A Study of Young Firm Performance in France between 2006 and 2009 Using the Process Theory of Organisation

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Introduction

This thesis studies the performance of a cohort of French firms between 2006 and 2009 using a theoretical framework developed for this purpose. This framework is based on the author's entrepreneurial experience and conviction that firm performance is dependent on solving a managerial problem with two components: (i) an entrepreneurial component which focuses on creating market power with respect to customer wants, resources, means of production, and technology and (ii) an organisational component aiming to implement adequate labour division and coordination and motivation mechanisms in the firm. Solving both aspects of the managerial problem in firms is expected to increase frim performance over time.

This book describes the origins of the managerial problem in the economic literature, studies its dual organisational and entrepreneurial aspect, and measures its effect on firm performance. The text is structured as follows. Part I reviews several literature streams which discuss both aspects of the managerial problem. Chapter 1 describes the "organisational problem" that results from a New Institutional Economics (NIE) approach to the firm and presents a literature stream that embodies a collection of pioneering attempts to bridge various teachings of NIE to the research on entrepreneurship called the "entrepreneurial process" (EP).[1] This review leads to (i) defining firm performance in Chapter 2 as firms' capacity to create value over time by combining heterogenous assets, individual actions and information (ii) and unveiling the difficulty in studying this concept in Chapter 3. This difficulty is crystallised within the definition of firm performance itself which refers to theoretical elements rooted in different epistemological stance. Indeed, while "Assets" are fundamental to performance in both theoretical approaches to the firm, EP's understanding of their characteristics is derived from the Austrian School of Thought and consequently differs strongly from that of NIE. The notions of "value" and the role of "individual actions" and "information" in organisation further vary when studied under different theoretical lenses.[2] The chosen definition of firm performance thus implicitly excludes the use of either EP or NIE as unique foundation for studying the subject of matter without creating methodological inconsistencies.

Part II presents a solution to this methodological puzzle by developing a theoretical framework which allows deriving teachings such as those provided by EP and NIE without methodological contradiction. The resulting framework, called the "process theory of organisation", is based on Ludwig von Mises' praxeology and describes the organisational and entrepreneurial problems in a way that is consistent with both perspectives of NIE and EP. Mises' "Human action" is chosen as theoretical reference because it offers (i) a solid context for theory building in entrepreneurship (i.e. the progressing

[1] See Chapter 1. for definitions. Following Picot (2012), transaction costs economics, the principal-agent theory, and the property rights theory are gathered in NIE.

[2] See the comparison of economic perspectives on organisation presented in Chapter 2.

economy) and (ii) theoretical foundations for developing the organisational aspect of Praxeology.[3] Only a slight modification to the underlying definition of the economics process is required in Chapter 4 (i.e. the addition of an explicit reference to a goal in a Mengerian tradition) to develop a model of firm performance in Chapter 5, describe the leverages on firm performance in Chapter 6, and present the managerial problem with both entrepreneurial and organisational components in Chapter 7.

This step by step development offers a general definition of organisations and a specific description of human influence on organisational structures. Key to understand the theoretical development is to consider the economic process as the transformation of inputs into outputs with respect to a goal and an infrastructure.[4] Organisations are defined as systems of nested economic processes conducted by human beings. The firm is defined as the lowest organisational level with full decision autonomy on designing and driving its strategy and architecture according to its long-run goal of value-creation. The process "firm" entails a structural component (i.e. a strategy and an architecture) and a behavioural component (i.e. human influence on the structural component, also called management in firms). This later component is divided into (i) searching for value-creation potentials (i.e. an entrepreneurial ability) and (ii) internalising the imagined value potentials (i.e. an organisational ability).

Part III tests the empirical validity of the process theory of organisation and measures the impact of managerial ability on firms' effectiveness in creating value.[5] The model assumes that two identical firms which evolve in the same environment might differ with respect to their effectiveness in creating value and efficiency in transforming inputs into outcomes.[6] Both notions of "effectiveness" and "efficiency" are equally important for a firm to be performant and depend on firms' managerial ability. The simple firm model derived from the theory in Part II (which excludes the use of advance mathematics in line with the Austrian tradition) is translated into an econometric model in Chapter 8. The benefit of model simplicity that follows an Austrian narrative vanishes at this step to stay consistent with the praxeological guidelines for empirical studies (still debated, see Chapter 8). A multi-level structural equation model is used to measure the conditional probability of a firm to be effective in achieving its goals while accounting for all aspects of the economic process and, importantly in a Miesian study, avoiding assumptions about the content of choice. The impact of the managerial ability on firm performance is represented by covariates for firm's entrepreneurial and organisational abilities measured in Chapter 9 and 10. Chapter 11 integrates these covariates into the firm model and details the findings: a strong support for the process theory of organisation in general and the influence of managerial ability on firm performance in particular.

Part IV presents a list of selected topics that can enrich the development of the process theory of organisation in the future. It assumes that this theoretical framework is worthwhile in studying

[3] See Chapter 4. for a description.

[4] Note that the notion of "input" differs from the classical definition. It describes anything that is transformed by the system firm. The system firm is not designed to transform capital and labor, see Chapter 4 for more on these definitions.

[5] Firm effectiveness in creating value is defined as the degree to which they achieve their goal.

[6] See Chapter 4. for a discussion on output and outcome.

complex economic phenomena and that the chosen econometric approach can satisfy Austrian rigour under precise conditions. More work is needed to validate these assertions, however. An important element to be part of a future research agenda is the explicit introduction of a "goal" in both theoretical and econometric developments. This adaptation has deep implications on the interpretation of economic models. The simple idea that economic systems have a purpose- as describes in Chapter 4 -implies that profit maximisation and capital accumulation are one amongst many conceivable economic goals and human motives. It extends the idea that human action must reflect firm-like behaviours in market-based societies, a common reading of economic theories based on methodological individualism, to any set of goals and motives. In such a framework, individuals are not merely entrepreneurs of their own life with competition as sole social coordination mechanism. Success and failure are not entirely due to the quality of individual resource allocation and judgement. To the opposite, making a distinction between human action and firm-like behaviours by separating the behavioural and the structural component of organisations underlines the idea that individual freedom is bound to collective responsibilities (see Dardot and Laval, 2010 for more on this topic). In the process theory of organisation, performance is function of both effectiveness and efficiency and efficiency becomes a means to an end, not an end in itself.

Part I: Literature review, research question, and research plan

Chapter 1 : Literature review

Chapter 1 reviews selected literature streams with interest in the current context. Section 1 links this investigation to theoretical building blocks used in the theoretical development. Section 2 presents a modern research agenda in organisational economics. Section 3 describes the organisational problem to be later extended into the process theory of organisation. Section 4 lists existing works on the entrepreneurial component of economic organisations and sets the path for the research question in Chapter 2.

