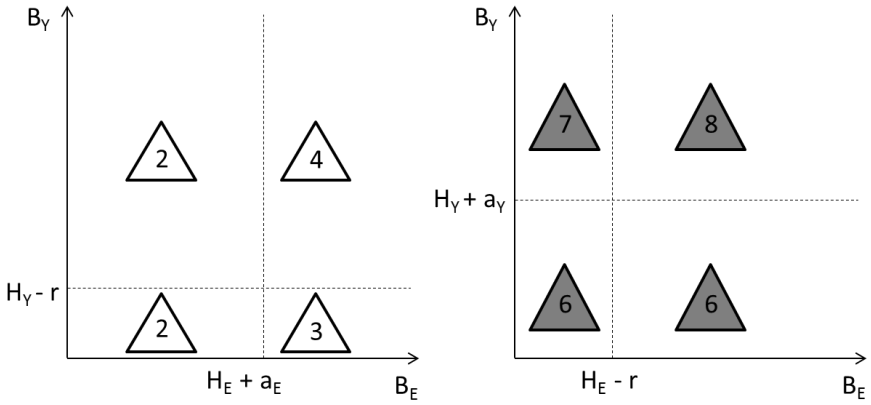
Moving to the bottom part of the tree, when F invites Y (which result in paths 5 to 8, identified with a shaded triangle) we continue to use backward induction to analyse how E makes his decision between running or not for the position. If F invites Y and Y accepts, then E best response will be not to run for the CEO position in the family firm (notice that like path 1, path 5 will never be played). When F Invites Y and Y does not accept then E needs to decide whether or not to run. Comparing his payoffs resulting from path 7 and 8, he will choose to run for the position if he values the CEO position of the family firm, net of the cost of running, more than his best option outside the family firm ($B_E > H_E\text{-}r$), else he will opt not to run for the position.

[16] If $H_i\text{-}r = B_i$ and/or $H_i + a_i = B_i$ then the assumption is that the child prefers pursuing the top position in the family firm.

Continuing to use backward induction, now at the node where E must decide if he will accept or decline the founder's invitation. E already anticipates that if he accepts then Y will not run, and his payoff will be the outcome of path 2 (i.e. H_E). He will not accept the invitation if $B_E > H_E + a_E$ and the outcome will result from either path 3 or 4 dependant on Y's decision.

Focusing on the lower part of the game tree, Y needs to decide whether or not to accept his father's invitation to become the successor. If he accepts, his payoff will be H_Y, as he knows that in that situation, E will decide not to run (path 6). Y will decline the invitation if the value he places on his best career option outside the firm suppresses both the value he attributes to becoming successor and the cost of going against his father ($B_Y > H_Y + a_Y$). If Y declines the invitation, then it will be E decision to run or not run which will determine if path 7 or 8 is chosen. Figure 5.2 graphically illustrates the backward induction until this point.

Figure 5.2. Activist approach: E and Y decisions

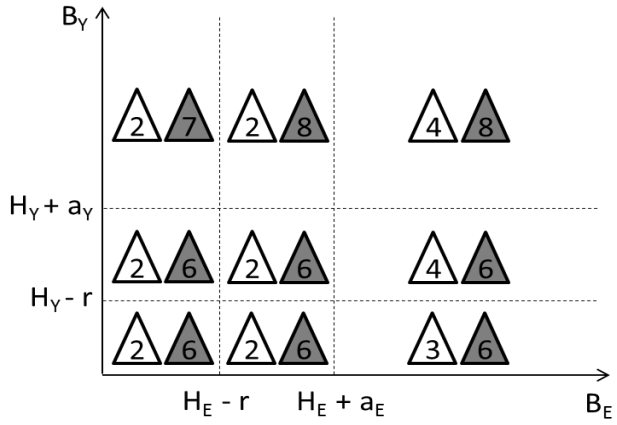


Source: Own elaboration

Continuing to use backward induction we finally arrive at the first node which refers to the founder's decision. He can choose between inviting one of his children and not inviting anyone. If he decides to maintain the status quo and not move forward with the succession his payoff will be 0 (as we assume he only values passing the family firm to his children). When deciding who to invite F takes into consideration what the subsequent players of the game (E and Y) will do and under what conditions.

Figure 5.3 graphically resumes all that information and shows what choices F faces in each situation.

Figure 5.3. Activist approach: F options



Source: Own elaboration

For instance, looking at the upper left corner of the graph ($H_Y + a_Y < B_Y$ and $H_E - r > B_E$) if F chooses to invite E (represented by the clear triangles) then the equilibrium path will be path 2, whereas if he invites Y (represented by the shaded triangle) path 7 will be the equilibrium path. F prefers path 2 to 7 as his payoff is higher in that case. Thus the equilibrium path is path 2,[17]as is the case when he needs to choose between path 2 and path 8.

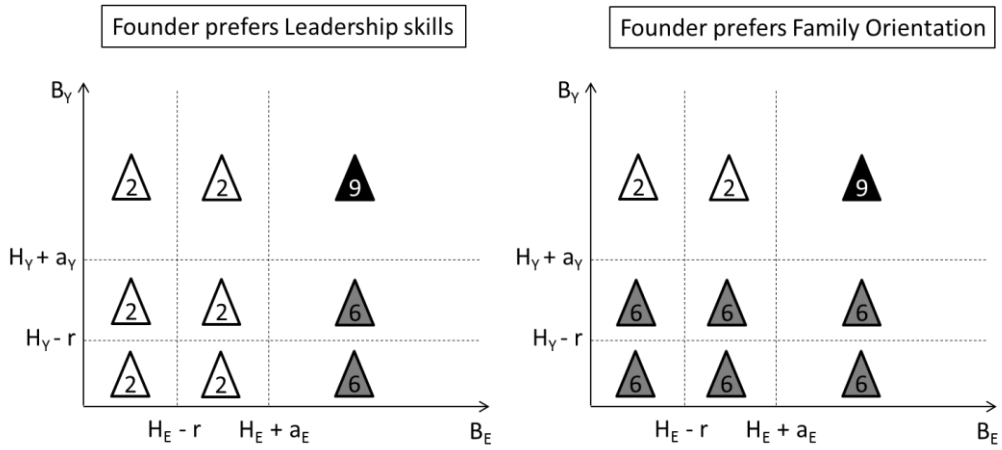
Using the same reasoning, when F faces deciding between path 6 and 3 or path 6 and 4 he will opt for path 6.

Now focusing on the situation when both his children value their career options outside the family firm such that they are unavailable to head the firm (i.e. $H_i + a_i < B_i$), then if F invites either child he will get a negative payoff of N (N>0), resulting from path 4 or 8. Therefore, in this case he will prefer not to invite anyone and obtain a payoff of 0 and the equilibrium path will be given by path 9. In the opposite situation when both his children are available to succeed him F will choose according to his predisposition of

[17] Note that each player's strategy is the complete plan of action for that player for each contingency, specifying what the player will do at each node he/she is called to play. In this case the equilibrium strategy is for Y: Y Not Run if F invites E and E Accepts; and Y Not Accept if F Invites Y. For E: E Accept if F invites E, and E Run if F Invites Y and Y Not Accept and for F: F Invite E. This results in equilibrium path 2.

valuing the business or the family dimension of the family firm. This is illustrated in Figure 5.4.

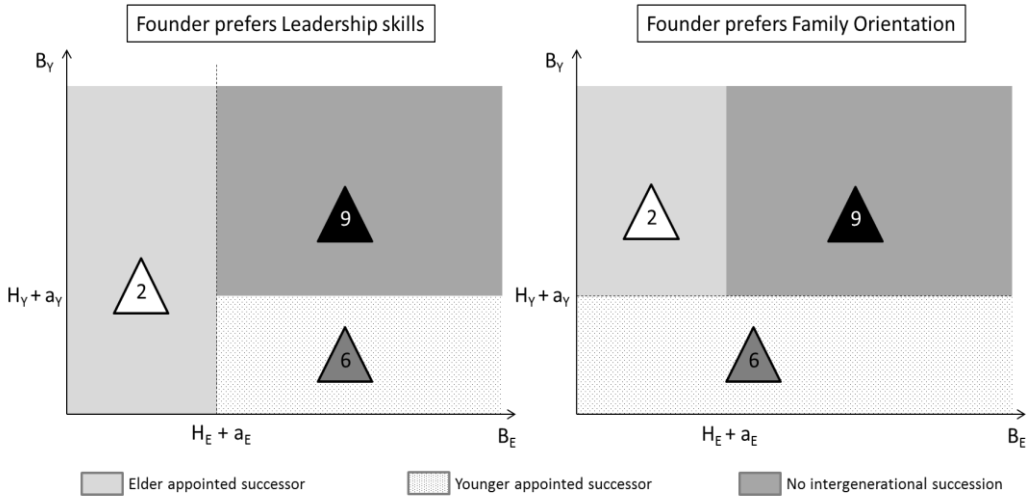
Figure 5.4 Activist approach: F decisions



Source: Own elaboration

The successor outcomes which result from the equilibrium paths are illustrated in Figure 5.5.

Figure 5.5. Equilibrium paths and successor outcomes for activist approach



Source: Own elaboration

The results show that when both children value their career options outside the family firm such that they opt to pursue them even incurring in the cost of going against their father ($B_i > H_i + a_i$) then the family firm's executive control will not stay in the family. The propensity of the family firms' executive control not staying in the family will be

decreased for children who are more subservient to their father and therefore do not want to go against his wishes (higher levels of a_i).

In the case that only one child is available to head the family firm (i.e. $B_E > H_E + a_E$ and $B_Y < H_Y + a_Y$ or $B_E < H_E + a_E$ and $B_Y > H_Y + a_Y$) then that child will be appointed successor. This is because intergenerational continuity is an emotional benefit the founder values which overrides appointing anyone from outside or selling the firm.

The successor outcome pattern differs in accordance to the founder's valuation of the business or family dimension only when both his children compete for the position, in which case he is called to choose between them. His choice is dependent on the children's relative attributes and how the founder values those attributes. The exact condition is given by $\alpha(L_E - L_Y) > \beta(O_Y - O_E)$, for a more business oriented founder, in which case he will opt for path 2, and invite E. Whereas for a family-first type of founder, the equilibrium path will be path 6 and Y will be his selected successor (the condition will be: $\alpha(L_E - L_Y) < \beta(O_Y - O_E)$.[18]

5.4. Reactive approach

5.4.1. Model

As opposed to a founder with an activist approach, the focus is now on the impact of a founder who does not want to take the initiative but instead adopts a more reactive role to his children's efforts in running for the position. The game for this succession approach is also of perfect and complete information where the elder child moves first and chooses between running or not running to head the family firm. Subsequently the younger child decides if he wants to run and finally the founder is called to make his choice and appoint his successor.

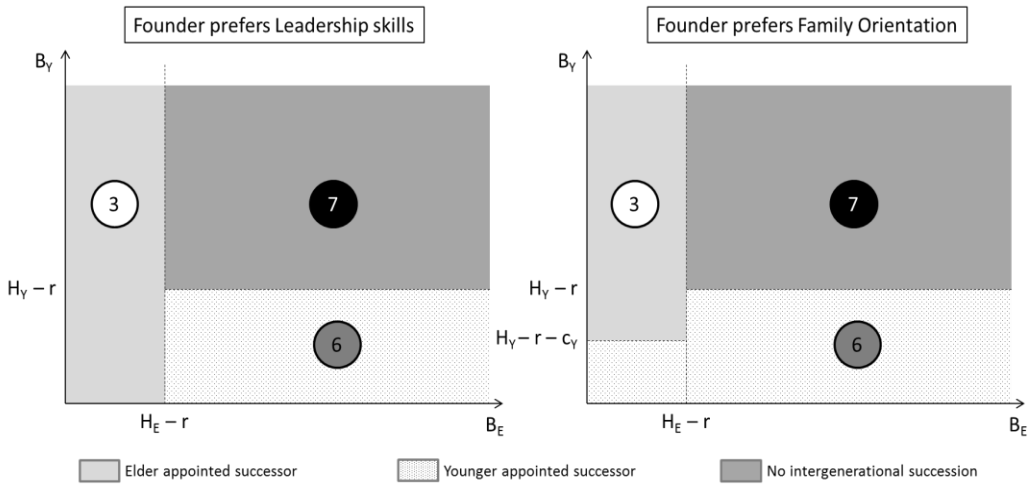
Note that this game is the same as presented in Chapter 4 with the elder moving first (Figure 4.1).

[18] If F is indifferent between choosing his elder or younger child, its assumed he chooses the elder.

5.4.2. Results

Figure 5.6. recalls the successor outcomes and equilibrium paths for that game.

Figure 5.6. Equilibrium paths and successor outcomes for reactive approach



Source: Own elaboration

The main results show that the successor outcome varies in accordance to the founder's preference of the family or the business dimension, when both children compete for the family firm's CEO position. A founder who values business dimension, i.e. $\alpha(L_E - L_Y) > \beta(O_Y - O_E)$, will opt for E else he will choose Y.

When only one of his children is available that child is named successor, and when both prefer to pursue their career outside the family firm then intergenerational succession is not secured.

For a more detailed analysis of the results refer to Chapter 4.4.

5.5. Discussion

5.5.1 Sensitivity analysis

Table 5.2 shows the impact in terms of successor outcomes of an increase in the parameters considered in both games.

Table 5.2. Impact on the propensity of successor outcomes

Approach:	Increase of:	Impact on the Propensity of: Elder becomes Sucessor	Younger becomes Sucessor	No Succesor
Activist & Reactive	α	+ / 0	- / 0	0
	β	- / 0	+ / 0	0
	$L_E - L_Y$	+ / 0	- / 0	0
	$O_Y - O_E$	- / 0	+ / 0	0
	H_E	+	-	-
	H_Y	-	+	-
Activist	a_E	+	-	-
	a_Y	-	+	-
Reactive	c_Y	+	-	0
	r	+ / -	+ / -	+

Source: Own elaboration

In terms of the children's attributes, E can, for example, through training; education and/or experience generated knowledge improve his leadership skills. This improvement of L_E, all other factors remaining unchanged, will increase L_E-L_Y which can increase the propensity of him becoming successor. An increase in the degree the founder values the business dimension (α) can also increase the possibility of E becoming successor. Conversely, increases of O_Y-O_E and β, can augment the propensity of Y being named successor.

Changes in the value the children attribute to heading the family firm, net of the cost of running, have a direct influence in terms of their propensity of being appointed successor. For instance, an increase in H_E, ceteris paribus, will increment E possibility of becoming the next CEO of the family firm

The changes in the variables analysed above impact the successor outcome in both possible approaches that the founder can adopt with regards to successor selection.

The emotional cost of going against the father is a cost that the children incur only when the founder adopts an activist approach. Variations of a_i have a direct impact in terms of the propensity of the child being appointed successor. For instance, an increase of a_E will increase the propensity of E becoming successor and decrease Y's propensity as well as contributing to ensure the continuity of the firm in the family.

On the other hand, for a reactive founder the cost of running and the emotional cost of conflict that Y incurs, c_Y, influences the subgame perfect Nash results. A decrease of r,

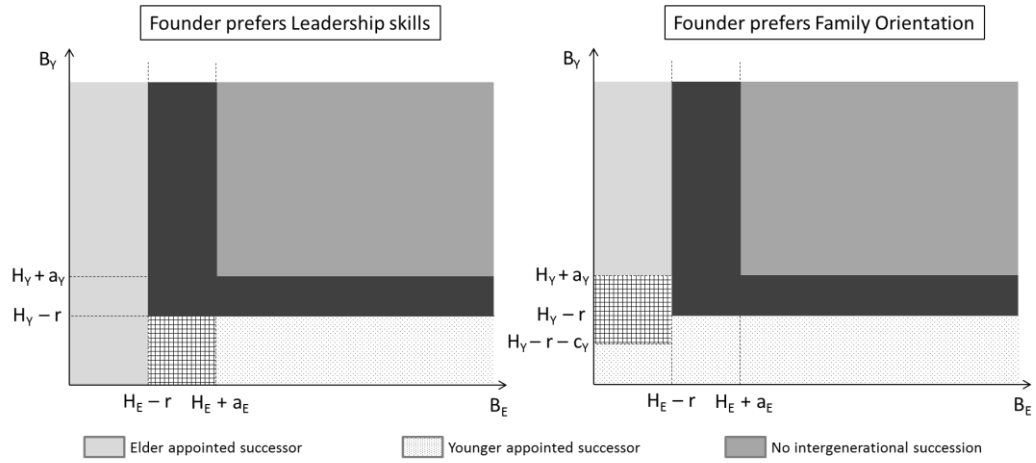
ceteris paribus, will increase the propensity of the firm's executive control staying in the family whereas as increase in c_Y will decreases Y propensity of becoming successor in favour of E.

The emotional costs incurred by E and F, c_E and c_F respectively, are important in terms of determining the equilibrium path of the games but do not directly influence the successor outcomes.

5.5.2. Impact of founder's approach

To study the impact in terms of succession outcomes of a founder who proactively initiates the succession process by inviting one of his children to succeed him, in comparison to one who responds after his children take the initiative, the succession outcomes for both approaches are overlapped and shown in Figure 5.7.

Figure 5.7. Successor outcomes activist vs. reactive



Source: Own elaboration

When both the children value their career options outside the family firm such that they are unavailable to succeed their father, the propensity of the firm not remaining in the family's control increases. This was the case for Norton Cooper's family firm which was responsible for bringing Chambord to the U.S. market. Both his sons established their own businesses outside the family firm, and the family firms was sold (to the Jack Daniels group).

This shows that even when the founder takes a proactive role and decides to move forward with the succession he still faces the possibility of not being unable to ensure intergenerational succession. However, if he doesn't actively initiate the process then there is a higher propensity that the firm's executive control will not stay in the family. In other words, although there is the possibility that both the children might prefer to pursue other career options besides heading the family firm, a founder who values intergeneration succession will be more successful ensuring the firm's continuity if he takes a proactive stance.

The founder by being more proactive places the onus on the child, making it more difficult for him to consider other career options. This is due to the emotional cost the children incur when they opt to go against their father's wishes (a_i). The more averse the children are to conflicting with their father (higher a_i) then the greater the propensity of securing intergenerational succession, as is illustrated by the L shaped shaded area in Figure 5.7. The emotional cost is important in determining that increase but so is the effort they are required to expend to be considered as potential successors (given by r). In some firms the requirements to be considered as a potential candidate are as low as showing interest, whilst in others these can be very demanding.

The founder's approach towards the succession process directly contributes to the continuity of the firms' executive control remaining in the family. Comparing both games it is evident that the propensity of the founder's preferred successor taking over the executive control of the firm is also increased by the founder taking an activist approach.

To help illustrate the point let's assume the founder prefers the business dimension to the family one and consider also that E would rather pursue his career outside the firm but is unwilling to go against his father's expressed wishes (i.e. $H_E - r < B_E < H_E + a_E$). In this particular case, E will only be appointed successor if F assumes a more proactive role and invites him, else E will opt out of the family firm, in which case intergenerational succession might be jeopardized. The rectangular chequered area in Figure 5.7 shows the increase in the propensity of E being appointed successor (in detriment of Y) simply due to F assuming a more proactive role.

If, on the contrary, the founder values the family dimension more than the business dimension, then he will prefer Y. Figure 5.7, shows that Y becoming successor is less prone to occur if F doesn't invite him. To illustrate this consider the case that Y wants to head the family firm but is so unwilling to risk family harmony by running against E (extreme high values of c_Y) that he will only become successor if E is not interested. If, on the other hand, Y is a child who really does not care about the conflict which might result from sibling competition (very low values of c_Y), then he will be successor as long as he is available (H_Y-r > B_Y). However, even in this particular situation, and assuming that Y is the founder's preferred successor, still it is more likely that Y is appointed successor if F adopts an activist approach and invites him (as illustrated in Figure 5.7 by the chequered rectangle).

The successor outcomes highlight that the emotional costs are determinant in defining the results. The more averse the children are to disrespecting their father's wishes (high levels of a_i) the higher the impact of the founder being proactive has in assuring family firm intergenerational continuity. Additionally, the founder's preferred successor is more prone to be appointed (illustrated by the checked areas) if he invites him, rather than if F waits for him to show interest and run for the position.

5.5.3. Role of emotional factors

The key emotional factors which are encompassed in the models relate to family firm continuity and family harmony. The subgame perfect Nash equilibrium shows that these factors are important in defining the successor selection.

A child who is affectively committed to the family and the firm will derive more emotional benefits from becoming CEO of the family firm. In the model this transposes as high levels of H_i, which results in a lower propensity of intergenerational succession not being secured.

The emotional costs included in our analysis are those resulting from the conflict between competing siblings and from father/child conflict. This last conflict tends to be salient when the child's actions are not aligned to the father's wishes, captured by a_i in

our model. The perfect Nash equilibrium results show that this cost is important in determining the successor outcome. The higher the importance that children attribute to respecting and fulfilling the father's expressed wishes, the greater the propensity of intergenerational succession being assured.

The emotional cost which the child incurs when he decides to run against his brother, c_j, is an important factor in determining the equilibrium paths and subsequently the successor outcomes in the case of the activist founder (refer to the Section 4.1). Whereas c_F and c_E are important in terms of determining the equilibrium path of the games they do not directly influence the successor outcomes. Whereas c_Y, in the case of a reactive founder, has a direct influence on who is appointed successor. Consider the situation when E informs of his interest to succeed his father. Y must then decide whether to race against his brother or not. If, for instance, we consider that Y is extremely conflict averse (high values of c_Y) the propensity of E being appointed successor is increased.

Children and founders who have a higher affective commitment will register higher emotional benefits and losses, as the emotional values are increased by affective commitment (Astrachan & Jaskiewicz, 2008).

5.5.4. Family optimal analysis

The family optimal solution refers to the successor outcomes resulting from decisions made with the objective of maximizing the aggregate payoff of the family, rather than each individual's payoff. For example, the family's payoff resulting for path 1, for activist approach, is: $\pi_E + \pi_Y + \pi_F = H_E - c_E + B_Y - r - c_{Y+} \alpha L_E + \beta O_E + I - c_F$ and $\pi_E + \pi_Y + \pi_F = H_E - r - c_E + B_Y - r - c_{Y+} \alpha L_E + \beta O_E + I - c_F$, for a reactive approach.

The paths which result in higher aggregate payoffs are paths 2, 6 and 9 for an activist approach and paths 3, 6 and 7, for a reactive one.

Table 5.3. Identification of conditions for family optimal outcomes

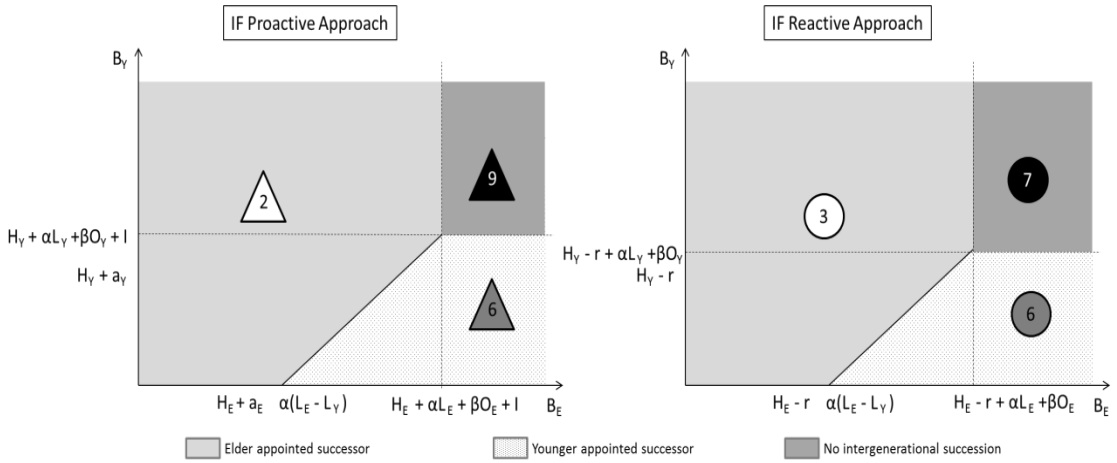
Type of Founder's Approach	More Desirable from Family Stance	Conditions
Activist Approach	Outcome 2 than Outcome 6	$B_Y + (H_E - H_Y) + \alpha(L_E - L_Y) + \beta(O_E - O_Y) > B_E$
	Outcome 2 than Outcome 9	$H_E + \alpha L_E + \beta O_E + I > B_E$
	Outcome 6 than Outcome 9	$H_Y + \alpha L_Y + \beta O_Y + I > B_Y$
Reactive Approach	Outcome 3 than Outcome 6	$B_Y + (H_E - H_Y) + \alpha(L_E - L_Y) + \beta(O_E - O_Y) > B_E$
	Outcome 3 than Outcome 7	$H_E + \alpha L_E + \beta O_E - r > B_E$
	Outcome 6 than Outcome 7	$H_Y + \alpha L_Y + \beta O_Y - r > B_Y$

Source: Own elaboration

Table 5.3 identifies the conditions for each outcome to be defined as the family optimal for both types of approaches. It shows that the subgame perfect Nash equilibrium successor outcomes are not always family optimal. For instance, consider that both children place the same value to becoming the new head of the family firm ($H_E=H_Y$), and both have the same family orientation level ($O_E=O_Y$) but in terms of leadership skills the elder child is more endowed than the younger ($L_E>L_Y$) and that $H_E + a_E > \alpha(L_E - L_Y)$.

Figure 5.8 shows the family optimal outcomes for both approaches, for this particular case.