1. Links to other theoretical perspectives

The theoretical framework on which this thesis is based entails (i) a central methodological core derived from praxeology,[7] (ii) a structural and behavioural component derived from the literature on the economic process (EP) and New Institutional Economics (NIE), and (iii) references to the literature on bounded rationality (BR) and decision-making.[8] These theoretical approaches are used to separate the structural and behavioural components of organisations and analyse their interaction. This implies dissociating the entrepreneur or organiser from his organisational unit (i.e. which results in defining the structural dimension of organisations), allowing for the distinction between the organisational and entrepreneurial functions in firms (i.e. the behavioural dimensions of organisations), and offering an analysis of human influence on organisational structures (i.e. the interaction of the structural and behavioural dimensions of the firm, or management). The next subsections describe this thesis's links to its main theoretical underpinnings in greater details.

1.1. On the Austrian School of Thought and praxeology

The reader who is not familiar with the writings of the Austrian School of Thoughts and praxeology can learn about the fundamental Austrian tenets in Appendix A. This text clarifies the author's position with regard to this heterogeneous body of literature, presents the evolution of the school's though since its foundation, and describes features of the praxeological progressing economy with relevance to the below theoretical development. Chapter 3, Section 3.2 further presents methodological considerations about the study of real phenomena in a Mengerian vein, the distinctions between Mises' praxeology and this thesis, the logic of choice and the systemic approach to the economy, the act of valuation and choice, as well as notes on theory building in praxeology.

[7] Praxeology is the deductive study of human action founded upon methodological individualism and subjectivism (see Klausinger (2013), for more on the topic). It uses the "action axiom" to theorise about human behaviour and describe empirical regularities that are both objective and universal (see e.g. Rothbard (1951) on this issue).

[8] The structural dimension describes a framework for individual behaviours in the economy. The behavioural dimension refers to individual actions and decisions occurring within this framework, see section 3.2 for a description.

1.2. On decision making and organising the firm

The reader who is not familiar with the literature on organisational studies can discover this work's organisational underpinnings in Appendix C. This text compares organisational features from the point of view of NIE, BR, and Austrian texts in general. It notes that most authors interested in entrepreneurship give entrepreneurs the role of organising the firm while the literature on organisation does not refer entrepreneurship at all. Some variations of the ideas that (i) structuring the firm's productive activities is a trade-off between the cost of organising and the potential efficiency gain in the firm, (ii) firms need to be run over time to ensure correspondence between the expected and effective outputs, and (iii) people's rationality is at best objective within the limit of their understanding of the world are expressed in the different fields. However, explicitly combining these elements leads to assert that firm's organisational function is linked to both structuring and driving activities within the firm. Concepts such as the need to define the material and immaterial structures that support and constraint production (i.e. the structuring activity) and the need to ensure that the system produces the desired outcome (i.e. the driving activity) emerge from this reading. This second concept is only at best implicitly described in the reviewed perspectives while firms in reality constantly invest energy in making sure tasks are executed with respect to their plan. Both aspect of running a firm can be traced back to the literature on decision-making, considered the trigger of any action in praxeology.

1.3. On entrepreneurship and the entrepreneurial process

The description of the theoretical underpinning used to derive the entrepreneurial aspect of the process theory of organisations are described in Chapter 1, Section 4, and Chapter 7, Section 3. The reader who is not familiar with the literature on EP can discover the models that converged into conceptualizing this perspective in Appendix D. In summary, EP studies entrepreneurship as an economic phenomenon in an attempt to overcome the main critic to entrepreneurship research, i.e. the lack of common definition of terms[9] that renders this discipline "fragmented among specialists who make little use of each other's work".[10] According to Morrow (2012) the key to solving this problem lays in determining characteristics which are simultaneously common to all entrepreneurs and distinct from non-entrepreneurs. Such "generic" but "specific" characteristics should clarify the boundaries of the field and could lead to a consistent theory of entrepreneurship.[11]

[9] EP does not focus on the entrepreneur as an individual, on entrepreneurial traits, or organisational forms. Examples of literature streams focusing on the entrepreneur as an individual are research on social inclusion, or ethnic and women entrepreneurship for example. Examples of research on the entrepreneurial traits can be found in most of the Austrian tradition where a person has specific abilities which are invariant over time. Examples of research linked to organisational forms are found in the body of literature on small firms and start-ups for example.

[10] Ucbasaran, 2001, p. 3

[11] This thesis choses a narrow approach to entrepreneurship due to its focus on the common and yet specific characteristics of entrepreneurs described in the literature on the entrepreneurial process. It further differs from many authors' approach because opportunities are formed in the entrepreneur's mind in a praxeological vein,

The various texts written by EP scholars led to distinguish fundamental characteristics that influence the entrepreneurial process (e.g. social networks, opportunities, cognition, routines, and environmental or contextual factors).[12] Recently, specialists have tried to harmonise the existing body of work and find commonalities within these heterogeneous perspectives. Hindle (2010) emphasises this idea and writes that "[t]he literature of entrepreneurial process is a diverse and jagged terrain but it contains four landmark works: Gartner (1985), Steyaert (2007), Sarasvathy (2001), and Shane (2003)".[13] In a review of forty years of entrepreneurial process literature, Moroz (2012) makes an attempt to "understand the nature of entrepreneurship by searching for generic and distinct characteristics of entrepreneurs in 32 existing models of entrepreneurship process".[14] Looking simultaneously for a set of common activities that are present in all models and specific patterns that are only true for models of entrepreneurship, they search for what constitutes an "entrepreneurial process". Moroz (2012) adds to Hindle's list of reference the work of Bruyat (2011).

The different views presented in Appendix D can be summarized in five points. First, economic actors are embeddedness in a broader system. This emphasizes the fact that individuals are differentiated from their organisations and environment. Entrepreneurship further occurs within firms and in interaction with firm's milieu. Second, entrepreneurship is linked to the discovery of opportunities and their enactment. Entrepreneurship is the faculty to detect business opportunities in one's environment and the ability to create value from these ideas. The notions of learning, thinking creatively and adapting to constant changes are strongly underlined. Third, the notion of entrepreneurship tends to be described as a phenomenon. Step by step, entrepreneurship is separated from the individual to become an activity and distinguished from the activity to become a phenomenon. This aspect is presented in more details in Chapter 7. A fifth interesting element emerges from Hindle et al.'s summary of EP's evolution: a need to separate the entrepreneurial function in firms from a managerial one. Indeed, the general view in the field is that entrepreneurial activity consists in discovering opportunities and managing the inherent organisation. This automatic link between discovery and exploitation is questioned by Hindle et al. because exploitation needs a different set of skills to be effectively carried on. Wright (2012) also suggests "[…] that there is a greater need to understand the processes that underlie entrepreneurial growth and that this reconfiguration can be achieved through generating greater insight into the role of entrepreneurial agency in driving entrepreneurial growth".[15] And Storey (1994)'s states that, "[c]learly the management of small business does require a range of skills, which will include marketing, production, personnel, research

waiting to be imagined, rather than "out there" waiting to be discovered. See Fritsch 2019 for a complete and comprehensive overview of the wider approach to entrepreneurship.

[12] Moroz, 2012, p. 784

[13] Hindle, 2010, p. 10

[14] Moroz, 2012, p. 782

[15] Wright, 2013, p. 14 and p. 16

and development and finance, as well as general management skills. The question is whether the presence or absence of such skills at start-up hampers the growth of the firm".[16]

The EP perspective, as expressed by Hindle et al., is close to answer these concerns. It, however, lacks definitions for the specific and yet generic characteristics of both entrepreneurial and managerial activities in firms. Because EP's concept of entrepreneurship closely resonates with the Austrian concept of entrepreneur (i.e. that entrepreneurship is the engine of the economy) and partly integrates notions of NIE in its later development, it constitutes a strong base for theory building in the current context. Amongst other things, the process theory of organisation developed below learns from EP to transform praxeology's trait approach into a phenomenological perspective. More on this is presented in Chapter 7.

2. Overview of modern research in organisational and institutional economics

The study of organisations is a complex field of research with intricate ramifications in various social, political, and economic aspects. In an attempt to define economic boundaries for the field, Claude Ménard (1995) describes the common and yet specific characteristics of organisations as bundles of "formal and voluntary agreements" which aim to "combine specific assets into collective action" with "conscious governance through fiat" (p.173). This definition is of particular interest in the current context for two reasons. First, it is very well integrated in modern organisational theory as described in the next subsections. Second, its formulation distinguishes organisations from institutions by underlining a conscious aim to combine and control collective actions. This implies that organisations are autonomous decisional entities interacting with one another in complex economic systems (see e.g. in Chavance (2012) on interactions). Such a definition puts agents' purposefulness and organisations' embeddedness in their environment at the centre of organisational research. This has implications on many aspects of investigating organisations, especially on the interactions between (i) internal organisation and (i) human perception of the environment. In an attempt to circumvent the complexity related to the various complementary views on organisations, the following subsections present three aspects of modern organisational research relevant to the below analysis, i.e. organisational embeddedness and the agent's purposefulness, internal organisation, and creativity.

2.1. Organisational embeddedness and the agents' purposefulness

A cornerstone in understanding organisational embeddedness is Oliver Williamson's (2000) paper on the social context for the study of organisations with four levels of analysis. Organisations are surrounded by norms, customs, or traditions at the lowest level (level 1); are embedded into an institutional environment which describes the general rules of the "game" at level 2; play the "game" by getting their governance structures right at level 3; and solve problems of resource allocation and employment at level 4. When taken into consideration, each level of social analysis imposes

[16] Storey, 1994, p. 133

constraints on the level just below it. For example, focusing on level 4 alone does not address issues of governance and institution and leads to the analysis of organisation under neoclassical premises. Accounting for levels 2 and 3 acknowledges for the need to govern contractual relationships and leads to new institutional analysis. Williamson (2000) further describes complementary dimensions which influence organisational studies: a level zero of cognitive and evolutionary analysis as well as interactions with technology and innovation (p.600).

The complexity of organisational embeddedness has fragmented the views on organisation participants and their interactions as a result of labour division in social sciences (Backhaus, 2010, p.56). Interesting insights about embeddedness at the firm level can be found in the work of Boulu-Reshef (2013), who describes firms' internal and external interactions in terms of economics of identity. She links the three central aspects of the research on firms—their nature, internal organisation, and boundaries—to the three central questions on identity—identification, individualisation, and multiple social identities (p.363). She explains that "firms are primarily seen as different from the market because they can enforce hierarchical relationships while allowing identification" (p.364). Her work defines two aspects of organisational research: "the role of internal organisation in enabling individuation and the role of firm boundaries in enabling collective intentions".

In the modern research on organisations, the description of firms as autonomic entities is proposed as a tool to understand how institutions are shaped by, and influence, the nature and evolution of organisations through time. Consequently, the firm's internal organisation is composed of modes of coordination which aim to shape the activities of purposeful individuals and create relations of power. As Baudry and Chassagnon (2010) note, the main divergence between early organisation theory (based on one hand on Hobbesian hierarchical organisations and, on the other hand, on Lock's consensual nature of authority[17]) and modern theories on organisations (mainly referring to transaction costs economics) "rests on the concept of power" and the "ability of economic actors—employers and employees—to make their interests prevail" (p. 498). The concepts of organisational embeddedness and purposive agents are regarded as two sides of the same coin. One exists because of the other and their mutual existence simultaneously orients the modern research in the field and increases difficulties in theorising.

2.2. Internal organisation

NIE serves as a generic framework to study the origin, nature, and boundaries of the firms. It serves as theoretical underpinnings for the development of the modern theory of the firm, also called the economics of organisations or organisational economics. It includes transaction cost economics (Williamson, 1989), agency theory (Holmström, 1979), mechanism design, the nexus of contracts approach (Jensen and Meckling, 1976), and the property rights theory of the firm (Hart and Moore,

[17] See Baudry and Chassagnon (2010) for more on this topic.

1990). These approaches are rooted in “Coase’s concept of costs to using the market” (Shirley et al., 2015, p. 229). They have in common that transactions are about the transfer of rights, and “these transfers required costly supports”. Their presence induces the existence of inefficient organisations, a phenomenon that opens the economic study of organisations to research on (i) what organisations are and (ii) how they evolve through time.

The research on the nature of organisations in NIE has led to them being defined as autonomous entities in which people interact to realise individual and collective goals (Jost, 2013; Picot, 2012). This autonomy results from the possession of full decision rights over the organisation’s strategy and architecture. The strategy defines ways to cope with strategic uncertainty and the architecture is the organisation’s internal structure, which includes the division of labour and various coordination and motivation mechanisms used to align the output of organisational participants to the organisation’s goal. The inclusion of purposeful agents in organisational studies creates a need to understand these coordination and motivation mechanisms.

Chavance (2012) underlines the duality of coordination modes in the literature citing various divergent points of view “like Marx *versus* Smith opposing *ex post* spontaneous coordination by the market to *ex ante* deliberate planned coordination by the capitalist in the manufacture, like Friedrich Hayek *versus* socialists contrasting the spontaneous order of the market and the organised order of the firm or organisation, or like Williamson *versus* the traditional neo-classical view, distinguishing governance through market or through hierarchy” (p. 39). The central point under the study of coordination modes is once again dual. It entails the following questions: (i) why do people conform to some sets of rules (Dequech, 2013) and (ii) what do people agree upon?