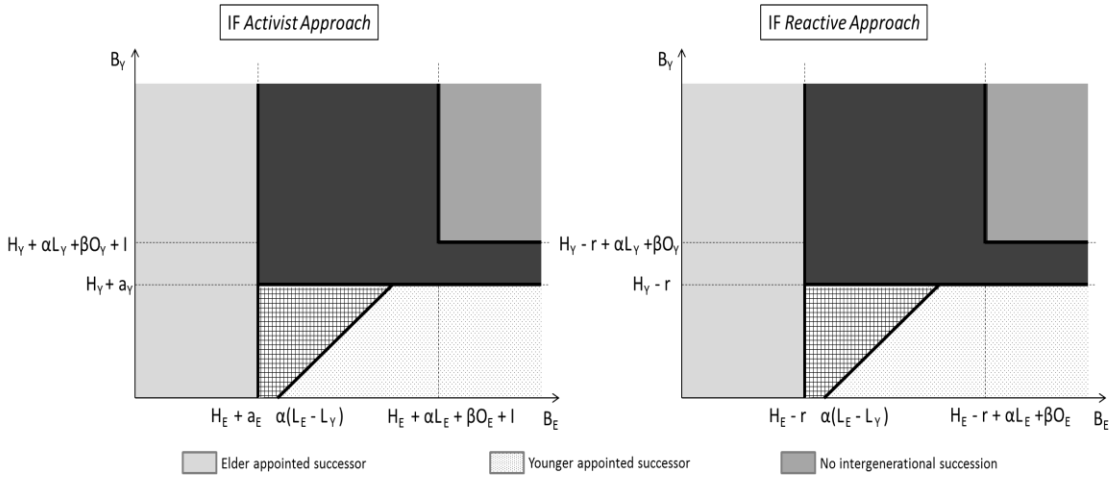
Figure 5.8. Family optimal outcomes



Source: Own elaboration

Figure 5.8 shows that the subgame perfect Nash outcomes are not always family optimal. This is easier to see by overlapping the family optimal solutions (Figures 5.8) with the perfect Nash solution (Figure 5.5).

Figure 5.9. Family optimal vs. subgame perfect Nash outcomes



Source: Own elaboration

The results show that if decisions were made with the concern of maximizing the payoff of the family as a unit, intergenerational succession would be secured more often than when each person is motivated to maximize his individual payoff. Independently of the founder's approach, when family members get together, and make decisions as a group then there is a greater propensity of the firm's executive control remaining in the family. This increase is illustrated in Figure 5.9 by the dark shaded L shaped areas.

Additionally the comparison shows that the family optimal outcome would result more times in the founder's preferred successor being appointed as is shown by the checkered triangular areas in Figure 5.9.

The next question refers to which type of founder the family as a unit prefers, one with an activist approach or a reactive approach. The family as a unit prefers that the founder adopt an activist approach as this ensures that the firm's continuity is more often secured than when adopting a reactive approach. In the example considered, this occurs when $H_E - r + \alpha L_E + \beta O_E < B_E < H_E + \alpha L_E + \beta O_E + I$ and $H_Y - r + \alpha L_Y + \beta O_Y < B_Y < H_Y + \alpha L_Y + \beta O_Y + I$. Additionally, in this case, the family optimal outcome for a founder with an activist, rather than a reactive, approach is more prone to appoint the founder's preferred child successor.

5.6. Summary

The founder is the vital link between the family and the firm, and is central to both. The founder is influenced by the family and when making decisions in the business he takes into consideration both economic and socio-emotional factors.

This chapter studied the role that the emotional factors play on the successor selection. The findings show that the emotional benefit resulting from intergenerational continuity and the emotional cost due to father/son conflict is important in determining the successor outcome. The more subservient the children are to their father then the higher the propensity of intergenerational succession being secured.

This chapter also took a closer look on the role that the founder's approach has on successor outcomes in the family firm. The results unequivocally demonstrate that when the founder does not adopt an activist approach there is an increased propensity that, on the one side, the founder's preferred successor will not succeed him, and on the other, and more worrying, that the family firm's intergenerational continuity will not be ensured.

Chapter 6

CULTURE: INDIAN SUCCESSOR ALIGNMENT

6. CULTURE: INDIAN SUCCESSOR ALIGNMENT

6.1. Introduction

The family firm is established by the founder and embedded in the family, which in turn is enveloped in the national cultural setting. There is an interplay between all these factors which contributes to defining and shaping the family firm and how it faces the critical stage of executive succession (Chrisman et al., 2002; Villannueva & Sapienza, 2009). The role of the family and the founder, using game theory, were analyzed in Chapter 4 and Chapter 5, respectively.

This chapter of the thesis deepens the use of game theory in family firms contributing to a better understanding of the impact that the cultural backdrop has on successor selection. In order to do so, the Indian cultural framework will be used. India's global importance has begun to attract scholar interest but little research has, so far, shed light on the managerial practices in the Indian context (Singh & Krishnan, 2007).This chapter of the thesis aims to contribute to bridge that gap.

This chapter was the basis for the article entitled "Cultural Dimension of Indian Family Firms – impact on successor selection" published in Problems and Perspectives in Management, October 2015, Volume 13, Issue 3, 116-123. This journal is indexed by Scopus.

India is home to a sixth of humanity and is the most diverse country in the world in terms of religion, language, class, ethnicity and ideology (Kapoor, 2004). Since its independence, it has registered improvement in the standard and quality of living resulting in significant increases in life expectancy and health conditions. This progress has been coupled with staggering economic growth and development, making India the fourth-largest economy worldwide and home to globally renowned companies in various sectors ranging from pharmaceuticals and steel, to information and space technologies (The World Bank, 2015).

The Indian economic landscape is dominated by family firms which range from small stores to large conglomerates. Their importance is evident by their sheer number, with more than six million family firm SME, and various large conglomerates in the hands

of family dynasties, such as: Birlas, Tatas, Singhanias, Ambanis and Bajajs. Other than the strong presence of the family firms, their contribution to the economy is essential, exceeding 60% of GDP and more than $50 million in market capitalization. Family firms are undoubtedly the backbone of the Indian economy.

Culture will have impact on the succession process. The reality of successor selection in Indian family firms emphasizes the role that younger generation's cultural alignment plays. Notwithstanding the founder's preference for intergenerational managerial succession, one or more of the children have not been available to follow him as CEO of the family firm, is not uncommon.

This was the case for Saurabh Dhoot who, after concluding his engineering degree at Imperial College London, co-founded the technology start-up Nivio as opposed to joining the family business conglomerate consumer electrics group Videocon. Also, Shravin, one of the sons of Sunil Bharti Mittal, has opted to fulfil his own entrepreneurial vision rather than integrate the family business, Bharti Enterprises, a leading global business group present worldwide with an array of diverse interests such as telecom and financial services, agriculture, infrastructure, retail and manufacturing, to name a few. Kavin, Shravin's twin brother, has been inducted as manager, initiating what most view as being his grooming stage to become successor. The elder son of Jitendra Soni, founder of Vishwa Gold and Diamond Traders a SME family firm with offices in Ahmadabad and Surat, concluded his undergraduate in an Ivy League university in the United States and decided to pursue his career as an Investment Banker in New York. Given his opt-out his younger brother has stepped in and been appointed successor.

To understand the underlining economic rationality of these decisions and to study the strategies of the selection process, this chapter applies a variation of the game modeled in Chapter 4. In the game used, the two siblings run simultaneously for the CEO position and then the founder, acting in accordance to the cultural setting, appoints his successor. Three possible scenarios, which differ in regards to the children's cultural alignment, are analyzed. Each child's payoffs are ranked and the successor outcomes, in each scenario, analyzed and compared. The findings highlight the negative impact that children's divergent cultural behaviours and attitudes have on family firm continuity

and family harmony. The results show that when at least one of the children is culturally aligned then intergenerational succession is secured.

This chapter begins by presenting the main traits of Indian culture, which is then followed by the presentation of the game and the results for the different scenarios and the subsequent discussion of the results. The chapter finalizes with a summary of the main findings and implications.

6.2. Indian culture

India is the world's largest democracy and home to more than a billion people, but beyond the diversity in Indian society, authors on Indian culture have noted there is an underlying unity that persists (Gupta, 2002).

In defining a country's culture factors such as: religion, history and education have been identified as important (Chrisman et al., 2002).

6.2.1. History

India became independent in 1947 and opted for a socialistic pattern of society where the state controlled, directly and indirectly, a big part of the economy. The state control started with the Industrial Policy Resolution which limited activities of the private sector. Later, the monopoly legislation barred private firms entry to many areas, and imposed high quotas and licenses for imports, restricting foreign investment (Dandekar, 1992).

At independence, India was one of the most industrialized countries in Asia but the state control led to inefficiencies and India became less competitive with exports falling from 2% in 1950 to 0.56% by 1990. In 1991, the government of India announced major changes in terms of policy (due to the impositions laid by the International Monetary Fund in exchange for their aid) which were cemented by late nineties leading to India's liberalization (Manikutty, 2000).

At present, India is among the fastest growing economies in the world and is ranked among the highest in terms of Gross Domestic Product yet still displays high levels of poverty (in accordance to the latest data from the World Bank).

6.2.2. Caste system

Along with the British rule the caste system has been pointed as a major contributor to Indian society being quite structured and stratified (Dana, 2000; Shivani, Mukherjee & Sharan, 2006). Dirks (2002) goes as far as arguing that the persistence of the caste system in India is not only due to the social and religious factors but also a direct result of the British colonial rule's propensity for measurement and control which led to the categorization of society in what he denotes as the modern caste system. Either way, the fact remains, that although the caste system was outlawed in 1947, its shadow still lingers on the social structure of India today and its social stratification persists for more than 3000 years (Freitas, 2006).

The caste system is the most known and widely commented upon features of Indian society. The term 'caste' remotes to the 16th century when the Portuguese navigators arrived in India and found Indian society divided into groups which they called 'castas' (Chhokar, 2000). The Hindu society has been divided for millennia into four castes or *varnas* led by the *Brahmins* (priest/philosophers/scholars/teachers), followed by the *Kshatriyas* (warriors/rulers/landowners), *Vaisyas* (traders/merchants), *Subdra* (peasants/farmers/artisans) and finally the untouchables which are so low that they are the outcasts of the system, and known as the *Harijans*, who perform menial work. This clear demarcation of occupations based in castes limits freedom of occupational choice reinforcing the practice of following in the family's occupation.

The rigidity of the caste system and its implications on economic development, hindering growth were pointed out by Olson (1982) and reinforced by Lal (1989). The barriers to mobility and the predetermined path that the values underpinning the caste system postulate, pose serious threat to entrepreneurial efforts (Harrison & Huntington, 2001). Additionally, the inequality which is the direct result of the caste system, leads to less resources and opportunities available to the lower classes which translates to

poverty and more inequality. Deshpande (2001) shows, that lower castes face more deprivation across India and that disparity has persisted for a long time (Kijama, 2006). Also, lower caste members have lower incomes due to the limitations posed by the caste system and the resource allocation of public goods and services across villages in India is also affected by the dimension of the lower classes (Banerjee & Somanathan, 2006). This internalization of the hierarchical norm can rapidly become a poverty trap for the poor (Rao & Walton, 2004). Munshi and Rosenzweig (2006) concentrated their study in Mumbai and found that the caste system played a role on the education choice made.

The caste system underlines Indian society and should not be ignored nor its role on national culture undermined (Gorringe, 2008).

6.2.3. Religion

Dunning (2003) argues that religion and ideological perspective provide a valuable insight to understand management behaviors, which is reinforced by Azmat and Samaratunge (2009).

India was the birthplace of two of the world's most important religions: Hinduism (7000 BC) and Budhism (487 BC). To this day, Hinduism represents more than 85% of the total population of India, as suggested by the World Bank. Hinduism is by far the most predominant religion in India. Many scholars, like Max Weber, have focused on the philosophy of renunciation and fatalism of the Hindu religion to label it anti-entrepreneurial (Tripathi, 1992). Nehru (1985) describes Hinduism as a vague faith which is impossible to define because it is so broad, embracing various beliefs and practices yet it's essential spirit seems to be to live and let live. One of the sacred scriptures the Bhagavat Gita emphasizes the law of karma, and the need to attain spiritual (and not material) well being. The Bhagvat Gita, which is a part of the Mahabharat epic, is a dialogue between Lord Krishna and Arjuna, where He explains the philosophy of action – karma (Mulla & Krishnan, 2006). The law of karma dictates that each action performed (karma) will affect the performer positively or negatively in accordance to the action. There is no action which can escape the law of karma. According to the law of karma, all actions have consequences which can appear as

dispositions (*samskairas*) or physical aspects of the body or the environment. All of these are instrumental in rewarding or punishing the doer according to the merit or demerit of the actions. Karma is a systematic explanation which extends the principle of causation to all realms: human conduct, physical world and moral realm, and is a continuous cycle which transcends time and even life, and does not need any supernatural agent intervention (Reichenbach, 1989). The strong belief in karma has helped perpetuate the caste system because, as Dumont (1980) refers, people have internalized the belief that their inherited status is inevitable as the consequence of actions in past lives. Hinduism and the caste system are so inextricably intertwined that the discussion of one necessarily implies discussing the other.

Other than karma theory, India philosophy has two fundamental beliefs: the existence of a permanent entity called the soul (*athma*) and the doctrine of *mukti* (or salvation). The doctrine of *mukti* postulates that the ultimate reward, the Nirvana, is the escape from the cycle of birth and rebirth known as *samsara* and this can be attained by selflessly performing one's duties in accordance to one's social position. The ideal of self denial and cessation of desire in order to achieve personal salvation is described in the Bhagvat Gita (Kaufman, 2005).

Personal salvation is a result of working hard and in accordance to one's social position (caste system) with the aim of attaining the ultimate goal of oneness with God. Therefore, these religious beliefs lead individuals to work for the improvement of society, with a sense of duty of obligation towards others. In fact, Mulla and Krishnan (2007) found that executives deeply rooted in karma yoga are also more likely to be high on others-oriented (rather than self-oriented) as well as more obedient and more responsible.

The demarcation of professions based on the castes allied to doctrines of self denial supports content passive acceptance of the status quo and can counter entrepreneurship and innovation (Dana, 2000).

Despite its combination of rigid social structures and seemingly constraining cultural values, India has become, in recent years, one of the fastest growing economies in the world (Singh & Krishnan, 2007). This growth and development has led to the

emergence of a sizeable middle class. The opportunities and job prospects available in the cities and towns has motivated the largest rural-urban migration of this century, with more than 10 million people leaving the countryside.

6.2.4. Cultural dimensions

The changes that Indian society is undergoing, with the dislocation from the rural areas to the cities and towns, on the one hand and the growing presence of international firms in India, on the other, has led the younger generations to become more permeable to western values. The Indian work force, one of the largest and youngest in the world, is in closer contact with global values impacting lifestyle, yet Indian society still remains deeply entrenched in its cultural background (Pearson & Chatterjee, 1999).

In accordance to Hofstede's cultural dimensions, Indian society is more collectivist subjugating the individual for the wellbeing of the group. The family and social ties are emphasized in detriment of the individual. The GLOBE results reveal India, as part of Southern Asia cluster, with a strong family and humane orientation - a hallmark of its deep community orientation (Gupta et al., 2009). Family is considered the most important value in Indian society followed by continuity of the family business (Hofstede, Van Deusen, Mueller, Charles & The Business Goals Network, 2002).

Table 6.1. Values in Indian society

India
Most important
Family interests
Continuity of the business
Personal wealth
Patriotism, national pride
Power
Least important
Staying within the law
Creating something new
Responsibility towards employees
Respecting ethical norms
Game and gambling spirit

Source: Adapted from Hofstede et al. (2002)

India, is defined as a respect culture given the high value it registers in terms of Power Distance (77 compared to the world average of 56.5). This score for India indicates a high level of inequality of power and wealth within the society but this is not necessarily subverted upon the population, which tends to accept it as a cultural norm and karmic outcome. The traditional hierarchical social structure of India, rooted in Hindu beliefs and perpetuated by the caste system, emphasizes respect for elders, teachers and superiors (Budhwar, 2001).

Table 6.2. Hofstede's cultural dimensions: India

India	
Power Distance	77
Individualism	48
Masculinity	56
Uncertainty Avoidance	40
Long Term Orientation	61

Source: Adapted from Hofstede (1991)

These national values translate both to the firm and the family circle. In the firm, as a result, management is often autocratic and hierarchical (House et al., 2002). The respect for the elderly and superiors is rooted in the culture and strengthen in the family, as various generations tend to live together. The Indian notion of family is quite extensive including: parents, married sons, their wives and children. The family also extends to include other relatives along the male line of descent, such as the family of the father's brother and father's sister. India is a traditional country and individuals' decisions are expected to be in tune with the family and social structure (Rutten, 2001).

The father-son relationship is quite formal and the son rarely openly disagrees with the father (Dutta, 1997).

India's rather traditional socio-economic context would be expected to be characterized as a high uncertainty avoidance and high power distance country, by Hofstede's cultural dimensions. However, India scores relatively low in terms of uncertainty avoidance although high in terms of power distance (Adler, 2002). This could be due to the unique mix of the rise of capitalism and free market ideas (especially after 1991 with the

liberalization of the economy) coupled with the lingering shadow of the caste system which persists even after being outlawed in 1947 (Carl, Gupta & Javidan, 2004). Also, the low uncertainty can be due to the importance given to karmic fate (Aycan et al., 2000). Indians believe that their destiny is controlled by actions of previous lives and this fatalism inhibits significant change in attitudes and behaviours (Saha, 1992; Husain, 1992; Sahay & Walsham, 1997; Tayeb, 1987).

India scores higher than average on masculinity index, which shows the gender discrimination of the Indian society. This is based on the cultural roles attributed to men and women in society limiting women's access to education and high level jobs (Sinha & Sinha, 1990). In terms of successor choice, the family firms are traditionally passed on to the male members of the family. The leadership role of women in Indian family businesses is relatively limited although they have begun to take on a more active role (Gupta, et al., 2009), as is the case of Roshni Nadar, daughter of HCL Technologies founder Shiv Nadar, who was appointed CEO of the group's holding company in 2009. The Godrej group is another example, where two of Adi Godrej's daughters, Tanya and Nisa, play active roles in the group.

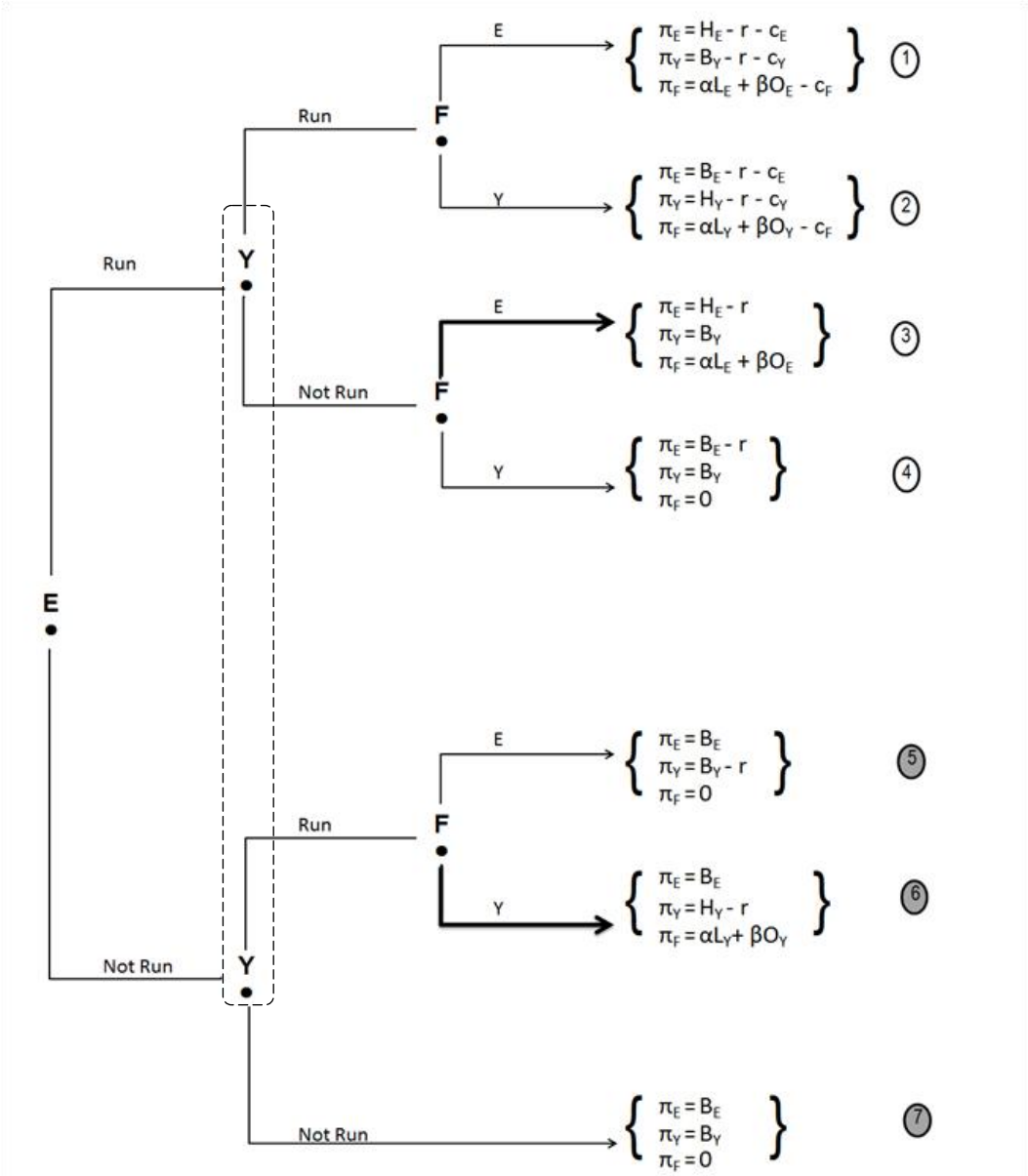
Although the law now allows female members to be named successor this is still not common practice in Indian firms where the primogeniture remains the main form of transfer, and the priority is the family and its well being.

6.3. Model and results

The founder is driven to maximize the sum of the financial and the emotional value of the family firm. The significance attributed to the emotional factors depends on the cultural setting. In Indian culture the family is seen as the centre of social identity and the success of the family firm enhances the family's reputation (Gupta et al., 2009). The family's stability and its wellbeing, on the one hand, and the firm's continuity, on the other, are of fundamental importance. As a result, the emotional factors play a key role in decision making in the family firm.

The younger generation is expected to respect and adhere to the wishes of the senior generations and not doing so results in turmoil in the family, with negative spill over effects in the firm (i.e. high emotional costs). To analyze the impact of the Indian cultural imprint on successor selection in the family firm, the game proposed in Chapter 4 was used, with the variation of the children moving simultaneously instead of sequentially. Figure 6.1 illustrates the game used.

Figure 6.1. Game tree representation



Source: Own elaboration

It is a game with three players: the founder (F), his elder son (E) and his younger son (Y). The children start by simultaneously deciding whether to run or not for the successor position, and subsequently, the founder chooses his successor. The payoffs refer to the benefit that the son has, net of any costs sustained, resulting from the conjunction of his decision with that of his sibling, given the founder's preference to uphold the existing cultural norms. The rankings of the payoffs obtained from this game for both the sons are used. The ranking of the payoffs reflect the order of preference of every strategic outcome for each son. The most preferred is ranked 3 and the least preferred is ranked 1.

Contrary to the American context where the most competent candidate is chosen, disregarding age, gender or bloodline, in India the cultural norms dictate that the elder son be appointed successor (Chrisman et al., 1998). The founder, is assumed to be culturally rooted in the traditional values of Indian culture.

The Indian founder's priorities are to ensure smooth intergeneration succession by appointing the elder son CEO without causing any tension or conflict in the family, and the children are fully aware of that and factor that in when making their decisions. However, as Indian society is changing it is not uncommon for the sons to adopt behaviors and make decisions which might not be in tune with the dominant cultural norms (Mulla & Krishnan, 2006). To analyze the impact of the cultural setting on successor selection three possible scenarios are considered in terms of the children's cultural alignment with the traditional cultural norms:

(i) Both children are aligned;

(ii) The elder son is misaligned;

(iii) Both children are misaligned.[19]

[19] Indian culture places the onus on the elder son, the younger son's cultural alignment is important only when the elder does not act in accordance to what is expected of him.

6.3.1. Both sons culturally aligned

In the first scenario, both sons do what is expected of them and respect traditional cultural values. In other words, E runs for the successor position and Y does not run. However, Y will consider running if he thinks that E will not, as family firm continuity is also a priority. Table 6.3 shows the payoff matrix (in normal form) with the rankings for both sons.

Table 6.3. Both sons culturally aligned

		Younger	
		Run	Not Run
Elder	Run	2,1	3,2
	Not Run	1,3	1,2

Source: Own elaboration

The pair of values in each cell indicates the ranking for each situation, for the elder and the younger son, respectively. For E, his preferred outcome (ranking 3) is to run for the top position in the family firm when Y does not compete for the position. Y prefers to run when E does not, to ensure that the family firm stays in the family. Y knows that although F would rather appoint E, if E is unavailable, then F wants to ensure intergenerational executive succession and so will appoint Y.

When both sons compete for the position it is a losing battle for Y given the founder's predisposition to appoint E, so Y's least preferred option is to run against his sibling.

6.3.2. Elder son culturally misaligned

The elder son who is not aligned with the traditional values of placing the welfare of the family before his own, has different preferences which translate in different rankings, for each strategic outcome. Consider the situation where his top priority is to pursue his career outside the family firm meaning he is unavailable to assume the successor position. As a result, his preferred option is not to run (ranking 3) and his least favored option is to run against his brother. Table 6.4 shows the altered rankings for E (Y's

rankings are unchanged as it is assumed that he maintains his preferences as expressed in the initial situation).