Both aspects of coordination modes gave rise to research on routines (Reinstaller, 2007; Grandori, 2010; Ulen, 2010; Lazaric, 2011; Witt, 2011) and motivation (Lopes et al., 2009; Aviram 2010; Roberts, 2010). In the views of Felin and Foss N. (2011), “routines are argued to be the most fundamental unit and building block of organisational capabilities” (p.231). In their review of the literature in psychology and philosophy on repetition and experience, they find “endogeneity-related problems associated with specifying repetition and experience as the key antecedent and mechanism of organisational routines and capabilities” (p.232). They suggest to “study the individuals that compose the organisation, their underlying characteristics, nature, abilities, preferences, choices, and so forth”, as well as “the organisation itself, as an actor”, “to understand its underlying nature, such as the identity-related choices of organisations” (p.251). They further describe a need to “understand how choice sets emerge for individuals and organisations, specifically how the set of ‘possible’ actions is conceptualized or created” and “how the imagination, hypotheses, and theories impact economic actors and organisational behaviour and performance”.

Loasby (2015) further explains that the Robbinsian output level (set where price equals marginal cost) implies that organisations are “inherently efficient” and their decreasing cost function forces them to “operate at equilibria” (p.247). Consequently, the cost of internal management, Coase’s theoretical

innovation, is non-existent. Loasby (2015) also writes that "[t]he inadequate treatment by economists of the transaction costs of markets is linked to the neglect of processes, and especially the processes of organising the growth and use of knowledge […]" and proposes a "reflection on the scarce resource of human cognition and the role (and fallibility) of institutions" (p.245). He concludes that "[m]arkets and firms are among the most important responses to this fundamental cognitive problem, because they provide domain-limited contexts for the development of such systems, which we may call institutions, together with devices for identifying the need for deliberate thought" (p.261).

Deliberated thought is at the centre of Posner's (2010) article on new institutional economics and organisation economics. He writes in his introduction that "[o]organisation economics emphasizes the relation between organisational structure and compensation systems, on the one hand, and innovation, the management of information flows, agency costs, and efficiency in general, on the other hand" (p.2). His analysis of various forms of private and public organisations describes "organisation attempting to align the conduct of the organisation's employees with the organisation's goals–and in all we have seen the attempt falter because of inherent limitations of the organisation as a method of motivating and structuring economic and other activity" (p.31). Adelstein (2010) considers Posner's examples "in light of the problems of purpose, information, and control faced by all central planners" and links his investigation to the emerging capabilities theory of organisation (p. 39). He writes that "[t]he planner's problem is posed very differently when the central plan has a specific outcome in sight than when it seeks to nurture an order whose outcomes cannot be predicted. The designer of such a system is more like a gardener, creating conditions under which a decentralized, largely spontaneously ordered process can freely produce outcomes that no one can foresee, than a carpenter, a planner who employs a strategy or blueprint to realize a preconceived objective within the confines of a formal organisation. For such a gardener, the organisational economics of greatest value is not Posner's, but Hayek's" (pp. 44-45).

2.3. Organisations and creativity

Acknowledging for purposive individual actions to be the intrinsic component of collective actions further led Baudry and Chassagnon (2010) to see transaction costs economics as an instrument superior to early organisation theory in analysing firm dynamics. In a similar vein to Boulu-Reshef (2013), they underline transaction costs economics as a key element in studying organisations, and they recognise Williamson's four main concerns: "(i) hierarchy and authority, (ii) intra-firm conflicts, (iii) the atmosphere of the firm, and (iv) the organisational dynamic of the firm" (p.478). Such a perspective on organisation nevertheless should lead scholars to agree with Adelstein (2010) in acknowledging the existence of creativity, subjectivity, and uncertainty. For example, according to Koppl et al. (2015), predicting economic evolution is impossible because the emergence of economic activity entails a notion of novelty, referred to by Kauffman as "adjacent possible", which is a micro-phenomenon with influence on, but no control at, the macro-level (p. 8). They also note that studying economics in a creative world mixes both Austrian and evolutionary perspectives, where a

Schumpeterian or Hayekian entrepreneur sets the conditions for a system to evolve according to evolutionary principles (see Aoki (2007) on mechanisms of cross-domain institutional changes, for example).

The inclusion of creative agents with free will in organisational studies implies a need to understand the dynamics of firms embedded within an economic environment. On this matter, Baudry and Chassagnon (2010) analyse the link between organisation theory and transaction costs economics and conclude that "[t]he introduction of the organisational dynamic into his theoretical framework leads Williamson to call attention to the 'visible hand' of management of Chandler (1977) in order to regulate the dynamic transformations of the firm and improve efficiency" (p. 498). The role of "power" in a firm's internal organisation introduced by transaction costs economics is nevertheless limited in an evolutionary perspective. Chavance (2012) studies the work of Commons and notes that "[he] opposes the concept of natural selection transposed by Veblen from Charles Darwin and applied to economic phenomena and especially to institutions, and in contrast borrows the concept of artificial selection. The reason he gives is that natural selection disregards the role of the human will (Commons, 1924: 376)" (p. 32). Furthermore, Commons stresses the role of power by describing "a hierarchy of power levels, through a process of delegation" (p.33). The analysis of individual and collective actions in firms is hence closely linked to their interdependence –or the exercise of power and free will in hierarchical organisation. Such an insight led Baudry and Chassagnon (2010) to note that, in the context of firms, "[i]f the farsighted vision of contract accurately highlights the crucial role of management in the choice of organisational design, this vision underestimates the employees' ability to have an influence on organisational regulation and to impose their own organisational rules" (p.498).

2.4. A modern research agenda on organisations

This overview of the literature relates the general difficulty in studying organisations to their embeddedness in a system of institutions and the existence of reciprocal interactions between autonomous, purposeful, and creative decisional entities. In my opinion, the two fundamental aspects to be explored to advance research on economic organisations are (i) interactions between institutions and organisations, between organisations themselves, and amongst them and (ii) the fact that organisations are composed of human beings with their own will.

The below work is an attempt to advance this agenda by analysing individual and collective actions in organisations and the related role of human beings in shaping interactions. It is based on the idea that the interplay of purposive human beings in economic systems results from two modes of action: (i) influence (interference with the course of actions in the form of creation or adaptation) and (ii) execution (realisation of routines according to a plan). The position adopted in this thesis is that understanding both types of actions in an organisational context is fundamental to advancing organisational research. The basic framework for realising this agenda is presented in the following sections.

3. The organisational problem in the modern theory of the firm

The description of the organisational problem is borrowed from Jost (2013) and Picot (2012). It is extended to an entrepreneurial component in the next section based on the work of Kirsten Foss, Nicolai Foss, Sandra Klein, and Peter Klein. Both sections serve as a departure point for the analysis of the organisational problem in a praxeological perspective in Parts II and III.