Table 6.4. Elder son culturally misaligned

		Younger	
		Run	Not Run
Elder	Run	1,1	2,2
	Not Run	3,3	3,2

Source: Own elaboration

6.3.3. Both sons culturally misaligned

For both sons who are culturally misaligned Table 6.5 shows their rankings. In this case, both sons rank not to run as their best option. Their second best option is to run if their sibling doesn't run and their least preferred scenario is to run against their sibling. The ranking of the payoffs highlights that although they would both rather pursue their career elsewhere, even at the cost of going against their father, they prefer to safeguard the family from the negative effects that sibling competition can have.

Table 6.5. Both sons culturally misaligned

		Younger	
		Run	Not Run
Elder	Run	1,1	2,3
	Not Run	3,2	3,3

Source: Own elaboration

6.4. Discussion

In this game, both sons decide simultaneously whether or not to run for the CEO position in the family firm and then the father chooses his successor. Each sibling, when making his decision, anticipates the father's decisions and considers his brother's decision making process, knowing that his brother is doing the same. The perfect Nash equilibrium of this subgame refers to the strategy of each player choosing his best response, when none can improve his payoff by unilaterally changing his strategy, and this is true of all subgames of the game.

The subgame perfect Nash equilibrium (SPNE), when both the sons uphold the cultural norms is: Y not run, E run and F appoints E his successor. When both E and Y are culturally aligned with the Indian cultural norms, then firm intergenerational continuity is ensured and family harmony maintained as there is no competition between the brothers nor any tension resulting from going against their father's wishes.

When the elder son prefers to opt for a career outside the family firm, incurring in the emotional cost of going against his father's wishes, his preferred option is to not run, even if that means that the family firm intergenerational continuity is not assured. He is willing to sacrifice family harmony, by opposing his father, as well as risking the family firm's executive control not staying in the family - two fundamental values of Indian culture. Assuming that the younger child acts in accordance to what is expected of him and is available to run for the CEO position, then intergenerational executive succession will be secured.

Finally, when both children are more individualist and less subservient to their father and prefer to pursue their career outside the family firm, this comes at a cost to the family and to the firm. The children choosing to put themselves, rather than the family first gives rise to tension between them and their father which transposes to the family and jeopardizes family harmony. The SPNE in this situation, is for both children not to run, which will mean that family firm's executive control will not remain in the family. From the stance of the family and the firm this is the worst possible result, damaging family harmony and inhibiting intergenerational managerial succession of the family firm.

The results show that when the children adopt behaviours which are not in line with the cultural norms, this impacts successor selection in the family firm and destabilizes the family, due to the tension created in the father/son relationship. Intergenerational succession is secured when at least one of the children is culturally aligned, and acts according to the Indian cultural norms. In practical terms, enhancing cultural alignment will safeguard family harmony and ensure intergenerational executive continuity.

6.5. Summary

The findings show that when at least one son, acts in accordance to what the cultural norms and values of society dictate, then the successor selection outcome will ensure that intergenerational managerial succession is secured and family harmony maintained, even at the cost of sacrificing the child's dreams and individual ambitions. In the opposite case, when both the children adopt behaviors divergent to the dominant cultural norms, there will be father/child tension jeopardizing family harmony, in the family circle and in the business sphere the firm's executive control will not stay in the family.

The results substantiate that the dynamic process of culture creation and management are the essence of leadership and so leadership and culture should be seen as two sides of the same coin, as argued by Schein (2004). In practical terms, the findings illustrate the importance of family firm leaders in promoting cultural diffusion and value congruency in the family, to ensure harmony and firm longevity.

Chapter 7

THE EXPERIMENT

7. THE EXPERIMENT

7.1. Introduction

Experimental economics is particularly well suited to study game theory. It is the most appropriate tool to carry out the empirical step of economic inquiry (Fontaine & Leonard, 2005). The empirical research in game theory provides the unique opportunity to empirically test the theoretical predictions with real behavior of individuals. Although the use of experimental methods in game theory has progressed in the recent past, contributing to a better understanding of human behavior in different strategic decision making, it has not yet been applied to the field of family firm succession. Such research is important to broaden the understanding of one of the most critical stages of the family firm.

Experimental economics studies economic behaviour, in the laboratory, resorting to methods developed by the natural sciences. It is a relatively young field but has received wide recognition especially after the Nobel Prize was awarded to Vernon Smith and Daniel Kahneman in 2002 (other Nobel laureates such as: Selten -1994; Ostrom -2009 and Roth -2012 made important contributions to the advancement of this methodology).

"*Economists have increasingly turned to the experimental model of the physical sciences as a method to understand human behavior"* (Levitt & List, 2007, p. 153).

The use of experimental economics is a novelty in the field of family firm succession. Experimental economics is a natural complement to game theory (Roth, 2002). This chapter describes the experiment which was conducted to test the equilibrium results obtained by the use of game theory.

The game presented in Chapter 4 was used, with the dissimilarity of the children moving simultaneously rather than sequentially. This variation widens the game's application to include families where there is deficient communication resulting in information gaps between the members. This game extends the founder/son communication traps, presented by Michael-Tsubari and Weiss (2013) to address deficient communication between siblings.

In families where there is little communication and individual decisions are made without discussing, consulting or informing the remaining members. The lack of communication between siblings can have very negative effects on the family and on the firm.

The Chadha brothers of the Indian conglomerate Wave is a very extreme case, where the lack of communication lead to discussions in the firm and ended in a deadly shoot out. Indeed that case is an exception but deficient communication between siblings, especially during the succession process is not an uncommon situation. The lack of communication between the Preve brothers triggered the split of the Italian rice-maker, Riso Gallo.

In this chapter the modeled game can be used to study families where siblings do not have fluid communication channels, which means they make decisions without the knowledge of what the other decides. Using a one shot succession game where the siblings move simultaneously, the game enables incorporating siblings who do not communicate nor coordinate their actions.

This chapter starts by presenting the modeled game and its theoretic results. Then the case to be tested, and its parameterization, is presented. This is then followed by the description of the design, procedures and results of the experiment. Subsequently the results are analyzed and the main conclusions close the chapter.

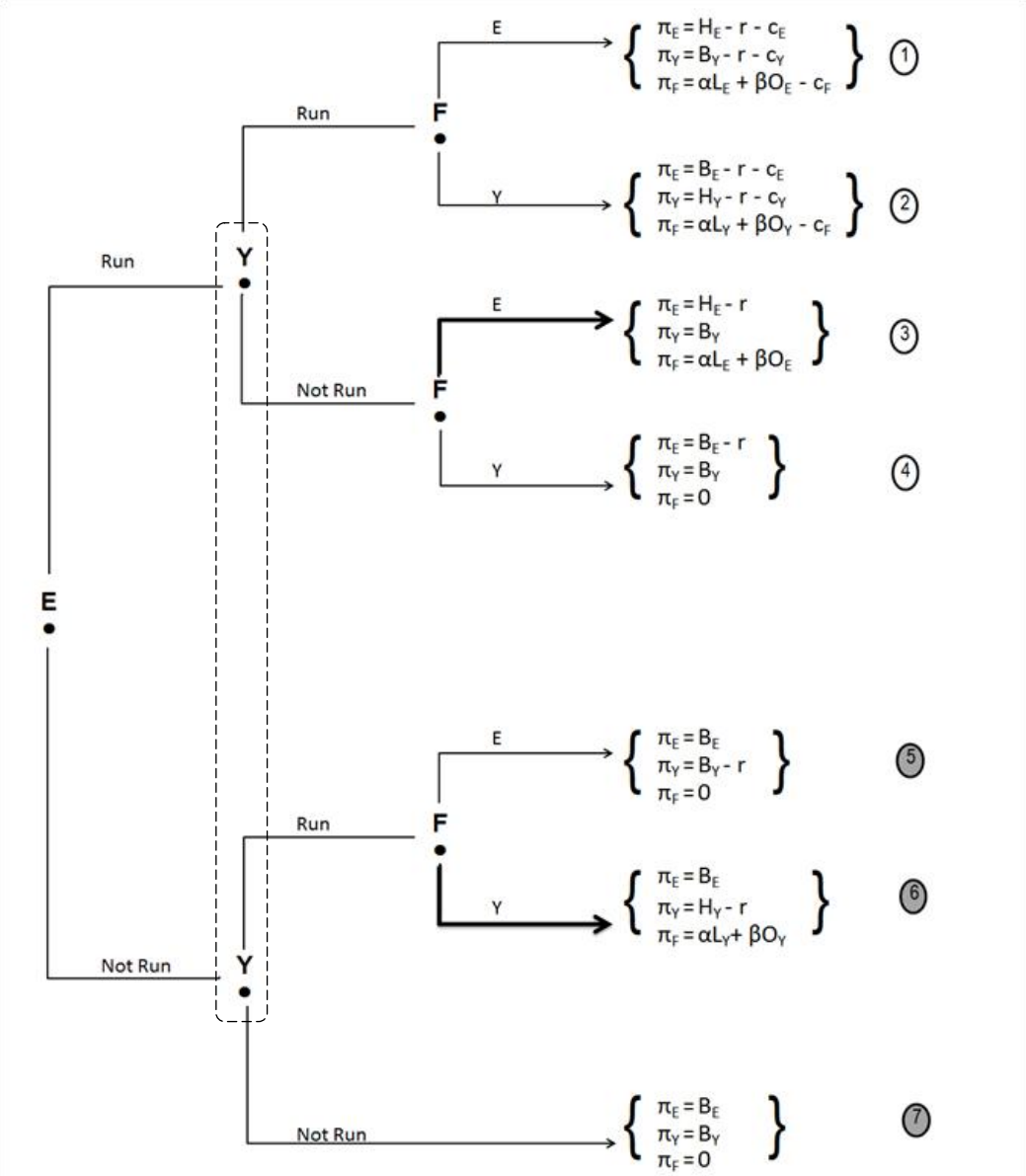
7.2. Model

7.2.1. Game structure

The successor selection game, which will be tested in the laboratory, is of complete and imperfect information. The game starts by the founder's children (Elder and Younger) simultaneously deciding whether to run or not run for the successor position. Then the Founder chooses his successor.

Figure 7.1 illustrates the game.

Figure 7.1. Game tree representation



Source: Own elaboration

This is a one-shot game (i.e. it is played only once). In contrast to the game presented in Chapter 4 where the siblings played sequentially, in this case they move simultaneously. The siblings make their decisions in ignorance of each other and cannot coordinate their plays. The dotted line in Figure 7.1 illustrates that Y and E play simultaneously.

7.2.2. Results

The backward induction technique is employed to reach the equilibrium solutions. Starting from the final node, which refers to the founder's decision, when E runs and Y does not, F will appoint E, so path 4 will not be played. Similarly, when E does not run and Y runs for the successor position, then F will appoint Y (path 5 will not be played). In other words, in those situations, path 3 and path 6 are always played (marked by darker line in the game tree). When both children compete for successor nomination, then the founder who prefers Leadership skills to Family Orientation, $\alpha(L_E - L_Y) > \beta(O_Y - O_E)$, will opt for E whereas Y will be chosen if the founder prefers Family Orientation to Leadership skills, $\alpha(L_E - L_Y) < \beta(O_Y - O_E)$.

Given that this game is of complete information, all the players are fully aware of the available strategies and corresponding payoffs to all. Therefore, the children when making their decisions anticipate what the founder will do and take that into account. Table 7.1 represents in normal form the children's simultaneous subgame move, according to the founder's preferences. Each cell has the payoffs of E and Y (respectively) for each possible combination of plays.

Table 7.1. Sibling subgame Nash equilibirum

Founder prefers Leadership skills

		Younger: Run	Younger: Not Run
Elder	Run	$H_E - r - C_E$, $B_Y - r - C_Y$	$H_E - r$, B_Y
	Not Run	B_E, $H_Y - r$	B_E, B_Y

Founder prefers Family Orientation

		Younger: Run	Younger: Not Run
Elder	Run	$B_E - r - C_E$, $H_Y - r - C_Y$	$H_E - r$, B_Y
	Not Run	B_E, $H_Y - r$	B_E, B_Y

Source: Own elaboration

To find the subgame perfect Nash equilibrium (SPNE) it is necessary to identify E and Y's best response given the other's best option, and we shall focus only on a founder who prefers Leadership skills to Family Orientation[20]. If E chooses not to run ($B_E > H_E - r$), then Y compares his payoffs between running ($H_Y - r$) and not running (B_Y) and will

[20] For a founder who prefers Family Orientation to Leadership skills, $\alpha(L_E - L_Y) < \beta(O_Y - O_E)$, the logic is exactly the same but applied to the other matrix shown in Table 7.1.

opt to not run if $B_Y > H_Y - r$. The SPNE, identified in Table 7.2 by the grey shaded cell, results in no intergenerational succession (path 7).

Table 7.2. Sibling subgame Nash equilibrium – Case 1

If $B_E > H_E - r$ and $B_Y > H_Y - r$

		Younger	
		Run	Not Run
Elder	Run	$H_E - r - C_E, B_Y - r - C_Y$	$H_E - r, B_Y$
	Not Run	$B_E, H_Y - r$	B_E, B_Y

Source: Own elaboration

If Y opts to run ($B_Y < H_Y - r$) and in the case that E values his career outside the family firm more then equilibrium path will be path 6. The SPNE is shown in Table 7.3 by the grey shaded cell. In this case the equilibrium path will be path 6. The SPNE is shown in Table 7.3 by the grey shaded cell.

Table 7.3. Sibling subgame Nash equilibrium – Case 2

If $B_E > H_E - r$ and $B_Y < H_Y - r$

		Younger	
		Run	Not Run
Elder	Run	$H_E - r - C_E, B_Y - r - C_Y$	$H_E - r, B_Y$
	Not Run	$B_E, H_Y - r$	B_E, B_Y

Source: Own elaboration

Now consider that E wants to succeed F ($B_E < H_E - r$) but not at the cost of competing against his brother ($B_E > H_E - r - CE$). In this case, if Y doesn't run E will run for the top position in the family firm, resulting in equilibrium path 3 being played. And if Y runs then E prefers to not run, resulting in equilibrium path 6. Table 7.4 shows both possible SPNE in this particular case.

Table 7.4. Sibling subgame Nash equilibrium – Case 3

If $H_E - r - c_E < B_E < H_E - r$ and $B_Y < H_Y - r$

		Younger	
		Run	Not Run
Elder	Run	$H_E - r - C_E$, $B_Y - r - C_Y$	$H_E - r$, B_Y
	Not Run	B_E, $H_Y - r$	B_E, B_Y

Source: Own elaboration

For all other cases, the equilibrium path will be path 3. The SPNE is shown in Table 7.5 by the grey shaded cell.

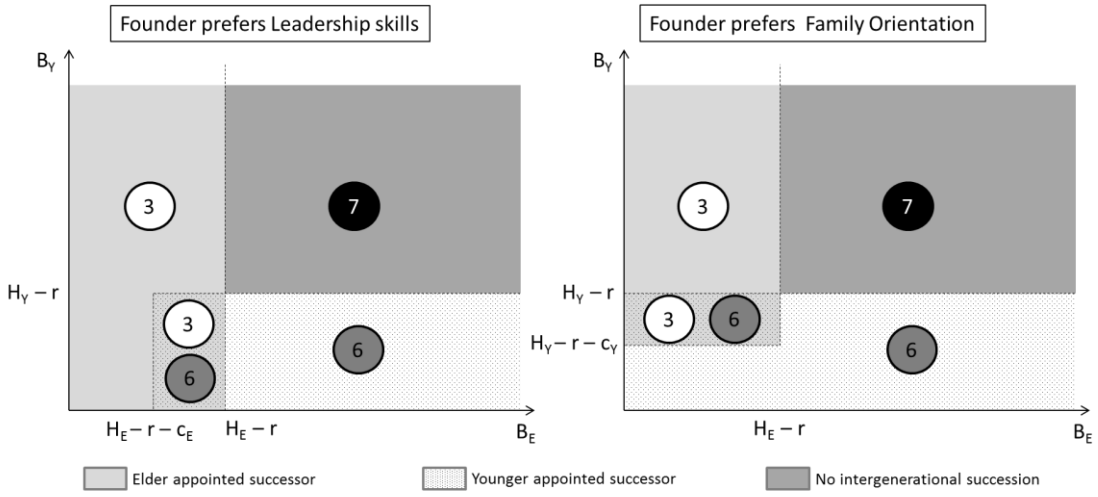
Table 7.5. Sibling subgame Nash equilibrium – All other cases

		Younger	
		Run	Not Run
Elder	Run	$H_E - r - C_E$, $B_Y - r - C_Y$	$H_E - r$, B_Y
	Not Run	B_E, $H_Y - r$	B_E, B_Y

Source: Own elaboration

Figure 7.2. illustrates the equilibrium paths and resulting successor outcomes of all these possible combination of situations, in accordance to the founder's preferences.

Figure 7.2. Equilibrium paths and successor outcomes



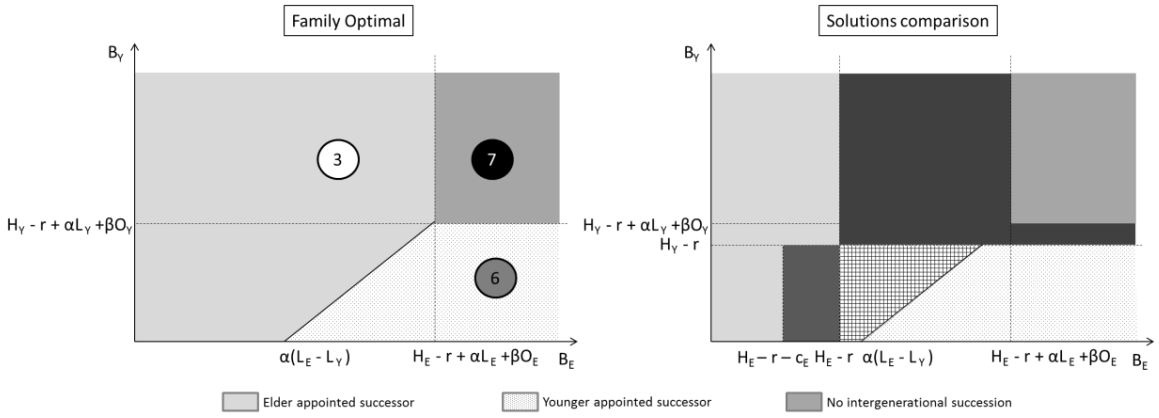
Source: Own elaboration

When both children prefer to pursue their careers outside the family firm ($B_i > H_i - r$) then the family firm's executive control will not stay in the family. When only one child runs for the position he is appointed successor. For instance, when only the younger child pursues the successor position (i.e. $B_E > H_E - r$ and $B_Y < H_Y - r$) then the equilibrium path is path 6 and he becomes the new CEO of the family firm.

The successor outcome only varies in accordance to the founder's preference when the siblings compete for the top spot in the family firm ($B_i < H_i - r$). When the founder values Leadership Skills more than Family Orientation, i.e. $\alpha(L_E - L_Y) > \beta(O_Y - O_E)$, E will be successor if he runs for the position ($B_E < H_E - r$) but when $H_E - r - c_E < B_E < H_E - r$ and $B_Y < H_Y - r$ the successor outcome could also be Y, as in this particular interval there are two possible Nash equilibriums. In that interval both path 3 and path 6 are equilibrium paths, which means that E or Y being appointed successor are possible Nash outcomes.

From a family stance not both of those Nash equilibrium are optimal. Focusing when the founder prefers Leadership Skills to Family Orientation, i.e. $\alpha(L_E - L_Y) > \beta(O_Y - O_E)$, consider for instance the case when both children place the same value to becoming the new head of the family firm ($H_E = H_Y$), and have the same family orientation level ($O_E = O_Y$) but in terms of leadership skills E is more endowed than Y ($L_E > L_Y$) and that $H_E - r < \alpha(L_E - L_Y)$. Figure 7.3 shows the family optimal outcomes for that situation.

Figure 7.3. Family optimal outcomes



Source: Own elaboration

It is evident that when the family members collaborate, in order to maximize the family's aggregate payoff, there is a greater propensity for the firm's executive control remaining in the family. This is illustrated by the dark shaded L shaped area in Figure 7.3.

Additionally, the results show that when decisions are made with the concern of maximizing the payoff of the family as a unit, path 3 is more predominant. When the family makes decisions as a group, there is an increased propensity of the firm's executive control being passed on to the founder's preferred successor. This is shown by the checkered triangular area in Figure 7.3.

Notice that the shaded grey rectangle area is the case in analysis (when H_E-r-c_E <B_E<H_E-r) where there are two possible Nash equilibrium resulting from path 3 and path 6. From a family stance, equilibrium Path 3 is preferred to equilibrium path 6, as the family's aggregate payoff is maximized when E is named successor.

Therefore, focusing on a founder who values Leadership Skills more than Family Orientation i.e. $\alpha(L_E - L_Y) > \beta(O_Y - O_E)$, the theoretical predictions show that:

(i) There is the case of a Nash equilibrium which is not family optimal (The dark shaded L shaped area and the chequered triangular area in Figure 7.3);

(ii) There is the case of multiple Nash equilibrium, where only one of the those is family optimal (the shaded grey rectangle in Figure 7.3);

(iii) There is the case of a Nash equilibrium which simultaneously is also the family optimal outcome (all the remaining areas of Figure 7.3).

7.2.3. Experimental case

The experiment should test one of the three cases presented above. As in the particular case of multiple Nash equilibrium, theory cannot determine, in some cases, which path will be played so the experiment will contribute by drawing some light on that choice.

As suggested by Crawford (1995) experimental research makes an important contribution in indentifying which Nash equilibrium is played when faced with

multiple. The case with the two Nash equilibrium will be tested in the laboratory (denoted Case 3 in section 7.2.2 and represented in Table 7.4).

Therefore, from the three possible situations, the experiment will focus on the case with two Nash equilibriums (with one of them is socially optimal) so as to test whether the theoretical predictions are confirmed in the experimental outcome and also explore if the socially outcome is played.

Table 7.6 characterizes the case and the theoretically predicted results.

Table 7.6. Characterization of case

Conditions	Results
$\alpha(L_E - L_Y) > \beta(O_Y - O_E)$	
$H_E=H_Y$; $O_E=O_Y$; $L_E>L_Y$; $H_E - r < \alpha(L_E - L_Y)$	Nash equilibrium: Younger successor (path 6) or Elder son successor (path 3)
$H_E - r - c_E < B_E < H_E - r$	Family Optimal: Elder son successor (path 3)
$B_Y < H_Y - r$	

Source: Own elaboration

The parameter values used for each case are summarized in Table 7.7.

Table 7.7. Parameter values

Parameters Values			
B_E	14	α	2
B_Y	14	β	1
H_E	20	O_E	2
H_Y	20	O_Y	2
r	5	c_E	2
L_E	12	c_Y	4
L_Y	4	c_F	6

Source: Own elaboration

Table 7.8. Payoff matrix

Children Payoffs

Father chooses E		Younger	
		Run	Not Run
Elder	Run	(13, 5)	(15,14)
	Not Run	(14, 9)	(14, 14)

Father chooses Y		Younger	
		Run	Not Run
Elder	Run	(7, 11)	(9, 14)
	Not Run	(14, 15)	(14, 14)

Father Payoffs

Father chooses E		Younger	
		Run	Not Run
Elder	Run	20	26
	Not Run	0	0

Father chooses Y		Younger	
		Run	Not Run
Elder	Run	4	0
	Not Run	10	0

Source: Own elaboration

The theoretically predicted equilibrium paths are:

(i) Elder – Run; Younger – Not Run and Father- Chooses Elder (Path 3) : This is the family optimal outcome

Table 7.9. Theoretical predictions: equilibrium path 3

Children Payoffs

Father chooses E		Younger	
		Run	Not Run
Elder	Run	(13, 5)	(15,14)
	Not Run	(14, 9)	(14, 14)

Father Payoffs

Father chooses E		Younger	
		Run	Not Run
Elder	Run	20	26
	Not Run	0	0

Source: Own elaboration

(ii) Elder – Not Run; Younger –Run and Father- Chooses Younger (Path 6)

Table 7.10. Theoretical predictions: equilibrium path 6

Children Payoffs

Father chooses Y		Younger	
		Run	Not Run
Elder	Run	(7, 11)	(9, 14)
	Not Run	(14, 15)	(14, 14)

Father Payoffs

Father chooses Y		Younger	
		Run	Not Run
Elder	Run	4	0
	Not Run	10	0

Source: Own elaboration

The Nash equilibrium predictions assume that the players are rational and sophisticated, in the sense they exercise foresight and consider the subsequent player's moves in their strategic decision making process. However, in practice, this might be problematic and players may be myopic resulting in outcomes which are not Nash equilibrium.

Additionally there is an added strategic uncertainty which results from the multiple equilibrium and as a consequence tends to reduce the probability of coordination (Huyck, Battalio & Beil, 1990). In the experimental case, although both the children's payoffs are quite similar they have mirror reflection payoffs in both Nash equilibrium outcomes. As one of those Nash equilibrium outcomes is also the family optimal, it is theoretically predicted it will have the most drawing power (McMillan, 1986).

7.3. Experimental design

7.3.1. Objective

The experiment which is conducted aims to confront the observed behavior to the theoretically predicted outcome (presented above). The experiment will address the following questions:

1. Are the experiment outcomes the predicted by the Nash equilibrium?
2. Do the players play the family optimal outcome?
3. In the presence of two Nash equilibrium what do the players do?

7.3.2. Physical environment and software

All the experimental sessions (including the pilot test) were conducted in the Univeristy of Aveiro's Behavioural and Experimental Lab in Economics and Management (BELEM) of the Department of Economics, Management and Industrial Engineering. This experiment also marked the launching of BELEM, which aims to be an innovative laboratory in Portugal. The lab will offer sixty computers all working in the same network which will be BELEM's flagship to attract international researchers.

The experiment was conducted in the computerized laboratory with 15 separate booths[21] ensuring the privacy of the participants. No communication between the subjects was allowed. The experiment was implemented using the z-Tree (Fischbacher, 2007) software.

7.3.3. Subject pool

The subjects were recruited from the pool of undergraduate finalists and graduate students of the Department of Economics and Management of the University of Aveiro. A total of 45 students participated out of which 55% were male. The average age of the sample was of 21 years, with more than 90% pursuing an economics or management degree.

7.3.4. Incentives

In addition to the 5 euros participation fee, each subject was paid according to the total payoffs points received in four, randomly determined, repetitions. Each point was worth 5 cents. This procedure was implemented to avoid wealth effects. The mean earnings in the experiment was of 7,30 euros, including the participation fee (this is higher than the student's opportunity cost).

7.3.5. Procedures

The three sessions were conducted in the BELEM of the University of Aveiro (Portugal) in November 2015.

Each session had a total of 15 subjects. Prior to the game, each subject was randomly and anonymously assigned to a fixed group for the duration of the session. Each session had 5 groups composed of 3 subjects, who were randomly assigned a role identified as

[21] See Appendix II for photos.

Member 1, Member 2 or Member 3 (E, Y or F, respectively). Each subject participated in 20 repetitions of the same game. Each session lasted approximately 1 hour.

At the beginning of each session the instructions,[22] appeared on each subject's individual computer screen, and were also read out loud. These covered the rules of the game and the table of payoffs for each player for all possible combination of actions. The players were informed that they should play each game independently and should try and maximize their payoffs in each repetition of the game. This was reinforced by the incentive payment method.

Once the preliminary instructional phase was concluded and, before the session began, each subject was asked to answer a brief socio demographic questionnaire, as suggested by Guala (2005).

The formal experiment session was then initiated. Member 1 and Member 2 (E and Y, respectively) started by, simultaneously, making their choice between Option A and Option B (Run and Not Run, respectively). Each time the subjects were called to make their choice the payoff matrix was presented on their computer screen so they were aware of the payoffs for each possible combination of actions.

They were also reminded that Member 3 only plays after both Member 1 and 2 had played. What both Member 1 and Member 2 choose was shown on Member 3's screen, along with the payoff matrix. Member 3 then was called to play choosing between Option A and Option B (appointing E or Y successor, respectively).

The players had 60 seconds to make their decisions and this time was shown on the upper right corner of the screen. This indication was merely to discourage players taking too long, and if the time was exceeded they could stay play.

At the end of the game all players were informed of the combination of actions taken by all the members of the group and corresponding payoffs. In each of the 3 sessions, the game was repeated 20 times. Camerer (2003) defends than even in one shot games it is important that the experiment repeats the game in order to allow learning.

[22] The instructions and information were provided in Portuguese (native language of the participants). What each player observed on the computer screen is included in the Appendix III.

At the end of the session each player's screen informed the player which four games were randomly selected for payment and respective value. The players were individually and privately paid.

7.3.6. Pilot test and adjustments

A pilot test was conducted with a total of 6 teachers of the Economics and Management Faculty of the University of Aveiro. The players were randomly divided into two groups and attributed a role (Member 1, 2 or 3). The instructions appeared on their individual screens and were also read to them before starting the game.

They were asked to play each repetition of the game as an independent game. The participants of the pilot test were not paid. No substantial glitches or adjustments were deemed necessary after the pilot testing phase.

Table 7.6. provides a summary of the experimental design.

Table 7.11.Experimental design: summary

Preliminary	Aim of Experiment	1. Are the experiment outcomes the predicted by the Nash equilibrium? 2. Do the players play the family optimal outcome? 3. In the presence of two Nash equilibrium what do the players do?
	Physical Environment	Behavioural and Experimental Lab in Economics and Management (BELEM) of Aveiro University
	Software	zTree software
	Subject Pool	45 students distributed in 3 sessions In each session there were 5 groups of 3 players
	Incentives	Payment of fixed value of 5 euros and a variable value of 0,05 cents indexed to the payoffs obtained Payment of a predetermined set of 4 games randomly selected Average payment per student was 7,30 euros Subjects paid individually and privately
	Instructions	Were provided to all subjects Were clear and opt for neutral terms to address subject roles and actions
	Pilot Test	Tested all the fundamental aspects of the experiment Unpaid test performed with Aveiro University faculty
Formal Experiment	All the data of the experiment was registered and data analyzed	

Source: Own elaboration

7.4. Results and discussion

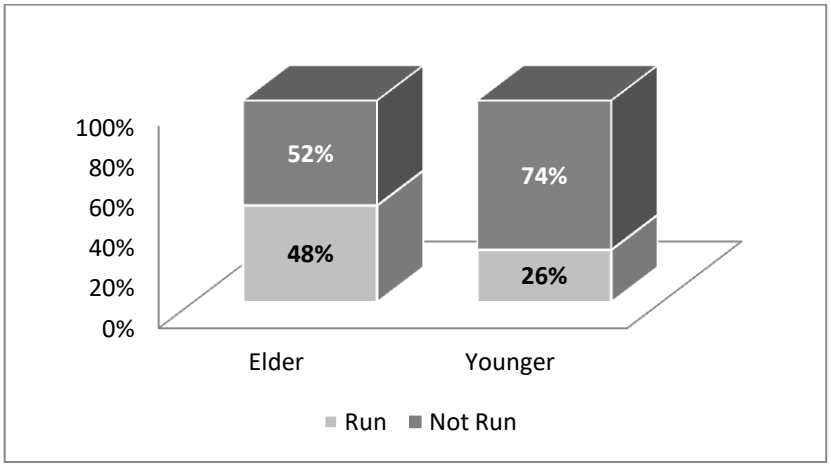
7.4.1 Descriptive Statistics

7.4.1.1 Decision analysis

In the experiment there were a total of 45 subjects distributed between three sessions: 15 subjects, representing the Elder child (denoted Member 1), whose decisions are referred to as Decision 1; another 15 subjects, representing the Younger child (denoted Member 2) whose decisions are referred to as Decision 2; and another 15 denoted as Member 3 (representing the Founder), whose decisions are referred to as Decision 3.

The siblings decide between running or not for the successor position. The experimental data[23] shows how the sum of the players representing the children (Elder and Younger), played.

Figure 7.4. Children's decisions



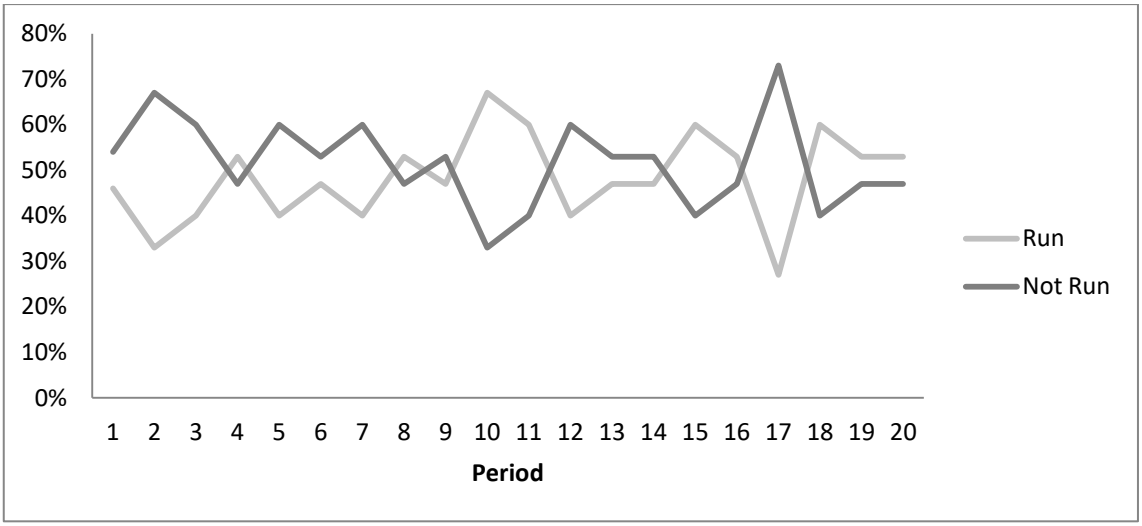
Source: Own elaboration

The younger child predominantly opts to not run whereas the elder is more divided between both the options.

That trend is highlighted in Figure 7.5 which illustrates the decisions that all the subjects representing E made during the 20 repetitions of the game. Each of the repetition is defined as a period.

[23] The data is presented in Appendix IV.

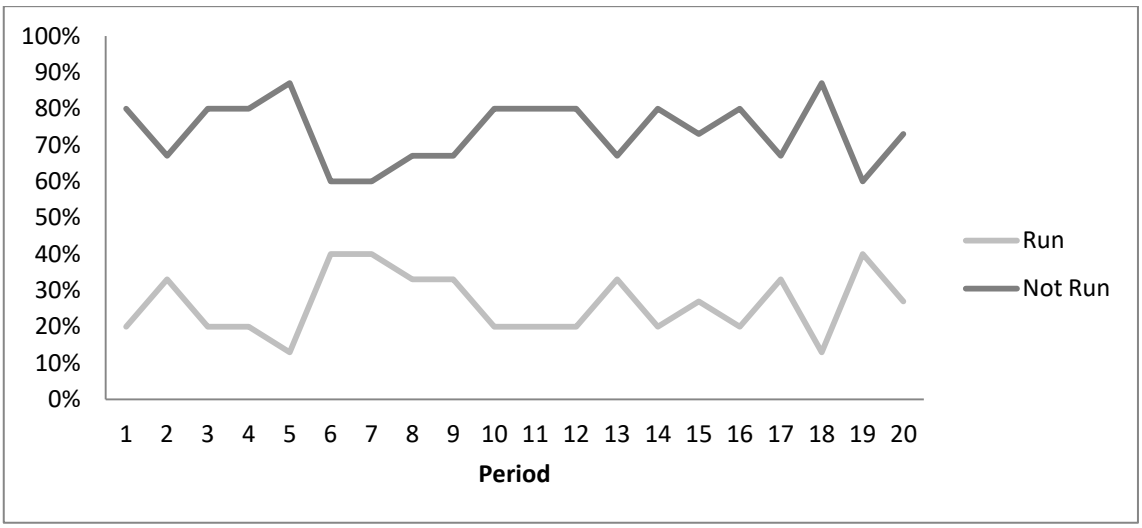
Figure 7.5. E decisions over time



Source: Own elaboration

The younger child, on the other hand, clearly prefers to play not run. For Y, not run is a dominant strategy when the founder chooses the elder. If Y chooses run and F chooses E then Y payoff will be 5 whereas if Y had opted to not run he would have received 14. Whilst, for E, in a similar situation the reduction in payoff is less accentuated (from 14 to 7). The payoff matrix shows that F prefers to appoint E; to avoid the risk of losing 75% of the potential payoff, Y avoids to run (as Figure 7.6 shows).

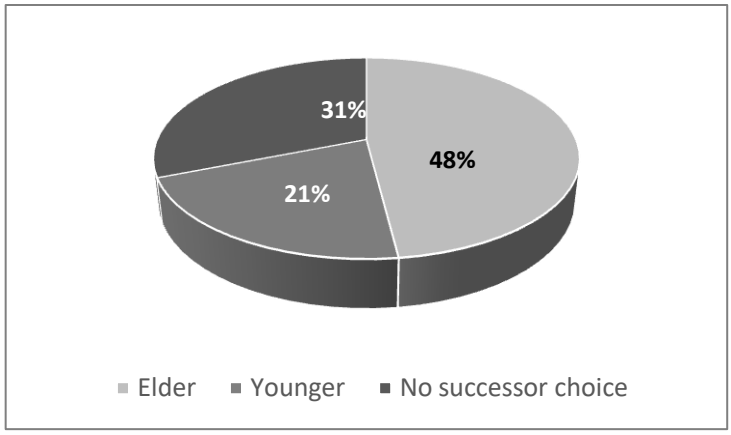
Figure 7.6. Y decisions over time



Source: Own elaboration

Figure 7.7 illustrates the founder's decisions. F can either choose to appoint E or Y, however when none of his children show interest in running for the CEO position in the family firm then intergenerational succession is jeopardized and the father is not called to play.

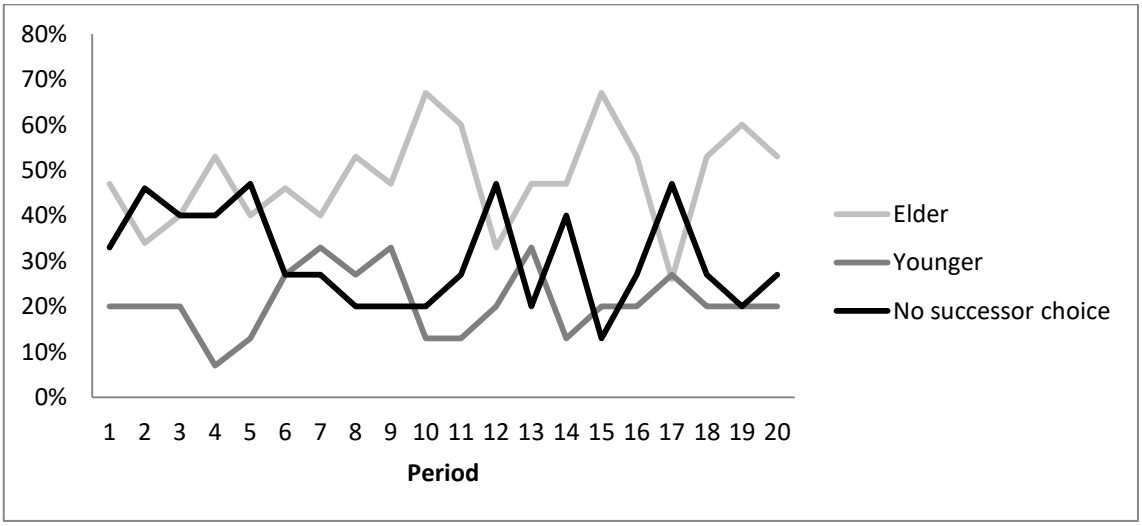
Figure 7.7. F decisions



Source: Own elaboration

On average, for approximately 3 out of the 20 repetitions of the game in each session, E and Y were unavailable to take over the executive control of the family firm, leaving the founder with no successor choice.

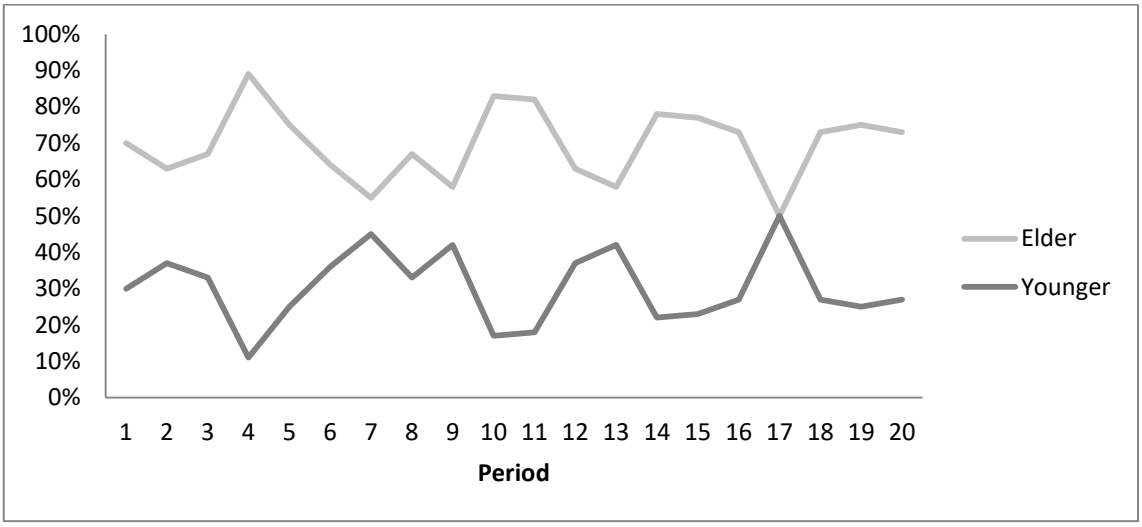
Figure 7.8. F decisions over time



Source: Own elaboration

The founder is not called to play between 20 and 45% of the 15 games played in each period, as is shown, above, in Figure 7.8.

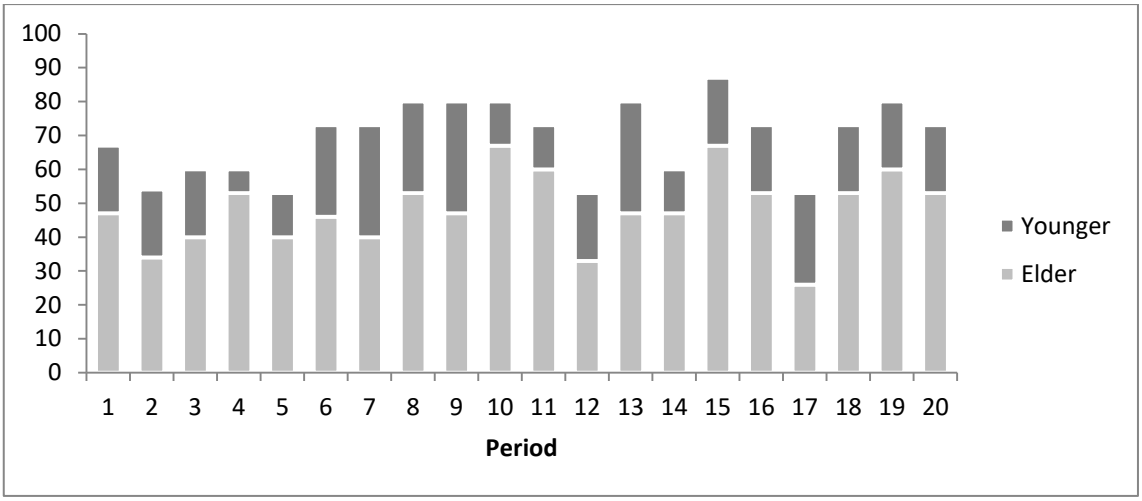
Figure 7.9. F successor choice



Source: Own elaboration

When the founder is called to play he prefers E to Y, as is evident in Figure 7.9 (due to the payoff he obtains). The only exception is period 17, where there is a draw.

Figure 7.10. F successor choice over time



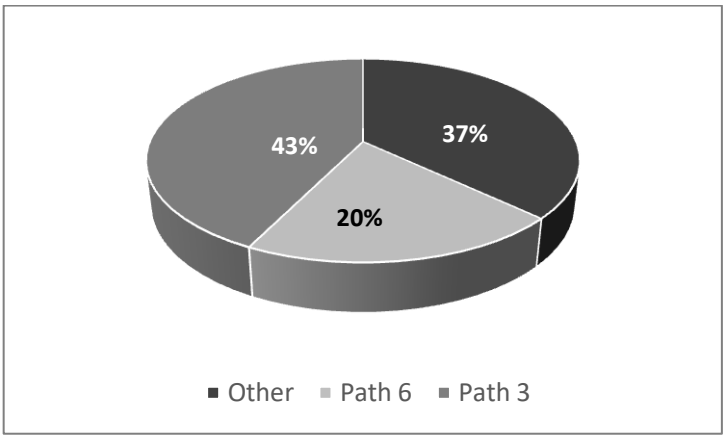
Source: Own elaboration

Period 17 coincides with one of the periods where the founder is least called to play. Notice for instance in period 15, when F is called to make a decision in 80% of the games and chooses E more than two thirds of the time.

7.4.1.2 Path analysis

To study the combination of the decisions of the three elements in each game, is possible by analyzing the paths and subsequent successor outcomes.

Figure 7.11. Path outcomes

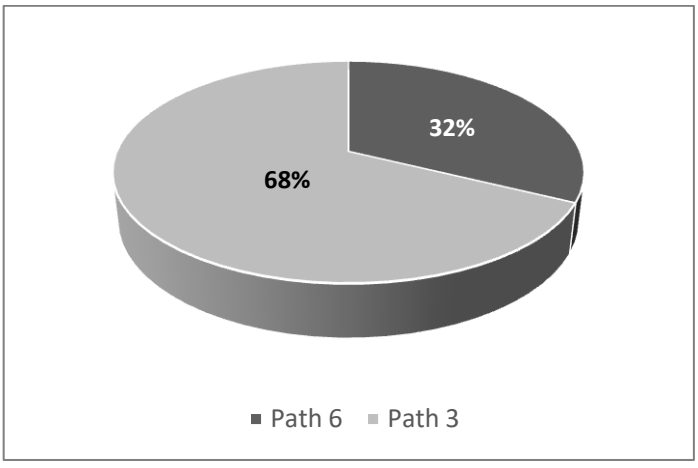


Source: Own elaboration

Path 6 and path 3 result in Y and E being appointed successor, respectively. Both those paths lead to Nash equilibrium outcomes.

The experimental data shows that in 63% of the outcomes were Nash equilibrium, so the theoretical predictions of the model are in the vast majority of times played.

Figure 7.12. Nash equilibrium outcomes

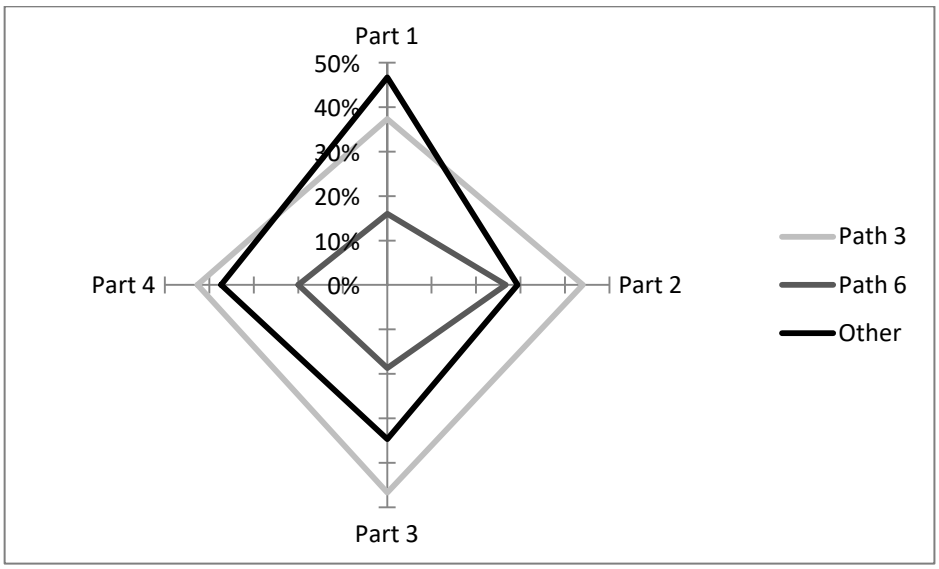


Source: Own elaboration

As presented earlier both path 6 and path 3 are equilibrium paths however path 3 also results in the family optimal outcome. Figure 7.12 shows that in more than 2/3 of the times the equilibrium Path 3 was played, the players opted for the path which maximized the family aggregate payoffs.

As mentioned above, in all sessions the game was repeated 20 times, these periods were divided into four parts: Part 1 included period 1 to 5; Part 2 went from period 6 to 10; period 11 to 15 is Part 3 and finally Part 4 encompasses period 16 to 20.

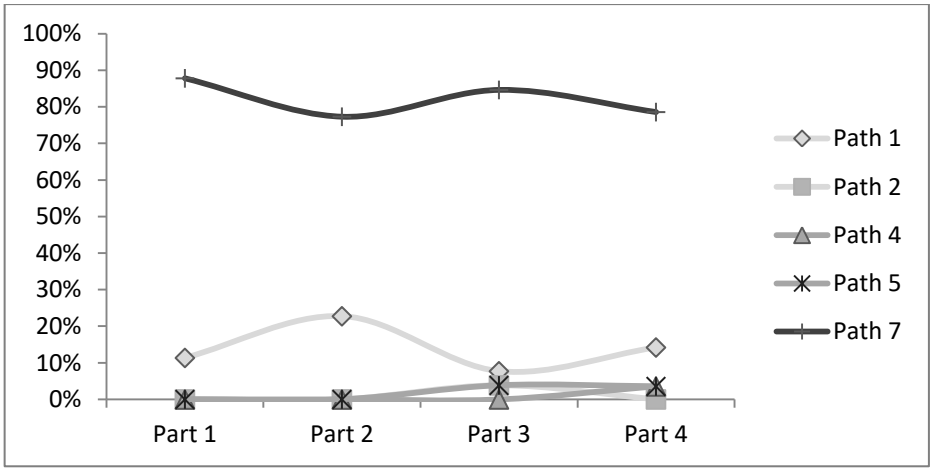
Figure 7.13. Equilibrium path outcomes per part



Source: Own elaboration

Overall, the other paths (refers to all non equilibrium paths) is quite significant but path 3 is the predominant outcome. In the course of the experiment initially, there is an increase in the times the equilibrium path is played, which is evident from Part 1 to Part 2, where there is an increase in the times path 3 and 6 are played in detriment of other paths. Although in subsequent Parts 3 and 4 there is a slight reversal of that trend and the family optimal path (path 3) is the most recurrent outcome in the final stages of the game (as opposed to what happened in the initial stages of the experiment).