3.1. Organisational participants and their interactions

Economic organisations are structures in which people interact to achieve individual and collective goals (Jost, 2013, p.13). Organisations can be firms, groups of interacting firms, governmental bodies, NGOs, or non- profit organisations. Their emergence results from an individual's perception of an advantage in coordinating actions over acting in isolation. This advantage is issued from Adam Smith's description of the benefits of labour division, which states the following: [18]

- People's cognitive and physical capacities are limited, which impede the realisation of complex or highly demanding activities, and;
- the repetition of tasks entails a learning effect.

In order to increase individual labour productivity, organisations combine individual specialised skills through labour division and benefit from a decrease in costs per worker by collectively using production means. The goal of an organisation is to use this effect to create value. Their total realised value added is defined as the sum of the consumer's and organisation's rents (Jost, 2013). The total consumer's rent represents the difference between the consumer's derived satisfaction from the use of a good and the price paid to acquire this good. The organisation's rent is the difference between its income and the total costs of production.

Eq. 1 Realised value added $= (\text{consumer's satisfaction} - \text{Income})$

$+ (\text{income} - \text{total production costs})$

$= \text{consumer's rent} + \text{organisation's rent}$

The total rent of an organisation can further be subdivided into sub-components for each organisation's participant. It represents the difference between their contribution and individual cost:

Eq. 2 Organisation's rent $= \text{income} - \text{total production costs}$

$= \sum(\text{participant's contribution}) - \sum(\text{participant's related costs})$

$= \sum(\text{participant's contribution}) - \text{total production costs}$

Analysing the process of value creation in organisations aims at understanding the role of each organisational participant and their interactions. These interactions can be described by the two pure forms of coordination mechanisms: market and hierarchy. In pure market interactions, all transactions

[18] Jost, 2013, p.15 building on the work of Adam Smith (1776)

between an organisation's participants are specified by contractual arrangements with entirely specified terms of exchange. An ideal example for such a coordination mechanism is the trade of goods and services under perfect competition in a neoclassical framework. A contract describes an exchange at a definite point in time. A price serves as a coordination instrument carrying all necessary information regarding the trade, which allows each participant to decide to enter the exchange in complete independence. In a pure hierarchical coordination mechanism, the contract describes the framework in which transactions occur and which higher-level instance specifies the term of the exchange. The coordination instrument takes the form of instructions to be followed by organisational members. Such organisations are based on a central authority which plans and directs the realisation of each task. Pure market interactions and hierarchies are extreme organisational architectures. Their combination creates a wide range of possible mixed forms. Real-world organisations, such as firms, entail characteristics of both coordination mechanisms including contract relationships and instructions.

3.2. Firms' strategy and architecture

An organisational design includes the definition of the organisation's strategy and architecture (Jost, 2013, p. 23). According to the new theory of the firm, both constitute leverages on value creation. The organisation's strategy aims at formalising the firm's mission and objectives by defining what to produce, how to produce it, and for whom to produce. The organisation's architecture aims to support an effective strategy execution through adequate repartition and coordination of tasks among organisational participants. Task repartition corresponds to the division of labour. It aims at allocating each step of the production process to organisational participants. Non-efficient labour division can arise when competencies do not match tasks, the learning effect of specialisation brings only insufficient productivity advantages, or the production process cannot be divided into clearly defined sub-tasks (Jost, 2013, p. 24). The coordination mechanism entails ways of exchanging output and information among participants. Non-efficient coordination mechanisms can arise with the participant's insufficient cooperation or tendency to pursue individual goals.

According to Jost (2013), the firm's boundaries are the lowest organisational participant with full autonomy in defining both strategy and architecture (p. 25). An autonomic system can thus be described as an organisational participant who influences both elements alone and in a direct way. This definition allows separating internal from external organisation participants. Internal participants are called organisational members due to their direct contribution to the overall organisational goal. They are part of the autonomic system and can be attributed to organisational units. External participants are located outside the boundaries of the autonomic organisation. They have an indirect influence on the organisational design and shape the organisation's specific and general environment. The specific environment entails participants as the firm's customers and suppliers. The general environment entails, for example, ecologic considerations such as global warming; legal consideration

such as the rules of law; and economic or social considerations such as unemployment, cultural or demographic evolutions, health and education systems, or general norms or values.

Founding the definition of firm boundaries on the degree of decisional autonomy over strategy and architecture allows defining the participants. It also renders their interactions contingent to each participant's decisions and treats organisations as "systems of decisions". The role of strategic decision-makers is depicted in this view as the necessity to structure the organisation in such a way that it can reach its objectives in an efficient way. The difficulty relies on the fact that they make decisions under strategic uncertainty resulting from the interaction of bounded rational agents in a world of imperfect information, which generates an organisational problem (Jost, 2013).

3.3. The organisational problem

The organisational problem results from the scarcity of resources, means of production, and information in a constrained world. This leads to strategic uncertainty and induces a difficulty to design efficient organisations. Picot (2012) defines three kinds of reactions to scarcity which lead to three aspects of the organisation problem.

The division of labour

Labour division represents the pure quantitative subdivision of activities. The focus on specialised tasks allows individuals to increase the qualitative outcome of their work through the gain of experience and the learning of specific knowledge (Picot, 2012, p.3). Designing an organisation with efficient labour division and specialisation requires perfect division of the tasks, constancy of sub-activity realisation by the labour force, and information on—and control over—people's behaviour. This implies that decision-makers face the problem of defining the "right" labour division and the "right" degree of specialisation that helps them to reach their goals.

Coordination mechanisms

A consequence of labour division and specialisation is actors' reduced autarky (Picot, 2012, p.3). Individual dependence on others increases with the degree of specialisation/labour division. People hence realise activities that provide them with means to cover their needs in an indirect way (ex: earning a salary). This indirect satisfaction of needs implies that people have to enter exchange activities to access the goods they want and have not produced. The parties involved in the exchange have to be aware of the existence of others willing to exchange, physically proceed to the exchange, and secure their interests. Coordination mechanisms are inherent to any exchange and imply the problem of defining the "right" exchange and coordination mechanisms that help them to reach their goals.

Motivation schemes

Most of the tasks executed by modern labour forces consist of producing goods for the consumption of others. Employees have to know what task to execute in order to generate an output corresponding to the will of other human beings. An employee in a car manufacturing company, for example, produces pieces that have no direct use to him. These pieces have a direct use to his employer. The factory needs to organise the employers' working environment in such a way that the employee's effective output corresponds to the employer's expectations. Actors thus face the problem of defining the "right" motivation mechanisms that help them to reach their goals.

3.4. The solution to the organisational problem

Coping with strategic uncertainty implies designing a strategy and an architecture which minimise the negative influence of uncertainty on organisational efficiency. Following the transaction cost theory, strategic decisions aim at influencing the transaction costs inherent to the institutional structure by focusing on the dependence between the individual modules composing the firm's internal organisation. The resulting architecture minimises the indirect, sequential, reciprocal, team-oriented, and knowledge-transfer oriented interdependence in order to create autonomous entities (Picot, 2012, p. 79).

Following the property rights theory, strategic decisions aim to define an optimal bundle of dynamic contracts with respect to their inherent transaction costs. They consist of defining independent modules with clear goals and objectives, designing effective incentive and control mechanisms, and formalising the repartition of decision rights and responsibilities among internal and external organisational participants. The resulting architecture entails the repartition of property rights among stakeholders (owner, manager, employee, state, etc.) and tools such as incentive and control mechanisms (including reputational effects), the allocation of decision rights and responsibilities, and the creation of independent modules with clear goals and objectives. These institutional arrangements must be designed in such a way that the positive effect of process independence, leverage potentials, and ownership substitutes are maximised while their negative components (related costs) are minimised.

Following the principal-agent theory, strategic decisions aim at influencing the individual behaviours of the organisation's participants by designing adequate incentive and sanction schemes as well as monitoring tool and risk allocation structures. This should minimize opportunistic behaviours such as adverse selection, moral hazard, hold up, or word breach, which result from information asymmetry (Jost, 2013, pp. 49–53). Institutional arrangements aim to ensure proper behaviour and reduce the inherent agency cost. The architecture of the firm integrates the allocation of risks between parties to increase efficiency. A principal that bears the complete risks in a relationship might please a risk-adverse agent but mitigate his motivation at the same time. The design of adequate incentive and

sanction schemes, monitoring tools, and risk allocation structures should lead to reducing the occurrence of inappropriate behaviours.

Firms are therefore presented in the new theory of the firm as autonomous entities with respect to their decision rights over their strategy and infrastructure. They are limited with respect to their spectrum of possible actions due to their embeddedness in a constraint world. They need to find the best possible strategy and architecture to reach their goal in interaction with their environment but face an organisational problem due to the presence of bounded rational agents, scarce resources, and incomplete information. Combining the new institutional points of view, this implies a difficulty in defining independent modules with clear goals and objectives; effective incentive, sanction, control, delegation, and monitoring mechanisms; and adequate risk allocation and repartition of decision rights, responsibilities, and authority to ensure efficient dependence between organisation participants while minimising transaction costs.

4. Adding an entrepreneurial component to the study of organisations

According to recent texts, combining the organisational and entrepreneurial perspectives on firms is key to improving the theory of the firm (Albertini and Muzzi, 2016; Dew et al., 2004; Casson, 2005; Foss K. et al., 2012; Garud et al., 2007; Tracey et al., 2011). However, efforts to integrate research questions from one field into the other's research agenda result in proposing entrepreneurial or organisational theories of the firm. Both approaches are limited due to their theoretical foundations. Scholars in each discipline have divergent understandings of general organisational features (such the firm's nature, internal organisation, and boundaries) and can hardly make use of the teachings of the other filed. Both body of literature nevertheless represent very strong foundations for studying different problematic related firm's study. An attempt to combine both literature streams is presented by Kristen Foss, Nicolai J. Foss, and Peter G. Klein (2012). They develop an entrepreneurial theory of economic organisations which describes the entrepreneur's advantage in hiring a labour force and owning assets when assets and entrepreneurial judgment are complementary. "The entrepreneur's role, then, is to arrange or organise the human and capital assets under his or her control" (p. 1893). They aim at bridging the theory of entrepreneurship and the theory of the firm by (i) "defining entrepreneurship as the exercise of judgment over resource uses under uncertainty" and (ii) "viewing the theory of economic organisation as a subset of the theory of asset ownership" (p. 1893). For the time being, however, the complex organisational problem described in NIE is only partly integrated in their approach. Also, as Foss K. et al. (2012) acknowledge, the interaction between the two problems of limited and dispersed information and heterogeneous uses of assets needs further consideration (p. 1907). These aspects are reviewed in the next subsection.

4.1. Merging the entrepreneurial and organisational approaches to the firm

Both fields of entrepreneurship and organisational studies have developed in isolation. According to Foss N. and Klein (2012), entrepreneurship scholars have "implicitly or explicitly dissociated the

entrepreneur and the firm" by portraying his activities as an independent cognitive act of discovering opportunities which is separated from the subsequent process of goods and services production. "Entrepreneurship, in this conception, is not a necessary component of all human decision-making, as argued by Knight (1921) and Mises (1949), but a specialized activity that some individuals are particularly well-equipped to perform" (pp.15–16). Foss N. and Klein (2012) also point out that the work of Schumpeter played a role in separating organisation theories and entrepreneurship by casting entrepreneurs "in heroic terms as an almost genial *Gründer*, so that entrepreneurship tended to become an exceptional occurrence of massive importance; the entrepreneur is a person who by introducing 'new combinations'—new products, production methods, markets, sources of supply, or industrial combinations—shakes the economy out of its previous equilibrium, starting a process Schumpeter termed 'creative destruction'" (p.17).

As a result, both fields developed strong understanding of different aspects of the firm. For example, analysing firm's internal organisation is considered a strength of NIE and weakness of entrepreneurship studies. Explaining firm creation is, however, considered a strength of entrepreneurship and not of organisational studies. Indeed, NIE justifies the firm's existence by peoples' perceived advantage from participating in organisations. In the words of Alchian and Demnetz (1972), "[r]esource owners increase productivity through cooperative specialization and this leads to the demand for economic organisations which facilitate cooperation" (p.777). This does not, however, explain how organisations come to existence at the first place. Firms need to be created to welcome members, but this is commonly let aside by mainstream economists who only partly understand the question of "genesis" (see Dew et al. (2004) for a critique). This research topic is rather attributed to the research on entrepreneurship since Richard Cantillon's (1755) treatise.

This situation has evolved in the last decades. Pioneering work aiming to bridge the gap between entrepreneurial and organisational studies can be found for example in the literature on the EP with the work of Gartner (1985), Bruyat and Julien (2000), Shane (2003), Sarasvathy (2004), Baker and Nelson (2005), Steyaert (2007), and Hindle (2010). This approach to the firm culminates with Foss N. and Klein's (2012) book named "Organising Entrepreneurial Judgment". As pointed out in this text, the existing body of literature on entrepreneurship can be classified into theories defining entrepreneurship as an outcome or a phenomenon (e.g. start-ups or self-employment) or theories that see entrepreneurship as a way of thinking or acting (creativity, innovation, alertness, judgment, adaptation).[19] The second approach, called the "functional" approach, is based on the work of Schumpeter (1911) and Knight (1921). Early work on the entrepreneurial function treats the entrepreneur in abstract terms and sees him as an analytical "stepping stone" used to understanding other phenomena such as economic development (Foss N. and Klein, 2012, p.7). This view has been developed along the lines of the Kirznerian opportunity discovery by the management research literature on entrepreneurship to give more attention to the entrepreneur and entrepreneurial

[19] See Foss (2012) for a complete overview on this topic.

actions, describing the "heuristics he makes use of", "the biases he might suffer from", "the experience base for his actions", "the kind of uncertainty he might confront", "the network structures that he is a part of", or "his previous employment experiences" (Foss N. and Klein, 2012, p.8).