Figure 7.14. The other paths

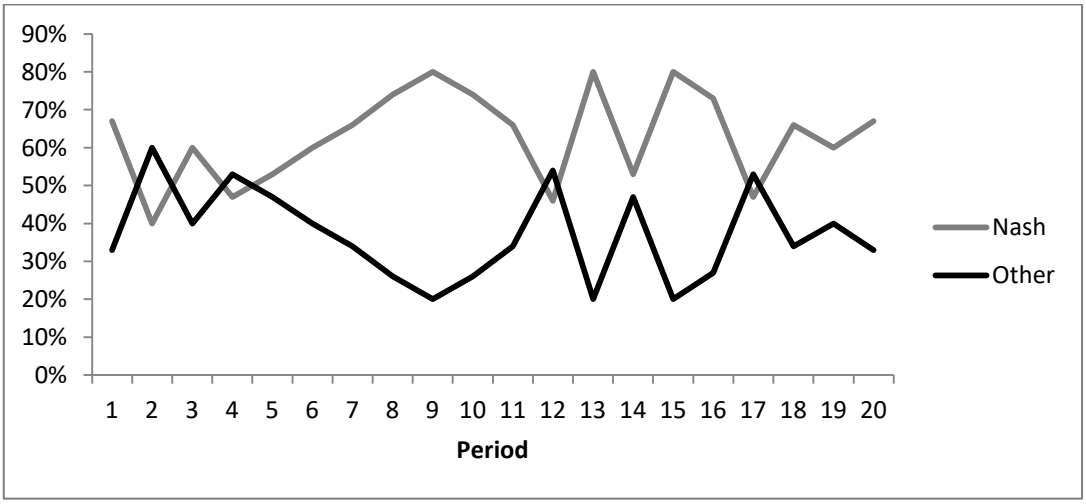


Source: Own elaboration

In terms of the non equilibrium paths, path 7 is the most played. path 7 is when both the children decide to pursue their careers outside the family firm. This explains the elevated number of times F isn't called to play as referred earlier. path 1, which is when siblings compete for the successor position, is played approximately 15% of the time, whilst the other paths are not significant.

Analyzing the paths played over the course of the 20 periods it is quite evident that the equilibrium paths are the most played. Although there is quite a lot of fluctuation during the course of the experiment, there is an increase in the tendency of the equilibrium paths being played.

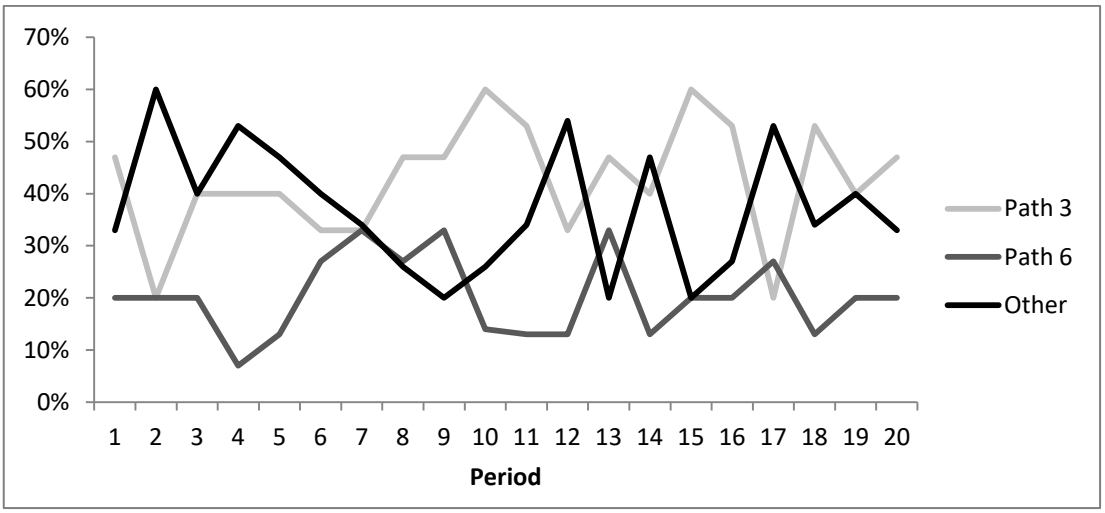
Figure 7.15. Equilibrium vs. Other paths



Source: Own elaboration

Figure 7.16, shows that path 6, starts to be played in approximately 20% of the games and registers a steady increase until period 7 then it fluctuates and levels back to the initial 20% level by the end of the experiment. In terms of equilibrium paths, path 3 is more often played than path 6 with the exception of period 17. The other paths fluctuates significantly, ranging from 20% to 60% of the paths played.

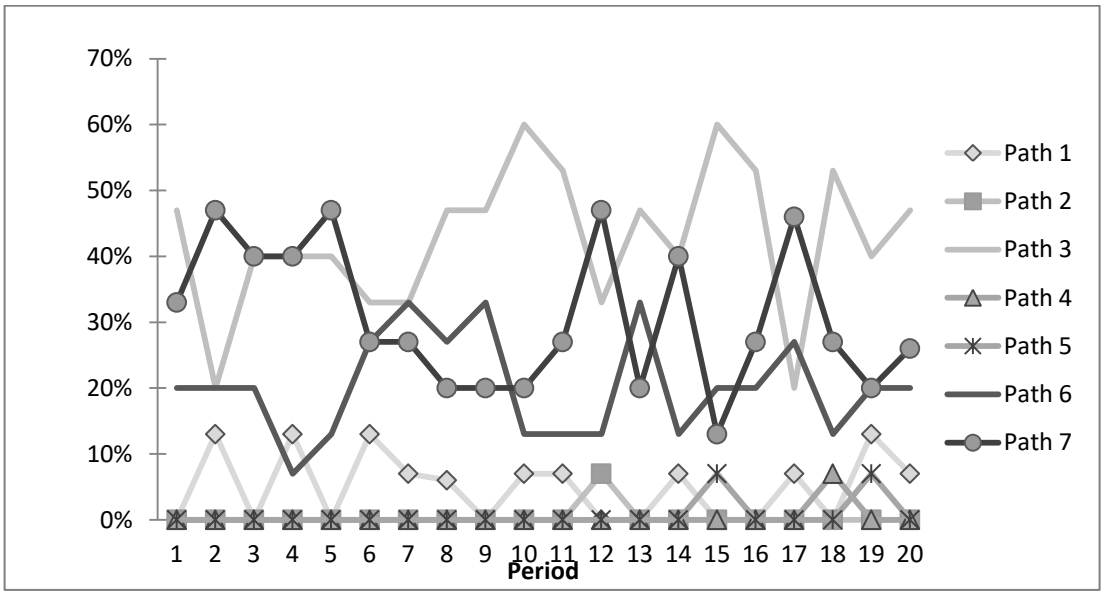
Figure 7.16. Evolution of equilibrium vs. non equilibrium paths



Source: Own elaboration

Figure 7.17 illustrates all the paths played during the experiment. The family optimal path, path 3, is the most played, followed by path 7 and then by equilibrium path 6.

Figure 7.17. Paths played in the periods



Source: Own elaboration

7.4.2 Econometric Analysis

7.4.2.1 Decision analysis

The chi squared test [24] was performed and no significant relationship was found between the sessions and the decisions made by the players:

- Elder Decision: X^2= 1.15; p=0.563;
- Younger Decision : X^2= 1.79; p=0.409;
- Founder's Decision: X^2=6.40, p=0.171.

Analyzing the children's decisions using econometric regressions allows a better understanding of what influences the probability of each sibling deciding to run or not run. To employ the regression which best fits the data the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) were used and the probit model was adopted.

In the regression analysis, the dependent variable referring to the elder's decision is denoted by EDecision and measures the probability of the elder son not running for the successor position in the family firm (the variable EDecision is equal to 0 if E runs, and 1 if he doesn't).

In terms of independent variables, the decisions made by all the players in the previous period [25] are considered. Where EPrevious and YPrevious stands for the elder and younger sons' decisions in the previous period, respectively. These variables are also equal to 1 if the previous decision was to not run or otherwise equal de 0. The founder's previous decision is denoted by FPrevious_E, when founder chooses E and by FPrevious_Y when the founder chooses Y. If the founder's previous decision was to chose E then the independent variable FPrevious_E assumes the value 1, on the other

[24] The STATA outputs are included in Appendix IV.

[25] As is common in experimental data analysis, in order to allow the subjects some time to apprehend the game, the first periods of the experimental data are not used for data treatment (Botelho, Dinar, Pinto & Rapoport, 2014; Botelho, Fernandes & Pinto, 2011). As a result, the data before period 6 was disregarded for purposes of the analysis. However, in this experiment, the results when using all the data are very similar to those presented.

hand if in the previous period the founder choose Y then the independent variable FPrevious_Y assumes the value 1.[26]

Additionally, to study the impact that time has on the decision making process of the siblings, a dummy independent variable was introduced. The dummy used assumes value 1 when the game is being played in that particular period. For instance, Dummy 7 has the value 1 if the game is being played in period 7 and zero for all other periods.

Table 7.12 shows the results of the regression applied.

Table 7.12. E decisions: probit maximum likelihood estimation

Variable	Probit MLE
Intercept	**16.70**
	(0.000*)
EPrevious	**-15.05**
	(0.000*)
YPrevious	**-1.53**
	(0.002*)
FPrevious_E	**-16.48**
	(0.000*)
FPrevious_Y	**0.03**
	(0.950)
Dummy7	**0.46**
	(0.564)
Dummy8	**-0.24**
	(0.770)
Dummy9	**0.32**
	(0.670)
Dummy10	**-0.64**
	(0.440)
Dummy11	**0.09**
	(0.924)
Dummy12	**1.04**
	(0.251)
Dummy13	**-0.04**
	(0.958)
Dummy14	**0.45**
	(0.609)

26 Notice that when, in the previous period, the founder is not called to play then both FPrevious_Y and FPrevious_E will be 0.

Variable	Probit MLE
Dummy15	**-0.36**
	(0.620)
Dummy16	**0.53**
	(0.490)
Dummy17	**1.48**
	(0.084)
Dummy18	**-0.43**
	(0.566)
Dummy19	**-0.20**
	(0.848)
Dummy20	**0.45**
	(0.568)
n	**225**
Log-pseudolikelihood	**-121.78**
Pseudo-R^2	**21.9%**

Note: p values in parentheses *** < 5%; ** < 10%**

Source: Own elaboration

The results indicate that the previous plays of all the players significantly influence the variable EDecision. If E's and Y's previous decision was to not run then there is a lower probability of E's current decision being not run. This is shown by the negative coefficient of EPrevious and YPrevious, which are both statistically significant ($p<0.05$). If in the previous period the founder choose E, then the probability of E choosing not run is significantly lower in the next period.

Now turning our attention to Y's decisions, the dependent variable YDecision measures the probability of the younger son choosing not run. The variable YDecision is equal to 0 if Y runs, and 1 if he doesn't. The independent variables are the same as the ones used above.

Table 7.13 shows the results of the application of the probit regression, with all independent variables (EPrevious, YPrevious, FPrevious_E and FPrevious_Y) and the dummy variables regarding the period of play.

Table 7.13. Y decisions: probit maximum likelihood estimation

Variable	Probit MLE
Intercept	-1.03
	(0.349)
YDecisionPrevious	1.11
	(0.013*)
EDecisionPrevious	0.07
	(0.924)
FDecisionPrevious_E	0.88
	(0.284)
FDecisionPrevious_Y	-0.42
	(0.418)
Dummy7	0.32
	(0.589)
Dummy8	0.73
	(0.198)
Dummy9	0.46
	(0.465)
Dummy10	1.32
	(0.029*)
Dummy11	0.59
	(0.324)
Dummy12	0.72
	(0.192)
Dummy13	0.41
	(0.438)
Dummy14	1.32
	(0.029*)
Dummy15	0.51
	(0.327)
Dummy16	0.76
	(0.259)
Dummy17	0.24
	(0.688)
Dummy18	1.66
	(0.007*)
Dummy19	-0.08
	(0.884)
Dummy20	0.71
	(0.231)
n	225
Log-pseudolikelihood	-90.67
Pseudo-R^2	32%

Note: p values in parentheses * < 5%; ** < 10%

Source: Own elaboration

If Y opted to not run in the previous period, the results indicate that there is a statistically significant increase in the probability of Y not running in the following period.

7.4.2.2 Path analysis

To study how the Nash path outcomes are influenced by the previous path outcome and by time, econometric regression was used.

In order to determine which regression to employ the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) were used and the probit model was adopted.

The dependent variable is denoted Nashpath and is equal to 0 if the equilibrium path 3 or 6 were the paths played and, otherwise, is equal to 1. The idea was to test whether the players tended to learn, with time to play those outcome and if the previous play influenced whether those paths were chosen subsequently.

Therefore, the previous path outcome was considered as an independent variable and denoted by NashPrevious.

Additionally, to study the impact that time has on the decision making process, a dummy independent variable was introduced (in accordance to what was done for the model which studied the siblings decision).

Table 7.14. Path equilibrium: probit maximum likelihood estimation

Variable	Probit MLE
Intercept	0.42
	(0.234)
NathPrevious	-0.31
	(0.100**)
Dummy7	0.24
	(0.610)
Dummy8	0.42
	(0.389)
Dummy9	0.70
	(0.161)
Dummy10	0.42
	(0.039)
Dummy11	0.20
	(0.675)
Dummy12	-0.34
	(0.466)
Dummy13	0.65
	(0.198)
Dummy14	-0.13
	(0.782)
Dummy15	0.63
	(0.195)
Dummy16	0.46
	(0.336)
Dummy17	-0.32
	(0.497)
Dummy18	0.18
	(0.702)
Dummy19	0.05
	(0.922)
Dummy20	0.23
	(0.618)
n	225
Log-pseudolikelihood	-136.82
Pseudo-R^2	4.9%

Note: p values in parentheses * < 5%; ** < 10%

Source: Own elaboration

The results show that if the Nash equilibrium paths 3 or 6 is not played in the previous period there is a decreased probability that those paths will be played in the next period. Once reached, the Nash equilibrium seems indeed to have some power of attraction.

7.5. Summary

This chapter of the thesis extends the games used until this point to include families which have communication deficiency, especially between siblings. A game of imperfect information was used to capture such type of families. The theoretical results were quite similar to those presented in previous chapters except for the particular case where there were two Nash equilibrium. This was the case used in the experiment.

The laboratory results show in more than 60% of the experiment outcomes the theoretically predicted outcomes hold true in the lab. In terms of the non equilibrium paths the one most played was path 7 which resulted in no intergenerational succession.

The experimental research reinforced the drawing power of the equilibrium which was simultaneously the family optimal outcome (path 3), which occurred, approximately, in two third of the Nash equilibrium outcomes.

The econometric analysis shows that the previous decisions of the players have a significant impact on the sibling decisions and on the Nash path outcomes.

Chapter 8

CONCLUSION

8. CONCLUSION

Family firms play a primordial role in the global economy as major contributors in terms of employment and wealth generation. Although there is a lack of a generally accepted definition of family firm there is a consensus that they differ from non-family firms.

Various are the characteristics of family firms which distinguish them from non-family firms such as their long term orientation; risk averse strategic nature; their inward orientation and harmonious working environments, to name but a few. However the uniqueness of the family firm arises from the enmeshment of the family and the business dimensions.

The family has an important impact on the firm at the most varied level: shaping the firm's cultural configuration, influencing its entrepreneurial efforts, contributing to its capital and affecting its strategic decision making. The kinship network the family provides and the access to tacit knowledge and information sharing which is promoted with constant contact between family members helps the firm to establish and grow its business. The trust, social and emotional involvement which is transposed to the firm reinforces the family firm's competitive advantage. The family offers financial, social and human resources, and many times the firm even borrows the family's name, yet the permeability of the firm to the family also has a dark side. The family can, for instance, absorb the firm's resources jeopardizing its financial well-being. The recruitment and remuneration of members according to their family ties instead of merit can undermine the firm's ability to maximize its performance. The family's conservative and risk averse nature can hinder the firm's entrepreneurial efforts. Family quarrels can penetrate the firm and business disagreements can also ignite family conflicts.

The interconnection between the family and the business, each with its own issues and possible conflicts means that the family firm is particularly exposed to conflict. This is especially salient in moments of change as is the case of management succession. Management succession in the family firm has been identified as its ultimate test. The passing of the family firm to the younger generation is a multistage process. The selection of the successor is a fundamental step in that process.

The succession race can exasperate conflict and tension between competing siblings, risking family harmony and, in some case, endangering the firm's continuity. This highlights the need to analyze the impact of the family on successor selection in particular in the presence of sibling competition.

Other than the family, the founder is, also, of fundamental importance to the family firm and to the succession process. The founder gives birth to the firm and plays a key role in the firm's definition and its identity. He is the bridge between the family and the business, linking both those dimensions. The founder has a dominant role in the family firm impressing on it his beliefs and moulding it to his vision, simultaneously, he is also central in the family. The founder's decision making process in the firm is determined by how he values the firm's business and family dimension. If the firm is seen as family serving then decisions made in the firm will be subordinated to family needs whilst business-first types will rather maximize the firm's performance. As a result, the founder maximizes the weighed sum of the financial and the emotional value. The emotional value relates to the family dimension of the firm and refers to the non-economic benefits net of costs. The main emotional benefit is to ensure intergenerational succession whereas conflict is the foremost emotional cost. Therefore, family firm succession is seen as important to ensure firm intergenerational continuity so is safeguarding family harmony. The founder sees the family firm as an extension of himself, and has difficulty in letting go. That reluctance in moving forward with the succession has been identified as the key contributor to the family firm's high mortality rates.

Besides the family and the founder, the national culture in which the family firm is embedded also affects it. The impact of the cultural setting is undisputed. Firms in different cultural settings address the business challenges differently. Cultural dimensions provide insight on the different attitudes and behaviors which affect business in different cultural settings.

When analyzing the family firm succession this thesis took a close look on the impact the micro context, referring to the family and the founder but also the wider context - national culture has on successor selection.

The process of successor selection is eminently a strategic decision process characterized by the interdependence of the founder and his children. This thesis employed the methodology of game theory as it provides a solid analytical way to study interdependent decision making to predict the successor outcomes. Although the use of game theory in this field is not novel it is still in its early stages and this thesis contributes to its advancement.

For the first time, to the best of my knowledge, the payoff functions of all players were extended to include the emotional benefit derived from the firm's executive control remaining in the family and the emotional cost resulting from conflict. This extension enables a more realistic view of the factors that can affect management succession in family firms. The findings advance the existing knowledge by providing analytical evidence as to their impact. The results show that the emotional cost related to the father/child conflict directly influences the succession outcome. The more subservient the children are to their father, the higher the propensity of intergenerational succession being assured.

The way the founder tackles the challenge of succession and in particular the choice of successor is dependent on his inclination towards the family or the business dimension. The results highlight that, what the founder identifies as being the main purpose of the family firm, either being family serving, or maximizing financial value, plays a crucial role in terms of successor selection.

The analysis of the three player and three staged modelled sequential game, emphasizes the negative impact of the founder not taking an activist approach to the succession. The results show that if the founder is not proactive then there is a higher propensity that his preferred successor is not appointed, and that intergenerational continuity is not secured. For practitioners and consultants working with family firms the findings unequivocally demonstrate the importance of the founder adopting a proactive approach to successor selection. The results provide the analytical proof of the dangers that can arise jeopardizing the firm's continuity as well as harm the family's stability, and so should provide an added motivation for the founder to abandon his reluctance in addressing the issue of succession.

With regards to the impact of the family on the successor outcomes, the game focused specifically on the role of sibling competition. The cost of conflict which is incurred when siblings compete for the successor position is of vital importance in determining the first mover advantage. The results indicate that the more a child is averse to conflict, the greater is the first mover advantage for his sibling. In practical terms, this can be an added stimulus for the sibling, as well as for the founder to push his preferred successor to take the initiative in the succession race.

The family optimal analysis indicates that when the family members cooperate and act to secure the maximum aggregate welfare then there is a greater propensity of intergenerational succession being ensured and an increased possibility of the founder's preferred successor being appointed. In practical terms, these findings highlight the importance of promoting family cohesion and a greater sense of attachment and identification with the family.

The way the challenge of executive succession is addressed is also influenced by the cultural setting. The thesis analyzes the impact of the Indian cultural setting on family firm successor selection. As India is steadily becoming a global player it is essential to understand its main cultural traits and the impact they have on managerial practices. By studying India the thesis contributes to expand the family firm literature beyond the Western World countries.

In India the older generations are rooted in the traditional cultural norms whereas the younger generations are in closer contact with western values and more permeable to them. The use of game theory to study the impact of cultural congruence on successor outcome is also a novel application. The results emphasize that the younger generation's cultural misalignment can jeopardize intergenerational succession and risk family harmony. The findings highlight the importance of promoting cultural congruence in the family firm. In practical terms this indicates the need of the founder and senior generations paying greater attention to the socialization process of the younger generations.

Game theory is the methodology used in this thesis, which is complemented by experimental economics, as it provides an appropriate setting for disclosing behavioral

patterns. The use of experimental economics, in family firm succession, is original. The laboratory data compares the theoretical predictions of game theory to the behavioral outcomes. The game modeled was extended to include families with deficient communication. In other words, families where the members do not discuss or coordinate their decisions. The results are similar to those reached by the previous models but with imperfect information there is a particular case where there are two possible Nash equilibrium. That was the case tested in the experiment.

The econometric analysis of the experimental data showed that the previous decisions of the players had a significant impact on the siblings' decisions and on the Nash path outcomes. The experiment results shows that in more than 60% of the experiment outcomes the behaviors of the family members did not deviate from the theoretically predicted equilibrium. The players tend to play the Nash outcomes. In the vast majority of times, the equilibrium path which resulted in the family optimal outcome was the most played. The laboratory data confirmed the drawing power of the family optimal outcomes.

The use of game theory in family firm is gaining momentum in the study of succession but is still in its early stages. This thesis contributes to spreading its applications. Future research can extend its use to include other succession process such as second and third generation transfers which tend to have more agents directly (i.e. more potential successors) and indirectly influencing the process; other potential successors and include additional stakeholders (such as nonfamily members) and more include more factors (both economical and non-economical).

The games used were all of complete information. In order to deepen the application of game theory in family firm succession, models of adverse selection could provide some insight on how the founder could promote self selection by offering multiple menu contracts. Another opportunity would be to use cooperative game theory to study the incentive for potential successors to collude in order to attain a certain successor outcome.

Another opportunity for future research would be to model games with other possible successor outcomes like the possibility of appointing two instead of one successor (i.e. operational splits of the firm).

Last but not least, extending the cultural analysis could be an interesting opportunity. The model could be extended to settings with distant cultural traits to India allowing comparisons between different cultural settings with regards to successor outcome. An experiment could also be conducted to test the impact of the cultural variable on successor selection.