4.2. From opportunity recognition to exploitation

As Foss N. and Klein (2012) remark, a complementary body of literature focuses on "how the exploitation of entrepreneurial opportunities is organised in the economy" (Shane and Venkataram, 2000, p. 224). The issue analysed here aims to understand why entrepreneurs chose some ways of organising their activities rather than others. This literature stream, coined the "locus of entrepreneurship", does not only see the expression of entrepreneurship in the creation of new firms only, or more broadly organisations, but acknowledges the possibility of discovering and seizing new opportunities after creation, exercising judgment over existing and potential resources, and introducing new products and processes.

The combination of opportunity discovery and exploitation in the entrepreneurial field has opened the door to a reflection on the organisational dimension of the entrepreneurial activity. These issues are treated in terms of decision-making problems in line with the new theory of the firm. Foss N. and Klein (2012) invoke "judgmental decision-making" as the element which allows bridging the gap between the entrepreneurship theories and the modern theory of the firm. In their view, "analyzing the resources used by entrepreneurs, both for the establishment of new ventures and the operation of existing ventures, sheds light on the manner in which perceived opportunities and real investments are transformed into value-creating activities" (p.12). The research on entrepreneurship should thus help improve the modern theory of the firm by introducing opportunity discovery as the reason for firms existing.

As Foss N. and Klein (2012) further explain, none of these perspectives (i.e. entrepreneurship and the modern theory of the firm) constitute a rejection of the other. Hence, "one could accept the basic Coasean explanation for firm boundaries (based on minimization of transaction cost) while adding behavioural, experimental, or cognitive elements to broaden the scope and applicability of the theory" (p.14). In their 2013 article, Foss and Klein further argue that useful pieces of information that allow incorporating both literature streams can be found in the writings of the Austrian school of thought. They explain that both perspectives share many similar characteristics representing a common ground for organisational analysis and even emerge from common sources of inspiration.[20]

For example, both literature streams use the notions of bounded rationality, tacit knowledge, the informal role of prices, the role of general, abstract rules, and spontaneous orders.[21] According to Foss and Klein (2013), Ronald Coase referred to the idea of spontaneous order to argue that participating

[20] In their article, Foss and Klein's article focus on Hayek's work but most of the ideas expressed are common to Austrian economists.

[21] See Appendix A for a presentation of the Austrian premises.

in a market imposes costs for "searching for trading partners, discovering the relevant price, negotiating and enforcing contracts, and so on" (p.9). His recognition of a firm's limits has later been developed by modern institutional theorists to express firm boundaries as the trade-off between the relative transaction costs of internal and external exchanges. Similarly, Oliver Williamson based some of his ideas on the Austrian work on knowledge, adaptation, and coordination. In particular, Foss and Klein (2009) write that "Williamson sees his general model of contractual relationship or "simple contracting schema", in which contractual hazards pose problems that require safeguards such as incentive alignment, specialised alignment mechanisms (like vertical integration), or reputation through repeated dealings (Williamson, 1985:32–35), an example of a Hayekian rule" (p.10). They further link Williamson's views to the Austrian school of thought by noting, for example, that Williamson (1985) sees much of the knowledge required for efficient decision-making as "highly idiosyncratic in nature", that economic inquiry is interesting under changing market circumstances, or "that markets have superior properties with respect to adapting to "autonomous" external changes (changes that do not require explicit coordination with other decision-makers), whereas hierarchy is superior when the relevant adaptation requires coordination ('bilateral adaptability') among many decision makers" (p. 11).

The idea that decisional autonomy is limited–i.e. that decision-making is embedded in a social context– also gave birth to the literature on institutional entrepreneurship (see Garud et al. (2007) for a comprehensive overview). This research field "is the result of the 'paradoxical' integration of the two concepts of institution and entrepreneurship. It combines, on one side, institutions–which provide continuity and stability of organisational processes and constrain actor's behaviour–with, on the other side, entrepreneurship–which is a creative force shaping and transforming institutions themselves" (Albertini et al., 2016, p.111). Authors belonging to this literature stream address the "paradox of agency" which underlines the bi-directional relationship between institutions and individuals.[22] For example, Seo and Creed (2002) present a theory of institutional agency and praxis that indicates "the interdependence of the political and the cognitive in the creation, maintenance, and change of institutional arrangement" (p.244). Battilana et al. (2009) present "a theory of action that accounts for actors' embeddedness in their institutional environment". Beyond the agency perspective, Tracey et al. (2011) suggest "a model which involves an institutional entrepreneur combining aspects of established institutional logics to create a new type of organisation underpinned by a new, hybrid logic" (p.60). Albertini and Muzzi (2016) extend institutional entrepreneurship to "low-status organisations" (the start-up of new organisations) and the "process of implementing new divergent organisational forms" (innovation in mature firms) (p.110).

[22] The paradox is summarised in Seo and Creed (2002, p.223) with the following question: how can actors change institutions if their "actions, intentions, and rationality" are conditioned by the institutions they wish to change?

While the literature on institutional entrepreneurship highlights very interesting aspects of dynamic organisational embeddedness, it also shows the difficulty to theorise simultaneously about cognition, decision-making, actions, organisations, and institutions. According to the analysis below, clues to understanding these aspects of economic organisations can be derived from the study of the interplay between individual and collective actions in an Austrian perspective (especially from the work of Menger (1871, 1883) and Mises (1949)). None of the authors mentioned in the review on institutional entrepreneurship, however, refer to Austrian writings.

4.3. The modified role of information and assets

As the work of Kristen and Nicolai Foss further shows, adding an Austrian entrepreneurial component to the study of organisation extends the decision problem about a firm's strategy and organisation to issues of (i) limited and dispersed information (see Arrow, 1974; Dew et al., 2004; Foss N. and Klein, 2012; Hayek, 1945; Kirzner, 1973; Menger,1871; Mises, 1949; Venkataraman and Sarasvathy, 2001) and (ii) heterogeneous uses of assets (i.e., Alchian and Demsetz, 1972; Barzel, 1997; Foss N. et al., 2007; Hayek, 1945; Kirzner, 1973; Menger, 1871; Mises, 1949).[23] Limited and dispersed information implies that knowledge is spread among market participants, and it is difficult to combine it in order to make sound decisions. The heterogeneity of assets' use goes further than "invoking the needed specificities in an ad hoc fashion to rationalize particular trading problems–for transaction cost economics, asset specificity; for capabilities theories, tacit knowledge; and so on" (Foss, 2012, p.21). The Austrian perspective, rather, describes assess heterogeneity in terms of a particular use of assets in the space-time structure of the production process. Combining this idea with Barzel's (1997) assets distinction based on their attributes, Foss N. and Klein (2012) describe entrepreneurship as an experiment on capital assets combination, which has a goal to discover new valued attributes. Attributes are to be viewed as "characteristics, functions, or possible uses of assets, as perceived by an entrepreneur" (p.21). Different asset attributes, attribute levels, or valued attributes create asset heterogeneity. These can vary over time, making it unlikely for an entrepreneur to know ex ante all relevant attributes of an asset when production decisions are made.