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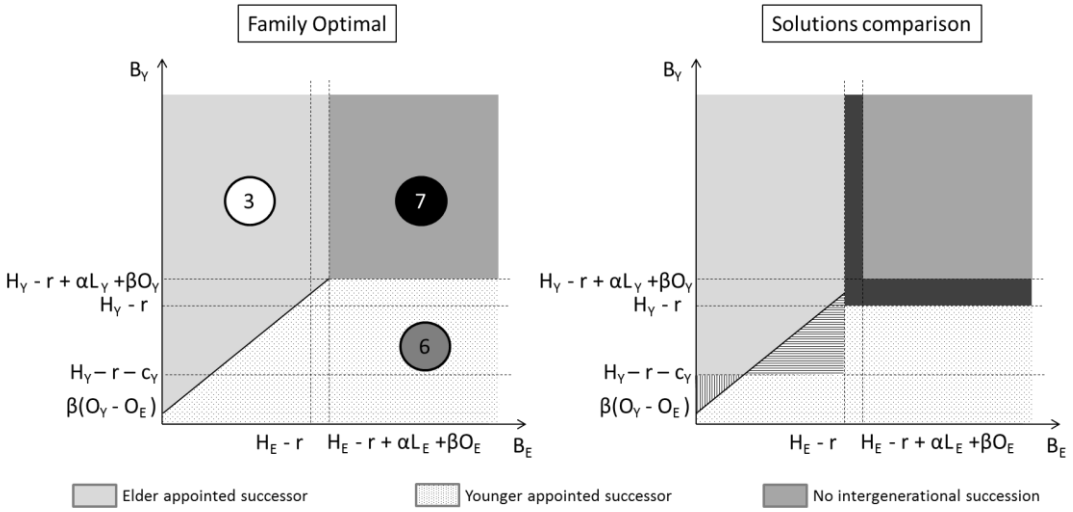
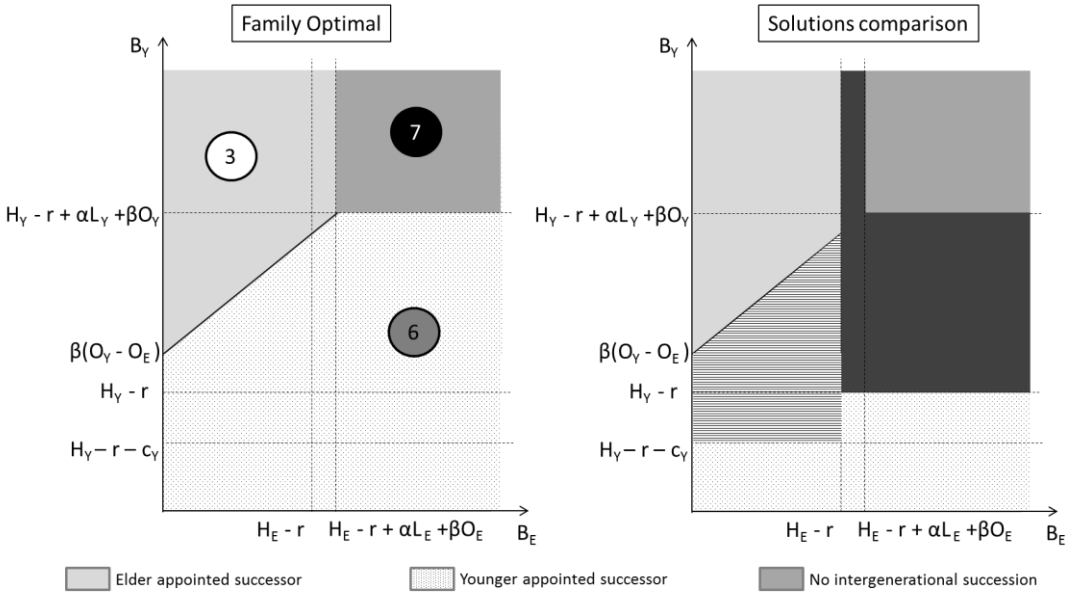
APPENDIX I - Family optimal outcomes

Founder prefers Family Orientation to Leadership skills

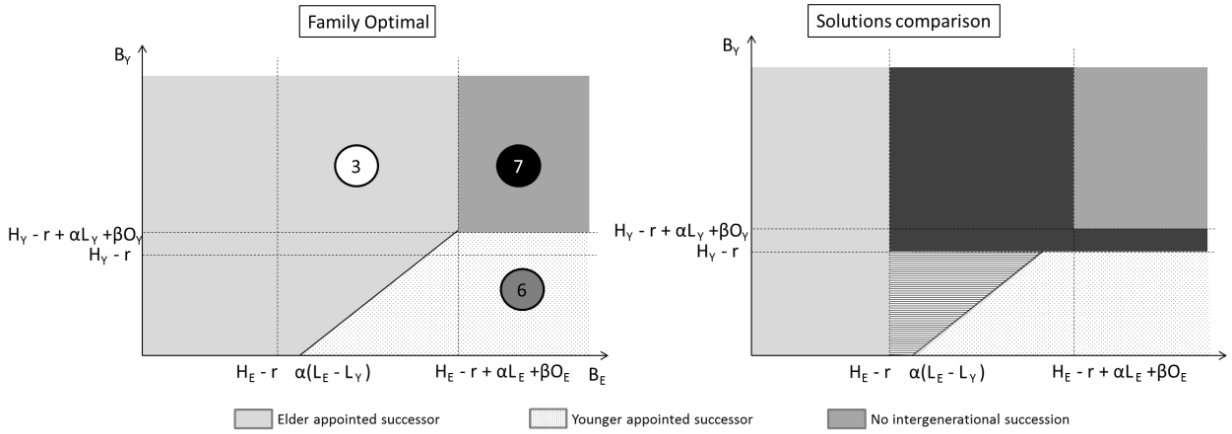
$$\alpha(L_E - L_Y) < \beta(O_Y - O_E)$$

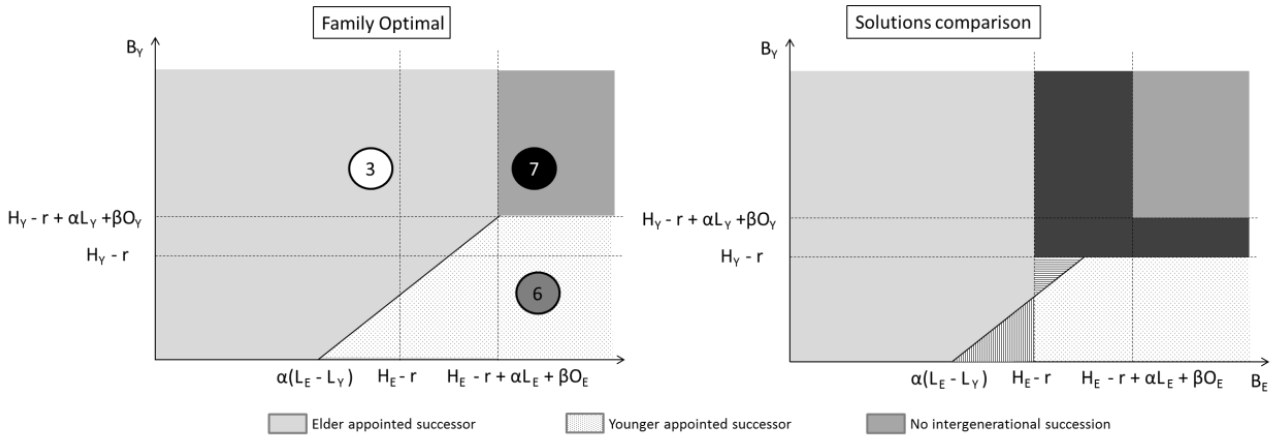




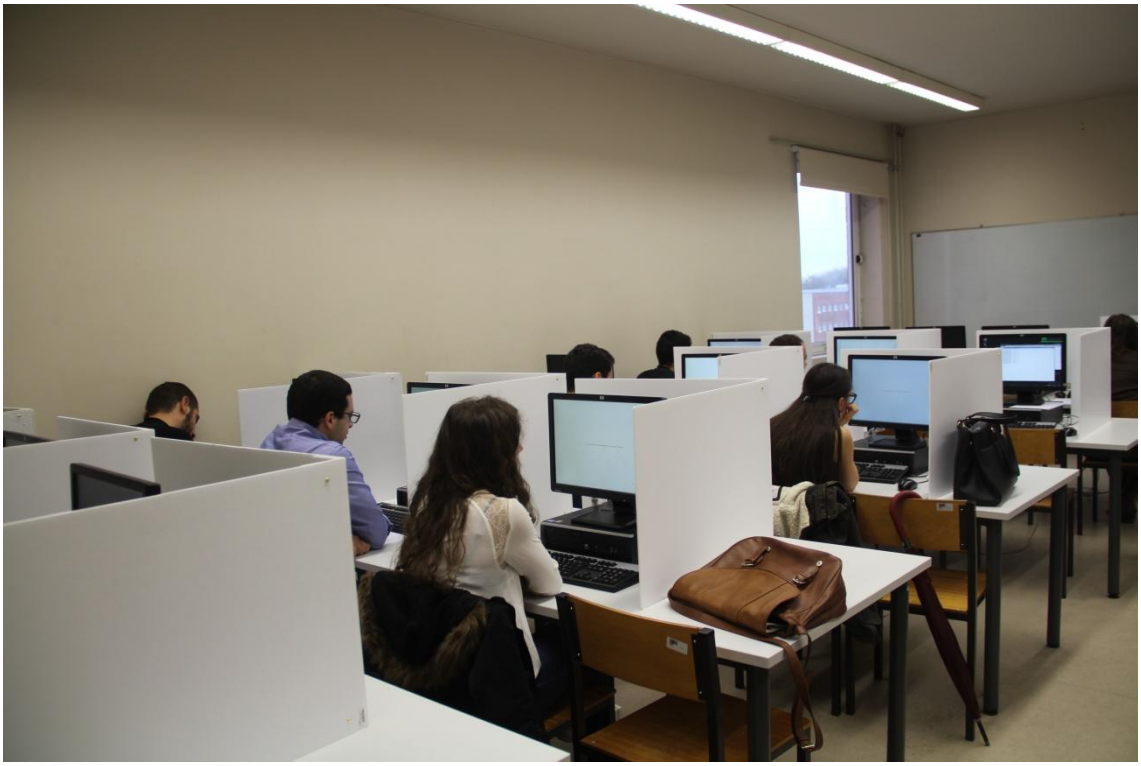
Founder prefers Leadership skills to Family Orientation

$$\alpha(L_E - L_Y) > \beta(O_Y - O_E)$$



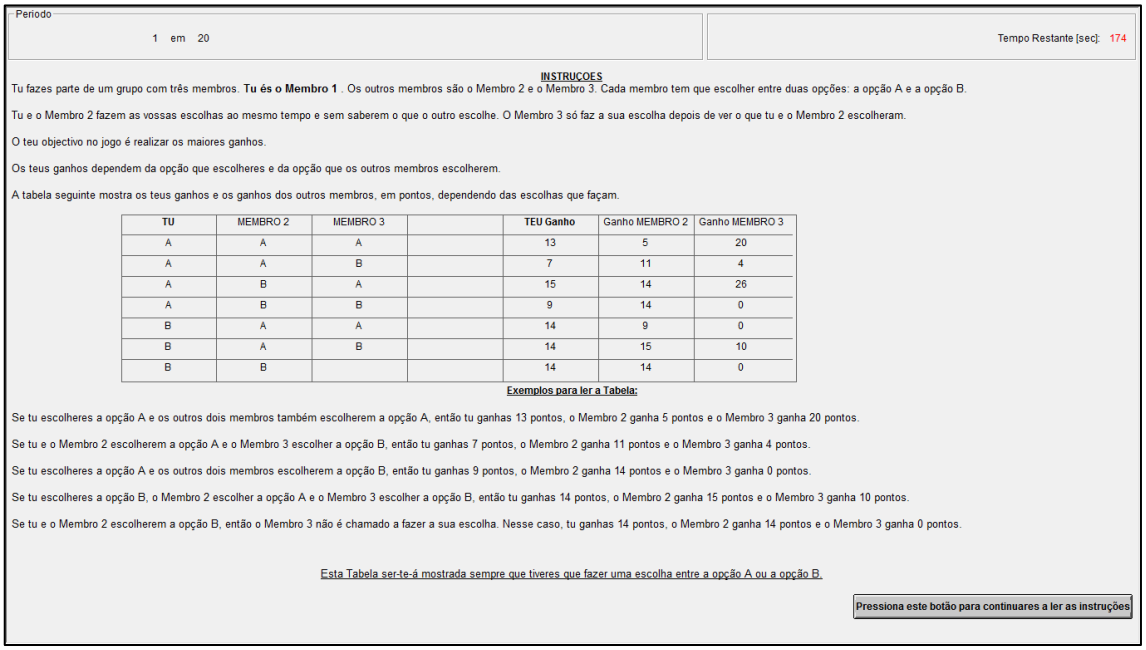


APPENDIX II - Experiment at BELEM: Photos



APPENDIX III - Instructions and information regarding the experiment

For Member 1



Periodo

1 em 20

Tempo Restante [sec]: 174

INSTRUÇOES

Tu fazes parte de um grupo com três membros. **Tu és o Membro 1** . Os outros membros são o Membro 2 e o Membro 3. Cada membro tem que escolher entre duas opções: a opção A e a opção B.

Tu e o Membro 2 fazem as vossas escolhas ao mesmo tempo e sem saberem o que o outro escolhe. O Membro 3 só faz a sua escolha depois de ver o que tu e o Membro 2 escolheram.

O teu objectivo no jogo é realizar os maiores ganhos.

Os teus ganhos dependem da opção que escolheres e da opção que os outros membros escolherem.

A tabela seguinte mostra os teus ganhos e os ganhos dos outros membros, em pontos, dependendo das escolhas que façam.

TU	MEMBRO 2	MEMBRO 3		TEU Ganho	Ganho MEMBRO 2	Ganho MEMBRO 3
A	A	A		13	5	20
A	A	B		7	11	4
A	B	A		15	14	26
A	B	B		9	14	0
B	A	A		14	9	0
B	A	B		14	15	10
B	B			14	14	0

Exemplos para ler a Tabela:

Se tu escolheres a opção A e os outros dois membros também escolherem a opção A, então tu ganhas 13 pontos, o Membro 2 ganha 5 pontos e o Membro 3 ganha 20 pontos.

Se tu e o Membro 2 escolherem a opção A e o Membro 3 escolher a opção B, então tu ganhas 7 pontos, o Membro 2 ganha 11 pontos e o Membro 3 ganha 4 pontos.

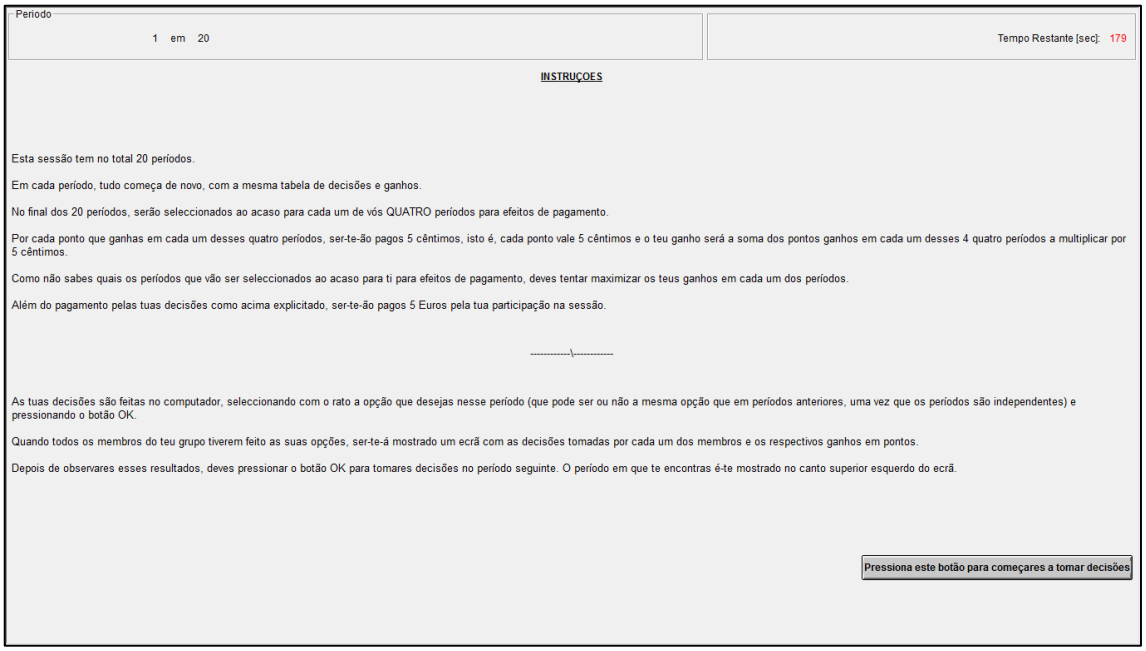
Se tu escolheres a opção A e os outros dois membros escolherem a opção B, então tu ganhas 9 pontos, o Membro 2 ganha 14 pontos e o Membro 3 ganha 0 pontos.

Se tu escolheres a opção B, o Membro 2 escolher a opção A e o Membro 3 escolher a opção B, então tu ganhas 14 pontos, o Membro 2 ganha 15 pontos e o Membro 3 ganha 10 pontos.

Se tu e o Membro 2 escolherem a opção B, então o Membro 3 não é chamado a fazer a sua escolha. Nesse caso, tu ganhas 14 pontos, o Membro 2 ganha 14 pontos e o Membro 3 ganha 0 pontos.

Esta Tabela ser-te-á mostrada sempre que tiveres que fazer uma escolha entre a opção A ou a opção B.

Pressiona este botão para continuares a ler as instruções



Periodo

1 em 20

Tempo Restante [sec]: 179

INSTRUÇOES

Esta sessão tem no total 20 períodos.

Em cada período, tudo começa de novo, com a mesma tabela de decisões e ganhos.

No final dos 20 períodos, serão seleccionados ao acaso para cada um de vós QUATRO períodos para efeitos de pagamento.

Por cada ponto que ganhas em cada um desses quatro períodos, ser-te-ão pagos 5 cêntimos, isto é, cada ponto vale 5 cêntimos e o teu ganho será a soma dos pontos ganhos em cada um desses 4 quatro períodos a multiplicar por 5 cêntimos.

Como não sabes quais os períodos que vão ser seleccionados ao acaso para ti para efeitos de pagamento, deves tentar maximizar os teus ganhos em cada um dos períodos.

Além do pagamento pelas tuas decisões como acima explicitado, ser-te-ão pagos 5 Euros pela tua participação na sessão.

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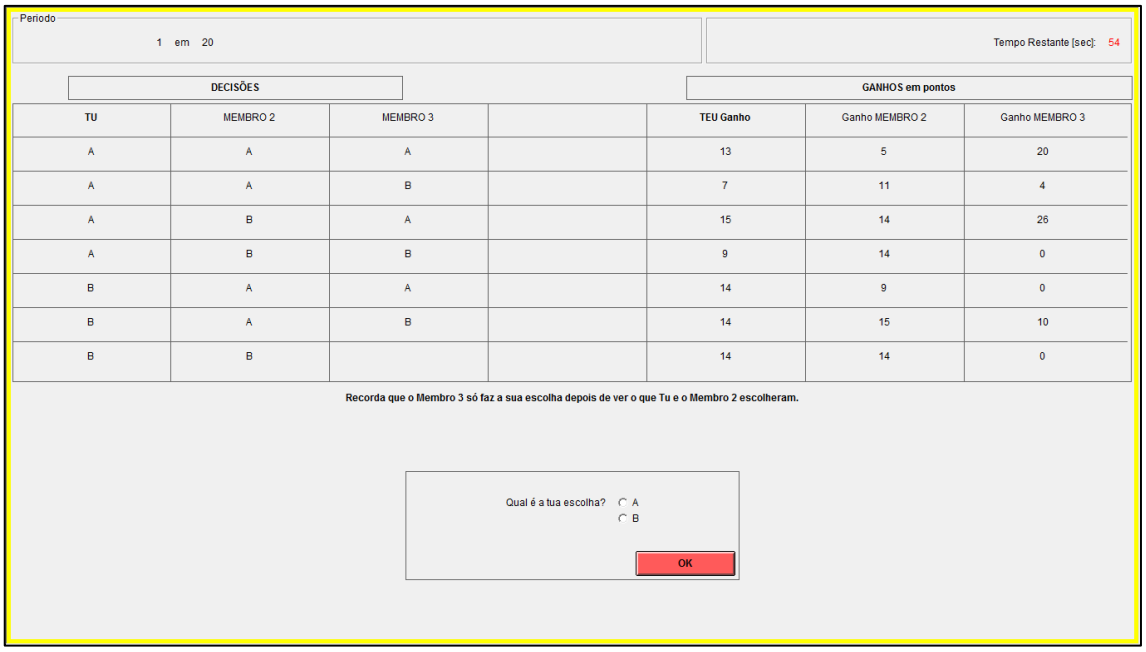
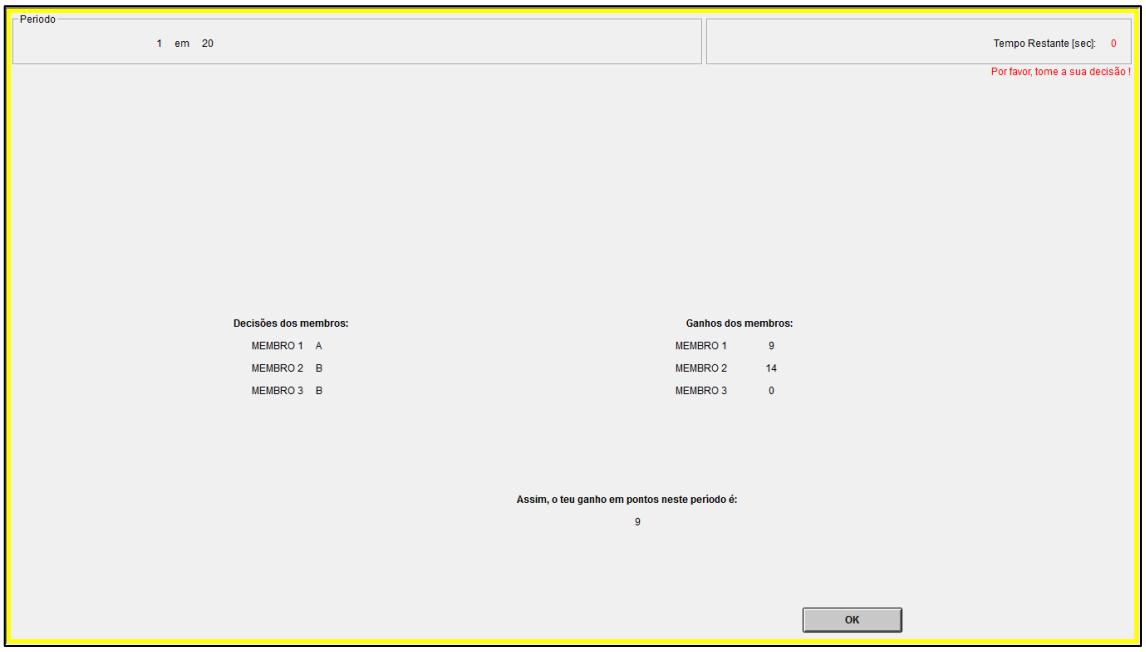
As tuas decisões são feitas no computador, seleccionando com o rato a opção que desejas nesse período (que pode ser ou não a mesma opção que em períodos anteriores, uma vez que os períodos são independentes) e pressionando o botão OK.

Quando todos os membros do teu grupo tiverem feito as suas opções, ser-te-á mostrado um ecrã com as decisões tomadas por cada um dos membros e os respectivos ganhos em pontos.

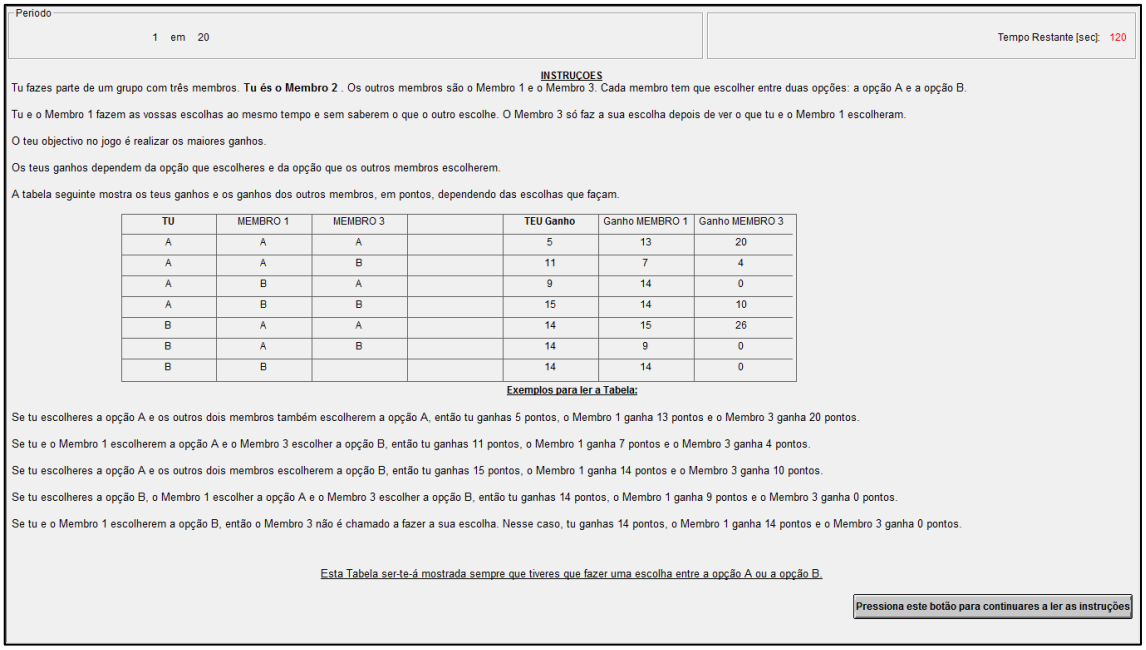
Depois de observares esses resultados, deves pressionar o botão OK para tomares decisões no período seguinte. O período em que te encontras é-te mostrado no canto superior esquerdo do ecrã.

Pressiona este botão para começares a tomar decisões


Periodo
1 em 20
Tempo Restante [sec]: 54
DECISÕES
GANHOS em pontos
TU | MEMBRO 2 | MEMBRO 3 | TEU Ganho | Ganho MEMBRO 2 | Ganho MEMBRO 3
A | A | A | 13 | 5 | 20
A | A | B | 7 | 11 | 4
A | B | A | 15 | 14 | 26
A | B | B | 9 | 14 | 0
B | A | A | 14 | 9 | 0
B | A | B | 14 | 15 | 10
B | B | | 14 | 14 | 0
Recorda que o Membro 3 só faz a sua escolha depois de ver o que Tu e o Membro 2 escolheram.
Qual é a tua escolha? A B
OK


Periodo
1 em 20
Tempo Restante [sec]: 0
Por favor, tome a sua decisão !
Decisões dos membros:
MEMBRO 1 A
MEMBRO 2 B
MEMBRO 3 B
Ganhos dos membros:
MEMBRO 1 9
MEMBRO 2 14
MEMBRO 3 0
Assim, o teu ganho em pontos neste período é:
9
OK

For Member 2



Período

1 em 20

Tempo Restante [sec]: 120

INSTRUÇOES

Tu fazes parte de um grupo com três membros. **Tu és o Membro 2** . Os outros membros são o Membro 1 e o Membro 3. Cada membro tem que escolher entre duas opções: a opção A e a opção B.

Tu e o Membro 1 fazem as vossas escolhas ao mesmo tempo e sem saberem o que o outro escolhe. O Membro 3 só faz a sua escolha depois de ver o que tu e o Membro 1 escolheram.

O teu objectivo no jogo é realizar os maiores ganhos.

Os teus ganhos dependem da opção que escolheres e da opção que os outros membros escolherem.

A tabela seguinte mostra os teus ganhos e os ganhos dos outros membros, em pontos, dependendo das escolhas que façam.

TU	MEMBRO 1	MEMBRO 3		**TEU Ganho**	Ganho MEMBRO 1	Ganho MEMBRO 3
A	A	A		5	13	20
A	A	B		11	7	4
A	B	A		9	14	0
A	B	B		15	14	10
B	A	A		14	15	26
B	A	B		14	9	0
B	B			14	14	0

Exemplos para ler a Tabela:

Se tu escolheres a opção A e os outros dois membros também escolherem a opção A, então tu ganhas 5 pontos, o Membro 1 ganha 13 pontos e o Membro 3 ganha 20 pontos.

Se tu e o Membro 1 escolherem a opção A e o Membro 3 escolher a opção B, então tu ganhas 11 pontos, o Membro 1 ganha 7 pontos e o Membro 3 ganha 4 pontos.

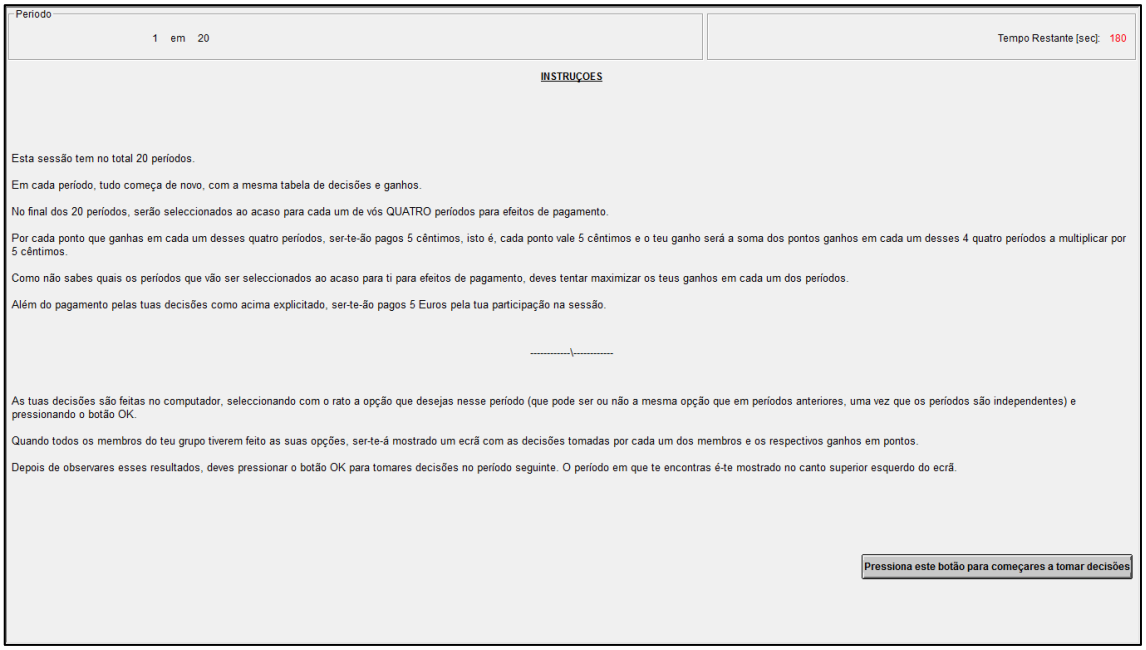
Se tu escolheres a opção A e os outros dois membros escolherem a opção B, então tu ganhas 15 pontos, o Membro 1 ganha 14 pontos e o Membro 3 ganha 10 pontos.

Se tu escolheres a opção B, o Membro 1 escolher a opção A e o Membro 3 escolher a opção B, então tu ganhas 14 pontos, o Membro 1 ganha 9 pontos e o Membro 3 ganha 0 pontos.

Se tu e o Membro 1 escolherem a opção B, então o Membro 3 não é chamado a fazer a sua escolha. Nesse caso, tu ganhas 14 pontos, o Membro 1 ganha 14 pontos e o Membro 3 ganha 0 pontos.

Esta Tabela ser-te-á mostrada sempre que tiveres que fazer uma escolha entre a opção A ou a opção B.

Pressiona este botão para continuares a ler as instruções



Período

1 em 20

Tempo Restante [sec]: 180

INSTRUÇOES

Esta sessão tem no total 20 períodos.

Em cada período, tudo começa de novo, com a mesma tabela de decisões e ganhos.

No final dos 20 períodos, serão seleccionados ao acaso para cada um de vós QUATRO períodos para efeitos de pagamento.

Por cada ponto que ganhas em cada um desses quatro períodos, ser-te-ão pagos 5 cêntimos, isto é, cada ponto vale 5 cêntimos e o teu ganho será a soma dos pontos ganhos em cada um desses 4 quatro períodos a multiplicar por 5 cêntimos.

Como não sabes quais os períodos que vão ser seleccionados ao acaso para ti para efeitos de pagamento, deves tentar maximizar os teus ganhos em cada um dos períodos.

Além do pagamento pelas tuas decisões como acima explicitado, ser-te-ão pagos 5 Euros pela tua participação na sessão.

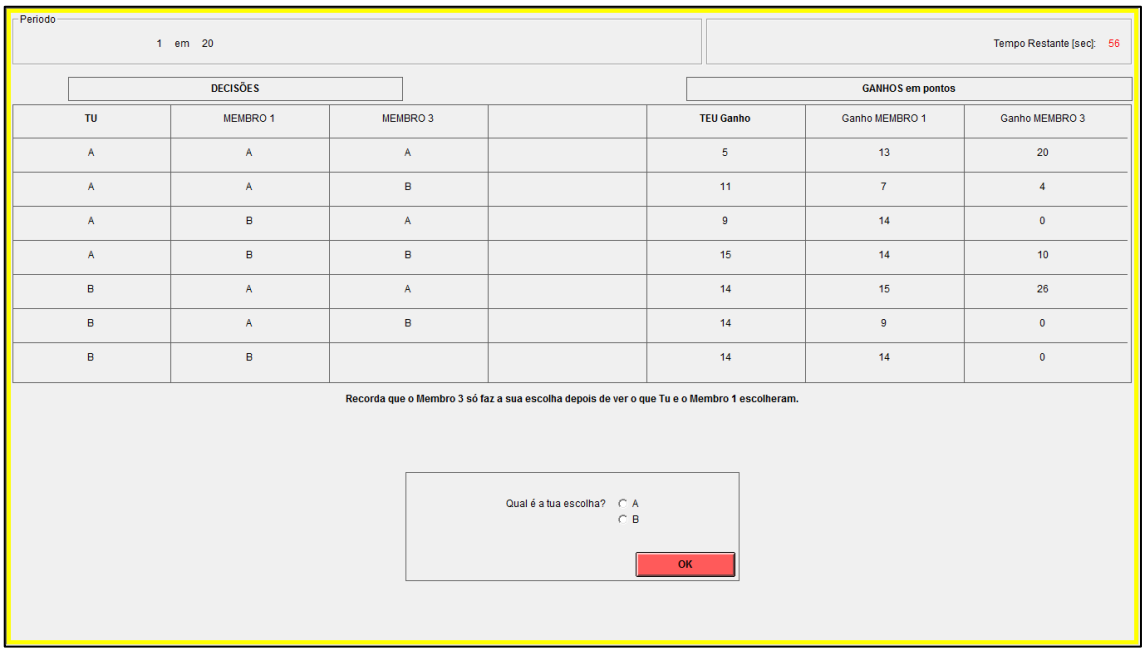
----------\----------

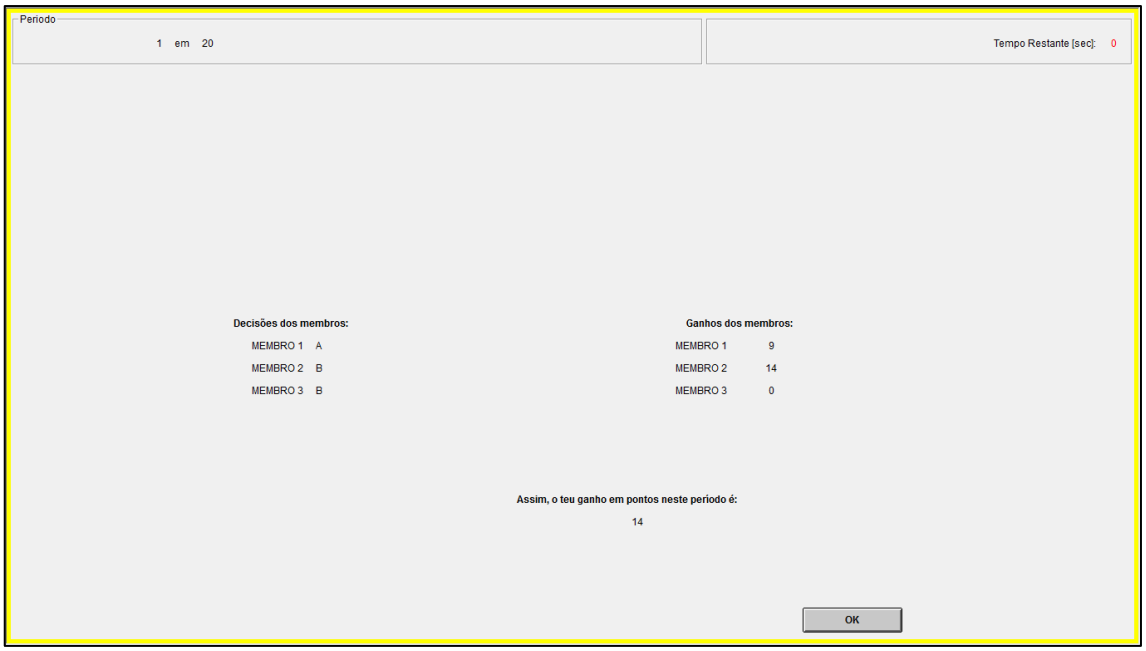
As tuas decisões são feitas no computador, seleccionando com o rato a opção que desejas nesse período (que pode ser ou não a mesma opção que em períodos anteriores, uma vez que os períodos são independentes) e pressionando o botão OK.

Quando todos os membros do teu grupo tiverem feito as suas opções, ser-te-á mostrado um ecrã com as decisões tomadas por cada um dos membros e os respectivos ganhos em pontos.

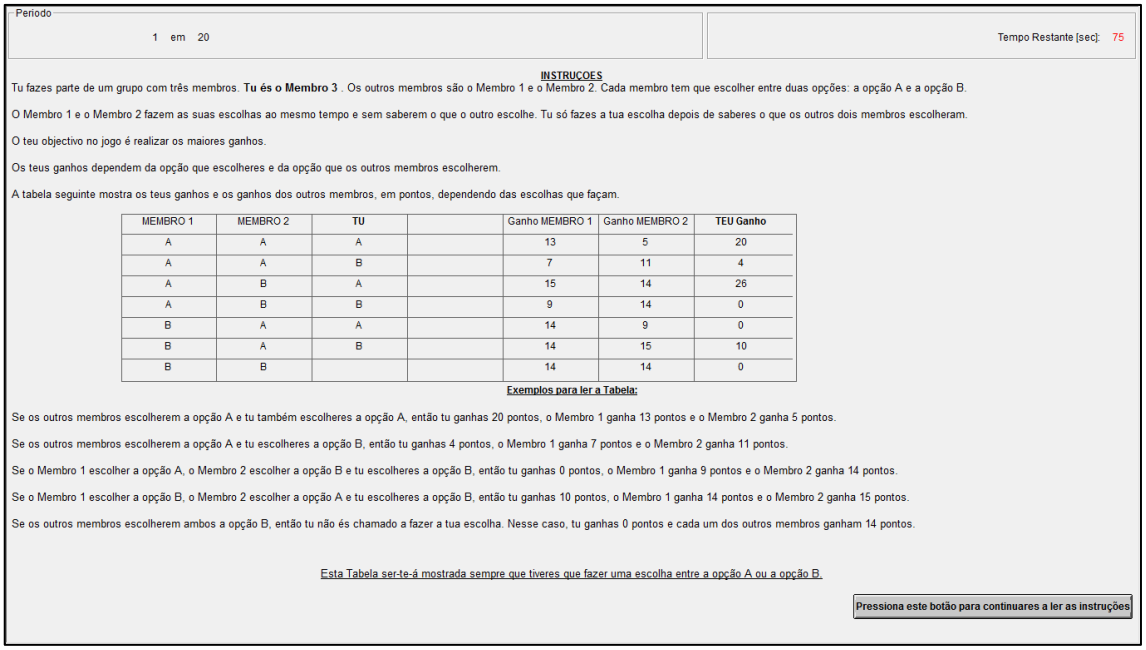
Depois de observares esses resultados, deves pressionar o botão OK para tomares decisões no período seguinte. O período em que te encontras é-te mostrado no canto superior esquerdo do ecrã.

Pressiona este botão para começares a tomar decisões


Periodo
1 em 20
Tempo Restante [sec]: 56
DECISÕES
GANHOS em pontos
TU | MEMBRO 1 | MEMBRO 3 | TEU Ganho | Ganho MEMBRO 1 | Ganho MEMBRO 3
A | A | A | 5 | 13 | 20
A | A | B | 11 | 7 | 4
A | B | A | 9 | 14 | 0
A | B | B | 15 | 14 | 10
B | A | A | 14 | 15 | 26
B | A | B | 14 | 9 | 0
B | B | | 14 | 14 | 0
Recorda que o Membro 3 só faz a sua escolha depois de ver o que Tu e o Membro 1 escolheram.
Qual é a tua escolha? A B
OK


Periodo
1 em 20
Tempo Restante [sec]: 0
Decisões dos membros:
MEMBRO 1 A
MEMBRO 2 B
MEMBRO 3 B
Ganhos dos membros:
MEMBRO 1 9
MEMBRO 2 14
MEMBRO 3 0
Assim, o teu ganho em pontos neste periodo é:
14
OK

For Member 3



Periodo

1 em 20

Tempo Restante [sec]: 75

INSTRUÇOES

Tu fazes parte de um grupo com três membros. **Tu és o Membro 3** . Os outros membros são o Membro 1 e o Membro 2. Cada membro tem que escolher entre duas opções: a opção A e a opção B.

O Membro 1 e o Membro 2 fazem as suas escolhas ao mesmo tempo e sem saberem o que o outro escolhe. Tu só fazes a tua escolha depois de saberes o que os outros dois membros escolheram.

O teu objectivo no jogo é realizar os maiores ganhos.

Os teus ganhos dependem da opção que escolheres e da opção que os outros membros escolherem.

A tabela seguinte mostra os teus ganhos e os ganhos dos outros membros, em pontos, dependendo das escolhas que façam.

MEMBRO 1	MEMBRO 2	TU		Ganho MEMBRO 1	Ganho MEMBRO 2	TEU Ganho
A	A	A		13	5	20
A	A	B		7	11	4
A	B	A		15	14	26
A	B	B		9	14	0
B	A	A		14	9	0
B	A	B		14	15	10
B	B			14	14	0

Exemplos para ler a Tabela:

Se os outros membros escolherem a opção A e tu também escolheres a opção A, então tu ganhas 20 pontos, o Membro 1 ganha 13 pontos e o Membro 2 ganha 5 pontos.

Se os outros membros escolherem a opção A e tu escolheres a opção B, então tu ganhas 4 pontos, o Membro 1 ganha 7 pontos e o Membro 2 ganha 11 pontos.

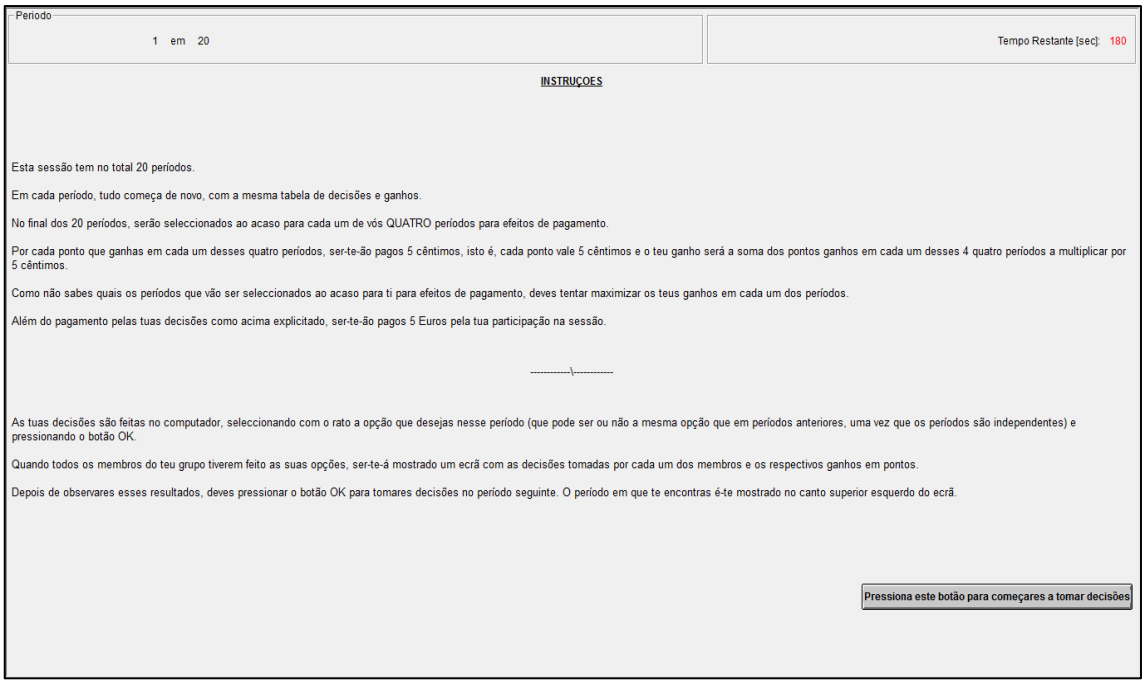
Se o Membro 1 escolher a opção A, o Membro 2 escolher a opção B e tu escolheres a opção B, então tu ganhas 0 pontos, o Membro 1 ganha 9 pontos e o Membro 2 ganha 14 pontos.

Se o Membro 1 escolher a opção B, o Membro 2 escolher a opção A e tu escolheres a opção B, então tu ganhas 10 pontos, o Membro 1 ganha 14 pontos e o Membro 2 ganha 15 pontos.

Se os outros membros escolherem ambos a opção B, então tu não és chamado a fazer a tua escolha. Nesse caso, tu ganhas 0 pontos e cada um dos outros membros ganham 14 pontos.

Esta Tabela ser-te-á mostrada sempre que tiveres que fazer uma escolha entre a opção A ou a opção B.

Pressiona este botão para continuares a ler as instruções



Periodo

1 em 20

Tempo Restante [sec]: 180

INSTRUÇOES

Esta sessão tem no total 20 períodos.

Em cada período, tudo começa de novo, com a mesma tabela de decisões e ganhos.

No final dos 20 períodos, serão seleccionados ao acaso para cada um de vós QUATRO períodos para efeitos de pagamento.

Por cada ponto que ganhas em cada um desses quatro períodos, ser-te-ão pagos 5 cêntimos, isto é, cada ponto vale 5 cêntimos e o teu ganho será a soma dos pontos ganhos em cada um desses 4 quatro períodos a multiplicar por 5 cêntimos.

Como não sabes quais os períodos que vão ser seleccionados ao acaso para ti para efeitos de pagamento, deves tentar maximizar os teus ganhos em cada um dos períodos.

Além do pagamento pelas tuas decisões como acima explicitado, ser-te-ão pagos 5 Euros pela tua participação na sessão.

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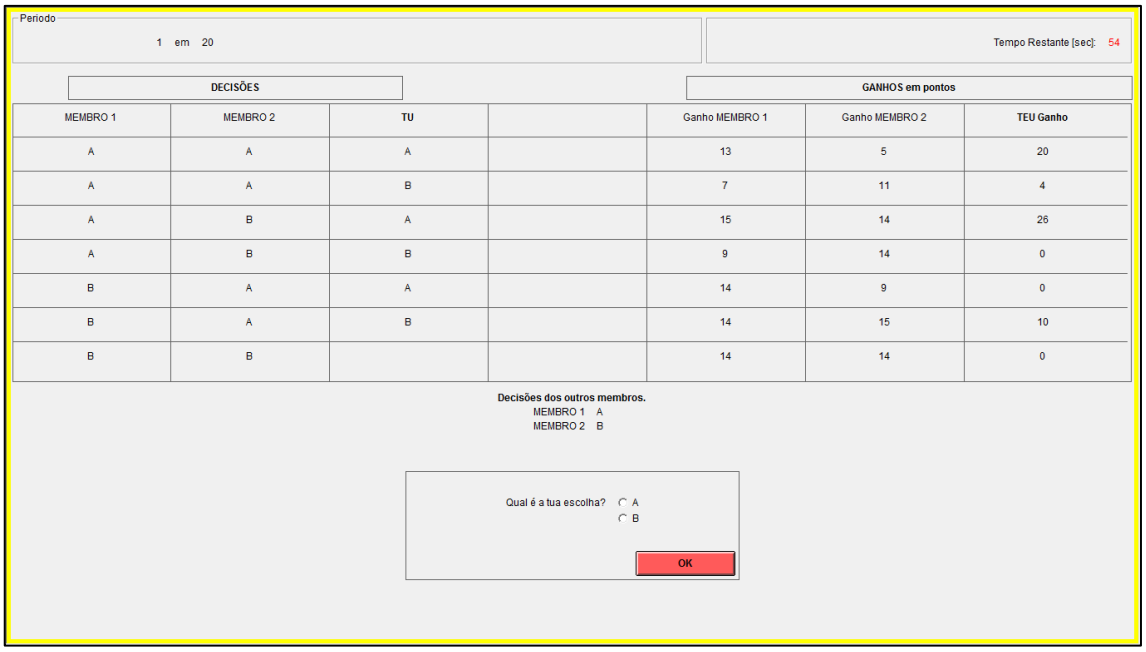
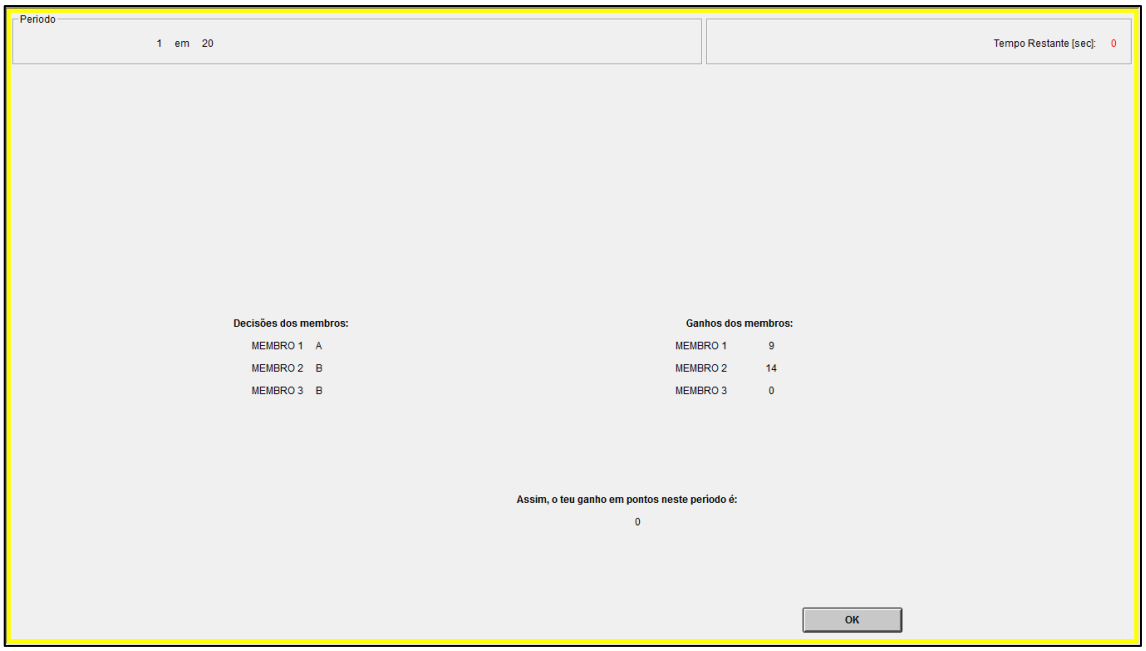
As tuas decisões são feitas no computador, seleccionando com o rato a opção que desejas nesse período (que pode ser ou não a mesma opção que em períodos anteriores, uma vez que os períodos são independentes) e pressionando o botão OK.

Quando todos os membros do teu grupo tiverem feito as suas opções, ser-te-á mostrado um ecrã com as decisões tomadas por cada um dos membros e os respectivos ganhos em pontos.

Depois de observares esses resultados, deves pressionar o botão OK para tomares decisões no período seguinte. O período em que te encontras é-te mostrado no canto superior esquerdo do ecrã.

Pressiona este botão para começares a tomar decisões


Periodo
1 em 20
Tempo Restante [sec]: 54
DECISÕES
GANHOS em pontos
MEMBRO 1
MEMBRO 2
TU
Ganho MEMBRO 1
Ganho MEMBRO 2
TEU Ganho
A A A 13 5 20
A A B 7 11 4
A B A 15 14 26
A B B 9 14 0
B A A 14 9 0
B A B 14 15 10
B B 14 14 0
Decisões dos outros membros.
MEMBRO 1 A
MEMBRO 2 B
Qual é a tua escolha?
A
B
OK


Periodo
1 em 20
Tempo Restante [sec]: 0
Decisões dos membros:
MEMBRO 1 A
MEMBRO 2 B
MEMBRO 3 B
Ganhos dos membros:
MEMBRO 1 9
MEMBRO 2 14
MEMBRO 3 0
Assim, o teu ganho em pontos neste periodo é:
0
OK

APPENDIX IV - STATA OUTPUTS

Paths played

doutcome	Freq.	Percent	Cum.
1	15	5.00	5.00
2	1	0.33	5.33
3	128	42.67	48.00
4	1	0.33	48.33
5	2	0.67	49.00
6	61	20.33	69.33
7	92	30.67	100.00
Total	300	100.00	

Paths played per part (Part1 = Period 1-5; Part2= Period 6-10; Part 3= Period 11-15; Part4= Period 16-20)

Part 1

doutcome	Freq.	Percent	Cum.
1	4	5.33	5.33
3	28	37.33	42.67
6	12	16.00	58.67
7	31	41.33	100.00
Total	75	100.00	

Part 2

doutcome	Freq.	Percent	Cum.
1	5	6.67	6.67
3	33	44.00	50.67
6	20	26.67	77.33
7	17	22.67	100.00
Total	75	100.00	

Part 3

doutcome	Freq.	Percent	Cum.
1	2	2.67	2.67
2	1	1.33	4.00
3	35	46.67	50.67
5	1	1.33	52.00
6	14	18.67	70.67
7	22	29.33	100.00
Total	75	100.00	

Part 4

doutcome	Freq.	Percent	Cum.
1	4	5.33	5.33
3	32	42.67	48.00
4	1	1.33	49.33
5	1	1.33	50.67
6	15	20.00	70.67
7	22	29.33	100.00
Total	75	100.00	

Paths played per period

Period = 1

doutcome	Freq.	Percent	Cum.
3	7	46.67	46.67
6	3	20.00	66.67
7	5	33.33	100.00
Total	15	100.00	

Period = 2

doutcome	Freq.	Percent	Cum.
1	2	13.33	13.33
3	3	20.00	33.33
6	3	20.00	53.33
7	7	46.67	100.00
Total	15	100.00	

Period = 3

doutcome	Freq.	Percent	Cum.
3	6	40.00	40.00
6	3	20.00	60.00
7	6	40.00	100.00
Total	15	100.00	

Period = 4

doutcome	Freq.	Percent	Cum.
1	2	13.33	13.33
3	6	40.00	53.33
6	1	6.67	60.00
7	6	40.00	100.00
Total	15	100.00	

Period = 5

doutcome	Freq.	Percent	Cum.
3	6	40.00	40.00
6	2	13.33	53.33
7	7	46.67	100.00
Total	15	100.00	

Period = 6

doutcome	Freq.	Percent	Cum.
1 |2	13.33	13.33	
3	5	33.33	46.67
6	4	26.67	73.33
7	4	26.67	100.00
Total	15	100.00	

Period = 7

doutcome	Freq.	Percent	Cum.
1	1	6.67	6.67
3	5	33.33	40.00
6	5	33.33	73.33
7	4	26.67	100.00
Total	15	100.00	

Period = 8

doutcome	Freq.	Percent	Cum.
1	1	6.67	6.67
3	7	46.67	53.33
6	4	26.67	80.00
7	3	20.00	100.00
Total	15	100.00	

Period = 9

doutcome	Freq.	Percent	Cum.
3	7	46.67	46.67
6	5	33.33	80.00
7	3	20.00	100.00
Total	15	100.00	

Period = 10

doutcome	Freq.	Percent	Cum.
1	1	6.67	6.67
3	9	60.00	66.67
6	2	13.33	80.00
7	3	20.00	100.00
Total	15	100.00	

Period = 11

doutcome	Freq.	Percent	Cum.
1	1	6.67	6.67
3	8	53.33	60.00
6	2	13.33	73.33
7	4	26.67	100.00
Total	15	100.00	

Period = 12

doutcome	Freq.	Percent	Cum.
2	1	6.67	6.67
3	5	33.33	40.00
6	2	13.33	53.33
7	7	46.67	100.00
Total	15	100.00	

Period = 13

doutcome	Freq.	Percent	Cum.
3	7	46.67	46.67
6	5	33.33	80.00
7	3	20.00	100.00
Total	15	100.00	

Period = 14

doutcome	Freq.	Percent	Cum.
1	1	6.67	6.67
3	6	40.00	46.67
6	2	13.33	60.00
7	6	40.00	100.00
Total	15	100.00	

Period = 15

doutcome	Freq.	Percent	Cum.
3	9	60.00	60.00
5	1	6.67	66.67
6	3	20.00	86.67
7	2	13.33	100.00
Total	15	100.00	

Period = 16

doutcome	Freq.	Percent	Cum.
3	8	53.33	53.33
6	3	20.00	73.33
7	4	26.67	100.00
Total	15	100.00	

Period = 17

doutcome	Freq.	Percent	Cum.
1	1	6.67	6.67
3	3	20.00	26.67
6	4	26.67	53.33
7	7	46.67	100.00
Total	15	100.00	

Period = 18

doutcome	Freq.	Percent	Cum.
3	8	53.33	53.33
4	1	6.67	60.00
6	2	13.33	73.33
7	4	26.67	100.00
Total	15	100.00	

Period = 19

doutcome	Freq.	Percent	Cum.
1	2	13.33	13.33
3	6	40.00	53.33
5	1	6.67	60.00
6	3	20.00	80.00
7	3	20.00	100.00
Total	15	100.00	

Period = 20

doutcome	Freq.	Percent	Cum.
1	1	6.67	6.67
3	7	46.67	53.33
6	3	20.00	73.33
7	4	26.67	100.00
Total	15	100.00	

Decisions of Type 1 (D1) – total

d	Freq.	Percent	Cum.
0	145	48.33	48.33
1	155	51.67	100.00
Total	300	100.00	

Decisions of Type 1 (D1) – per period

Period = 1

d	Freq.	Percent	Cum.
0	7	46.67	46.67
1	8	53.33	100.00
Total	15	100.00	

Period = 2

d	Freq.	Percent	Cum.
0	5	33.33	33.33
1	10	66.67	100.00
Total	15	100.00	

Period = 3

d	Freq.	Percent	Cum.
0	6	40.00	40.00
1	9	60.00	100.00
Total	15	100.00	

Period = 4

d	Freq.	Percent	Cum.
0	8	53.33	53.33
1	7	46.67	100.00
Total	15	100.00	

Period = 5

d	Freq.	Percent	Cum.
0	6	40.00	40.00
1	9	60.00	100.00
Total	15	100.00	

Period = 6

d	Freq.	Percent	Cum.
0	7	46.67	46.67
1	8	53.33	100.00
Total	15	100.00	

Period = 7

d	Freq.	Percent	Cum.
0	6	40.00	40.00
1	9	60.00	100.00
Total	15	100.00	

Period = 8

d	Freq.	Percent	Cum.
0	8	53.33	53.33
1	7	46.67	100.00
Total	15	100.00	

Period = 9

d	Freq.	Percent	Cum.
0	7	46.67	46.67
1	8	53.33	100.00
Total	15	100.00	

Period = 10

d	Freq.	Percent	Cum.
0	10	66.67	66.67
1	5	33.33	100.00
Total	15	100.00	

Period = 11

d	Freq.	Percent	Cum.
0	9	60.00	60.00
1	6	40.00	100.00
Total	15	100.00	

Period = 12

d	Freq.	Percent	Cum.
0	6	40.00	40.00
1	9	60.00	100.00
Total	15	100.00	

Period = 13

d	Freq.	Percent	Cum.
0	7	46.67	46.67
1	8	53.33	100.00
Total	15	100.00	

Period = 14

d	Freq.	Percent	Cum.
0	7	46.67	46.67
1	8	53.33	100.00
Total	15	100.00	

Period = 15

d	Freq.	Percent	Cum.
0	9	60.00	60.00
1	6	40.00	100.00
Total	15	100.00	

Period = 16

d	Freq.	Percent	Cum.
0	8	53.33	53.33
1	7	46.67	100.00
Total	15	100.00	

Period = 17

d	Freq.	Percent	Cum.
0	4	26.67	26.67
1	11	73.33	100.00
Total	15	100.00	

Period = 18

d	Freq.	Percent	Cum.
0	9	60.00	60.00
1	6	40.00	100.00
Total	15	100.00	

Period = 19

d	Freq.	Percent	Cum.
0	8	53.33	53.33
1	7	46.67	100.00
Total	15	100.00	

Period = 20

d	Freq.	Percent	Cum.
0	8	53.33	53.33
1	7	46.67	100.00
Total	15	100.00	

Decisions of Type 2 (D2) - total

d	Freq.	Percent	Cum.
0	79	26.33	26.33
1	221	73.67	100.00
Total	300	100.00	

Decisions of Type 2 (D2) – per period

Period = 1

d	Freq.	Percent	Cum.
0	3	20.00	20.00
1	12	80.00	100.00
Total	15	100.00	

Period = 2

d	Freq.	Percent	Cum.
0	5	33.33	33.33
1	10	66.67	100.00
Total	15	100.00	

Period = 3

d	Freq.	Percent	Cum.
0	3	20.00	20.00
1	12	80.00	100.00
Total	15	100.00	

Period = 4

d	Freq.	Percent	Cum.
0	3	20.00	20.00
1	12	80.00	100.00
Total	15	100.00	

Period = 5

d	Freq.	Percent	Cum.
0	2	13.33	13.33
1	13	86.67	100.00
Total	15	100.00	

Period = 6

d	Freq.	Percent	Cum.
0	6	40.00	40.00
1	9	60.00	100.00
Total	15	100.00	

Period = 7

d	Freq.	Percent	Cum.
0	6	40.00	40.00
1	9	60.00	100.00
Total	15	100.00	

Period = 8

d	Freq.	Percent	Cum.
0	5	33.33	33.33
1	10	66.67	100.00
Total	15	100.00	

Period = 9

d	Freq.	Percent	Cum.
0	5	33.33	33.33
1	10	66.67	100.00
Total	15	100.00	

Period = 10

d	Freq.	Percent	Cum.
0	3	20.00	20.00
1	12	80.00	100.00
Total	15	100.00	

Period = 11

d	Freq.	Percent	Cum.
0	3	20.00	20.00
1	12	80.00	100.00
Total	15	100.00	

Period = 12

d	Freq.	Percent	Cum.
0	3	20.00	20.00
1	12	80.00	100.00
Total	15	100.00	

Period = 13

d	Freq.	Percent	Cum.
0	5	33.33	33.33
1	10	66.67	100.00
Total	15	100.00	

Period = 14

d	Freq.	Percent	Cum.
0	3	20.00	20.00
1	12	80.00	100.00
Total	15	100.00	

Period = 15

d	Freq.	Percent	Cum.
0	4	26.67	26.67
1	11	73.33	100.00
Total	15	100.00	

Period = 16

d	Freq.	Percent	Cum.
0	3	20.00	20.00
1	12	80.00	100.00
Total	15	100.00	

Period = 17

d	Freq.	Percent	Cum.
0	5	33.33	33.33
1	10	66.67	100.00
Total	15	100.00	

Period = 18

d	Freq.	Percent	Cum.
0	2	13.33	13.33
1	13	86.67	100.00
Total	15	100.00	

Period = 19

d	Freq.	Percent	Cum.
0	6	40.00	40.00
1	9	60.00	100.00
Total	15	100.00	

Period = 20

d	Freq.	Percent	Cum.
0	4	26.67	26.67
1	11	73.33	100.00
Total	15	100.00	

Decisions of Type 3 (D3) – total (-1 refers to the times F is not called to play)

d	Freq.	Percent	Cum.
-1	92	30.67	30.67
0	145	48.33	79.00
1	63	21.00	100.00
Total	300	100.00	

Decisions of Type 3 (D3) – per period (-1 refers to the times F is not called to play)

Period = 1

d	Freq.	Percent	Cum.
-1	5	33.33	33.33
0	7	46.67	80.00
1	3	20.00	100.00
Total	15	100.00	

Period = 2

d	Freq.	Percent	Cum.
-1	7	46.67	46.67
0	5	33.33	80.00
1	3	20.00	100.00
Total	15	100.00	

Period = 3

d	Freq.	Percent	Cum.
-1	6	40.00	40.00
0	6	40.00	80.00
1	3	20.00	100.00
Total	15	100.00	

Period = 4

d	Freq.	Percent	Cum.
-1	6	40.00	40.00
0	8	53.33	93.33
1	1	6.67	100.00
Total	15	100.00	

Period = 5

d	Freq.	Percent	Cum.
-1	7	46.67	46.67
0	6	40.00	86.67
1	2	13.33	100.00
Total	15	100.00	

Period = 6

d	Freq.	Percent	Cum.
-1	4	26.67	26.67
0	7	46.67	73.33
1	4	26.67	100.00
Total	15	100.00	

Period = 7

d	Freq.	Percent	Cum.
-1	4	26.67	26.67
0	6	40.00	66.67
1	5	33.33	100.00
Total	15	100.00	

Period = 8

d	Freq.	Percent	Cum.
-1	3	20.00	20.00
0	8	53.33	73.33
1	4	26.67	100.00
Total	15	100.00	

Period = 9

d	Freq.	Percent	Cum.
-1	3	20.00	20.00
0	7	46.67	66.67
1	5	33.33	100.00
Total	15	100.00	

Period = 10

d	Freq.	Percent	Cum.
-1	3	20.00	20.00
0	10	66.67	86.67
1	2	13.33	100.00
Total	15	100.00	

Period = 11

d	Freq.	Percent	Cum.
-1	4	26.67	26.67
0	9	60.00	86.67
1	2	13.33	100.00
Total	15	100.00	

Period = 12

d	Freq.	Percent	Cum.
-1	7	46.67	46.67
0	5	33.33	80.00
1	3	20.00	100.00
Total	15	100.00	

Period = 13

d	Freq.	Percent	Cum.
-1	3	20.00	20.00
0	7	46.67	66.67
1	5	33.33	100.00
Total	15	100.00	

Period = 14

d	Freq.	Percent	Cum.
-1	6	40.00	40.00
0	7	46.67	86.67
1	2	13.33	100.00
Total	15	100.00	

Period = 15

d	Freq.	Percent	Cum.
-1	2	13.33	13.33
0	10	66.67	80.00
1	3	20.00	100.00
Total	15	100.00	

Period = 16

d	Freq.	Percent	Cum.
-1	4	26.67	26.67
0	8	53.33	80.00
1	3	20.00	100.00
Total	15	100.00	

Period = 17

d	Freq.	Percent	Cum.
-1	7	46.67	46.67
0	4	26.67	73.33
1	4	26.67	100.00
Total	15	100.00	

Period = 18

d	Freq.	Percent	Cum.
-1	4	26.67	26.67
0	8	53.33	80.00
1	3	20.00	100.00
Total	15	100.00	

Period = 19

d	Freq.	Percent	Cum.
-1	3	20.00	20.00
0	9	60.00	80.00
1	3	20.00	100.00
Total	15	100.00	

Period = 20

d	Freq.	Percent	Cum.
-1	4	26.67	26.67
0	8	53.33	80.00
1	3	20.00	100.00
Total	15	100.00	

Decisions of Type 3 (D3) – total (only when F plays)

d	Freq.	Percent	Cum.
0	145	69.71	69.71
1	63	30.29	100.00
Total	208	100.00	

Decisions of Type 3 (D3) – per period (only when F plays)

Period = 1

d	Freq.	Percent	Cum.
0	7	70.00	70.00
1	3	30.00	100.00
Total	10	100.00	

Period = 2

d	Freq.	Percent	Cum.
0	5	62.50	62.50
1	3	37.50	100.00
Total	8	100.00	

Period = 3

d	Freq.	Percent	Cum.
0	6	66.67	66.67
1	3	33.33	100.00
Total	9	100.00	

Period = 4

d	Freq.	Percent	Cum.
0	8	88.89	88.89
1	1	11.11	100.00
Total	9	100.00	

Period = 5

d	Freq.	Percent	Cum.
0	6	75.00	75.00
1	2	25.00	100.00
Total	8	100.00	

Period = 6

d	Freq.	Percent	Cum.
0	7	63.64	63.64
1	4	36.36	100.00
Total	11	100.00	

Period = 7

d	Freq.	Percent	Cum.
0	6	54.55	54.55
1	5	45.45	100.00
Total	11	100.00	

Period = 8

d	Freq.	Percent	Cum.
0	8	66.67	66.67
1	4	33.33	100.00
Total	12	100.00	

Period = 9

d	Freq.	Percent	Cum.
0	7	58.33	58.33
1	5	41.67	100.00
Total	12	100.00	

Period = 10

d	Freq.	Percent	Cum.
0	10	83.33	83.33
1	2	16.67	100.00
Total	12	100.00	

Period = 11

d	Freq.	Percent	Cum.
0	9	81.82	81.82
1	2	18.18	100.00
Total	11	100.00	

Period = 12

d	Freq.	Percent	Cum.
0	5	62.50	62.50
1	3	37.50	100.00
Total	8	100.00	

Period = 13

d	Freq.	Percent	Cum.
0	7	58.33	58.33
1	5	41.67	100.00
Total	12	100.00	

Period = 14

d	Freq.	Percent	Cum.
0	7	77.78	77.78
1	2	22.22	100.00
Total	9	100.00	

Period = 15

d	Freq.	Percent	Cum.
0	10	76.92	76.92
1	3	23.08	100.00
Total	13	100.00	

Period = 16

d	Freq.	Percent	Cum.
0	8	72.73	72.73
1	3	27.27	100.00
Total	11	100.00	

Period = 17

d	Freq.	Percent	Cum.
0	4	50.00	50.00
1	4	50.00	100.00
Total	8	100.00	

Period = 18

d	Freq.	Percent	Cum.
0	8	72.73	72.73
1	3	27.27	100.00
Total	11	100.00	

Period = 19

d	Freq.	Percent	Cum.
0	9	75.00	75.00
1	3	25.00	100.00
Total	12	100.00	

Period = 20

d	Freq.	Percent	Cum.
0	8	72.73	72.73
1	3	27.27	100.00
Total	11	100.	

Probit Regression for Nash

```
probit Yi Yi1 DummyPeriod7 DummyPeriod8 DummyPeriod9 DummyPeriod10 DummyPeriod11 DummyP
   > eriod12 DummyPeriod13 DummyPeriod14 DummyPeriod15 DummyPeriod16 DummyPeriod17 DummyPeri
   > od18       DummyPeriod19       DummyPeriod20       if       (Period>=6       ),       vce(robust)

   Iteration 0:    log pseudolikelihood = -143.89886
   Iteration 1:    log pseudolikelihood = -136.84415
   Iteration   2:  log pseudolikelihood   = -136.82255
   Iteration   3:  log pseudolikelihood   = -136.82255

   Probit regression                                 Number of obs    =         225
                                                     Wald chi2(15)    =       14.24
                                                     Prob > chi2      =      0.5078
   Log pseudolikelihood = -136.82255                 Pseudo R2        =      0.0492
```

Yi	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Yi1	-.3059835	.1903853	-1.61	0.100	-.6791318	.0671647
DummyPeriod7	.2424056	.4750292	0.51	0.610	-.6886346	1.173446
DummyPeriod8	.4165932	.4837855	0.86	0.389	-.5316089	1.364795
DummyPeriod9	.6989185	.4986138	1.40	0.161	-.2783466	1.676184
DummyPeriod10	.4226856	.4928707	0.86	0.391	-.5433232	1.388694
DummyPeriod11	.1994696	.4762505	0.42	0.675	-.7339642	1.132903
DummyPeriod12	-.3388074	.4652755	-0.73	0.466	-1.250731	.5731159
DummyPeriod13	.6494965	.5047717	1.29	0.198	-.3398379	1.638831
DummyPeriod14	-.1303023	.4714026	-0.28	0.782	-1.054234	.7936298
DummyPeriod15	.6323492	.4904832	1.29	0.197	-.3289802	1.593679
DummyPeriod16	.4622196	.4799521	0.96	0.336	-.4784693	1.402908
DummyPeriod17	-.3177478	.4674232	-0.68	0.497	-1.23388	.5983848
DummyPeriod18	.1813535	.4745128	0.38	0.702	-.7486745	1.111381
DummyPeriod19	.0458986	.4659639	0.10	0.922	-.8673738	.959171
DummyPeriod20	.2321068	.4659511	0.50	0.618	-.6811405	1.145354
cons	.4171498	.3507661	1.19	0.234	-.2703391	1.104639

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	225	-143.8989	-136.8225	16	305.6451	360.3027

Probit Regression for D1

```
probit  D1 D11 ZiD21  Type3_A Type3_B DummyPeriod7 DummyPeriod8 DummyPeriod9 DummyPeriod
  > 10 DummyPeriod11 DummyPeriod12 DummyPeriod13 DummyPeriod14 DummyPeriod15 DummyPeriod16
  > DummyPeriod17 DummyPeriod18 DummyPeriod19 DummyPeriod20 if (Period>=6 ), vce(robust)

  Iteration 0:    log pseudolikelihood = -155.95589
  Iteration 1:    log pseudolikelihood = -122.51097
  Iteration 2:    log pseudolikelihood = -121.88889
  Iteration 3:    log pseudolikelihood = -121.79902
  Iteration 4:    log pseudolikelihood = -121.78056
  Iteration 5:    log pseudolikelihood = -121.77658
  Iteration 6:    log pseudolikelihood = -121.77586
  Iteration 7:    log pseudolikelihood = -121.77578
  Iteration 8:    log pseudolikelihood = -121.77577
  Iteration 9:    log pseudolikelihood = -121.77577

  Probit regression                                 Number of obs     =        225
                                                    Wald chi2(18)     =     448.50
                                                    Prob > chi2       =     0.0000
  Log pseudolikelihood = -121.77577                 Pseudo R2         =     0.2192
```

D1	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
D11	-15.04686	.9076646	-16.58	0.000	-16.82585	-13.26787
ZiD21	-1.526531	.4873059	-3.13	0.002	-2.481632	-.5714285
Type3_A	-16.48344	.9433575	-17.47	0.000	-18.33238	-14.63449
Type3 B	.0332616	.5314805	0.06	0.950	-1.008421	1.074944
DummyPeriod7	.4626236	.8017461	0.58	0.564	-1.10877	2.034017
DummyPeriod8	-.2401265	.8230518	-0.29	0.770	-1.853279	1.373025
DummyPeriod9	.3208278	.7519169	0.43	0.670	-1.152902	1.794558
DummyPeriod10	-.6368071	.8246914	-0.77	0.440	-2.253172	.9795583
DummyPeriod11	.0851673	.8879098	0.10	0.924	-1.655104	1.825439
DummyPeriod12	1.035968	.9015502	1.15	0.251	-.7310379	2.802974
DummyPeriod13	-.0379889	.7251393	-0.05	0.958	-1.459236	1.383258
DummyPeriod14	.451625	.8824337	0.51	0.609	-1.277913	2.181163
DummyPeriod15	-.3610773	.7290247	-0.50	0.620	-1.78994	1.067785
DummyPeriod16	.5325102	.771535	0.69	0.490	-.9796706	2.044691
DummyPeriod17	1.482971	.8579053	1.73	0.084	-.1984923	3.164435
DummyPeriod18	-.4325354	.7533275	-0.57	0.566	-1.90903	1.043959
DummyPeriod19	-.2010998	1.048697	-0.19	0.848	-2.256508	1.854308
DummyPeriod20	.4499037	.7874296	0.57	0.568	-1.09343	1.993237
_cons	16.70481	1.239494	13.48	0.000	14.27545	19.13418

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	225	-155.9559	-121.7758	19	281.5515	346.4574

Probit Regression for D2

```
probit   D2 D21 ZiD11  K L DummyPeriod7 DummyPeriod8 DummyPeriod9 DummyPeriod10
DummyPeriod11 DummyPeriod12 DummyPeriod13 DummyPeriod14 Dum
> myPeriod15 DummyPeriod16 DummyPeriod17 DummyPeriod18 DummyPeriod19 DummyPeriod20 if
(Period>=6 ), vce(robust)

Iteration 0:   log pseudolikelihood = -133.4145
Iteration 1:   log pseudolikelihood = -91.763182
Iteration 2:   log pseudolikelihood = -90.673447
Iteration 3:   log pseudolikelihood = -90.672087
Iteration 4:   log pseudolikelihood = -90.672087

Probit regression                                 Number of obs   =        225
                                                  Wald chi2(18)   =      64.90
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -90.672087                 Pseudo R2       =     0.3204
```

D2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
D21	1.106243	.4441173	2.49	0.013	.2357888	1.976697
ZiD11	.0727869	.7675961	0.09	0.924	-1.431674	1.577248
K	.8824061	.8228717	1.07	0.284	-.7303927	2.495205
L	-.4197257	.5184237	-0.81	0.418	-1.435817	.5963661
DummyPeriod7	.3216163	.595187	0.54	0.589	-.8449288	1.488161
DummyPeriod8	.7344329	.5703826	1.29	0.198	-.3834964	1.852362
DummyPeriod9	.4619737	.6321358	0.73	0.465	-.7769898	1.700937
DummyPeriod10	1.323648	.6066435	2.18	0.029	.1346481	2.512647
DummyPeriod11	.5901496	.5983004	0.99	0.324	-.5824976	1.762797
DummyPeriod12	.7208399	.5520865	1.31	0.192	-.3612296	1.80291
DummyPeriod13	.4078762	.526267	0.78	0.438	-.6235881	1.43934
DummyPeriod14	1.323648	.6066435	2.18	0.029	.1346481	2.512647
DummyPeriod15	.5147986	.5257387	0.98	0.327	-.5156303	1.545227
DummyPeriod16	.7611134	.6737795	1.13	0.259	-.5594702	2.081697
DummyPeriod17	.2397016	.5974677	0.40	0.688	-.9313136	1.410717
DummyPeriod18	1.661394	.6118922	2.72	0.007	.4621077	2.860681
DummyPeriod19	-.0750561	.5151084	-0.15	0.884	-1.08465	.9345378
DummyPeriod20	.7099086	.5924566	1.20	0.231	-.451285	1.871102
_cons	-1.026423	1.095856	-0.94	0.349	-3.174262	1.121415

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	225	-133.4145	-90.67209	19	219.3442	284.2501