A close relationship exists between dispersed knowledge and the heterogeneity of assets' use. It constitutes the core of the research on the entrepreneurial theory of the firm. The "choice of organisational design needs to reflect the characteristics of the knowledge held by the firm and its input owners (as partly reflected in organisational design theory, e.g. Galbraith, 1974). Thus, dispersed knowledge constraints the (efficient) use of centralized allocation and coordination mechanisms, and that proper organisational design must take this into account" (Foss, 2013, p.13). Consequently, decision-makers at higher organisational levels cannot be held for more knowledgeable than their employees. They partly base their decisions on information hold by other participants and possibly unknown to them at time the decision is made. Indeed, according to the literature on the knowledge

[23] See Chapter 2, Section 2, on limited and dispersed information and heterogeneous uses of assets.

economy, firms need to rely on an increasing number of knowledge specialists, both organisation members and participants of their specific and general environment. This practice implies the use of managerial authority as a mechanism of coordination (Grandori, 1997; Grandori and Kogut, 2002) because “knowledge dispersal transfers ‘real authority’ (Aghion and Tirole, 1997) to employees, that is, those who know which decisions should optimally be made, when and where, in response to changing contingencies” (Foss, 2013, p.14). The role of management becomes that of creating and enforcing a “constitution”, a framework for actions within the firm, “interfering as little as possible with the play of the game”.

Chapter 2 : Research question

Foss N. and Klein (2012) note that "the economic theory of the firm can be improved substantially by taking seriously the entrepreneurial aspect of firm organisation and strategy" (p.2). Similarly, according to Casson (2005), "the introduction of entrepreneurship can facilitate the development of an integrated synthetic theory of the firm" (p.327). Realising such an agenda is, however, dependent on solving a methodological puzzle linked to different theoretical underpinnings shaping the organisational and entrepreneurial disciplines. Some insights toward solving this problem are given in the literature review by highlighting a need to investigate individual and collective actions perpetrated in organisations by conscious and purposeful human beings. It also shows the related need to consider two shortcomings commonly expressed in reference to entrepreneurial research on organisations: (i) a lack of understanding of the link between asset heterogeneity, entrepreneurship, and organisations and (ii) a lack of understanding of the link between dispersed knowledge and changing organisations. The below work proposes to study these shortcomings as a problem of combining assets and information in organisations.

1. The heterogeneous use of assets in organisations

Jost (2013) defines strategy and architecture as two organisational leverages on firm's value-creation process. Defining efficient labour division, coordination mechanisms, and motivation schemes should result in optimal cost-income ratios for each organisational participant. However, no strategy or architecture take form as long as they haven't been imagined, designed, and formally expressed. The literature on entrepreneurship proposes a solution to this shortcoming in the form of opportunity imagination and exploitation. This view, however, unveils supplementary issues linked to the entrepreneurs' subjective valuation of profit opportunities. Even if an entrepreneur were to base his strategy on creative asset combinations with uses superior than those currently observed in the market, the potential for value-creation in the organisation is not secured. The question of which strategy is adequate in making room for profit-generation still needs answering.

The literature on judgmental decision-making explains that successful entrepreneurs are superior in making judgments about new means-end relationships. As Foss N. and Klein (2012) note, judgmental decision making over the asset combination is that which generates profit and loss (Von Mises), generates economic growth (Schumpeter), or causes markets to equilibrate (Kirzner). Organising the entrepreneurial process "[..] is essentially the concept of entrepreneurship as judgmental decision-making under uncertainty […]"(p.20). However, "[i]n this approach entrepreneurs are modelled as decision-makers who invest resources based on their judgment of future market conditions, investments that may or may not yield positive return" (p.20). Their success is directly linked to the concrete implementation of the vision with a commercial use and its acceptance by customers. In the view of Alchian and Demnetz (1972), "[…] potential uses of different inputs in different potential

applications indicates that the firm is a device for enhancing competition among sets of input resources as well as a device for more efficiently rewarding the inputs" (p.795). In the words of Kirzner (1973), the perceived sources for profit are information differentials among market participants which bring the entrepreneur to exploit a creative asset combination. In all cases, the firms' strategy reflects its subjective understanding of asset specificity and aims to create value for the firm.

The notion of asset specificity expressed in relation to limited and dispersed information is different than the same notion in NIE. It builds on Menger's description of economic goods where higher-order goods, such as raw resources, are transformed in production sequences to ultimately result in goods of first order, or consumption goods. As a consequence, the value of higher-order goods is determined by the use value of the first-order goods, or its ability to satisfy a consumer's want (marginal utility). Because capital goods are composed of higher-order goods, their degree of substitution is limited when time is accounted for. While some goods are produced in a business cycle's boom, for example, they might no longer be needed in the next period and may be hard to redeploy to other more productive uses due to their specificity. Misallocation is the "dark side of specificity" in both Williamson's and the Austrian school's views (Foss N. and Klein, 2013, p. 12). However, the reasons leading to misallocation are different. While asset specificity in the work of Williamson refers to the temporal dimension of the production and leads to bilateral monopoly, the Austrian description of specificity emphasises the specificity of an asset's use rather than the specificity of a relation. Resources and production means are thus described as specialised to particular places in the time structure of the production (Foss N. and Klein, 2013, p.11).

As stated by Foss N. and Klein (2012, p.21), "[j]udgment thus implies asset ownership, for judgmental decision-making is ultimately decision-making about the employment of resources". As argued below, entrepreneurial decision-making in firms aims to define the best asset combination–or firm architecture–with respect to the entrepreneurial imagined opportunity-or firm strategy. Adding an entrepreneurial component to the study of organisational structures and their formation therefore does not contradict the findings of the modern theory of the firm. It rather opens the field of research to a wider interpretation of information constraints and creates a need to theorise about creative asset combinations with heterogeneous use of assets.

2. Decision-making, authority, coordination mechanisms, and motivation schemes

While commonalities can be found in the literature on entrepreneurship and the new theory of the firm, differences appear when examining the underlying assumptions from a formal point of view. From an Austrian perspective, economic phenomena are subjective. The related information problem is different than that of NIE. As Kirzner (1997) remarks, asymmetric information often refers to situations where people do not know about the realisation of a stochastic variable but know its underlying distribution. They hence have a fairly good knowledge of what information they are missing. The Austrian view on information, however, implies genuine or "sheer" ignorance. It implies that actors do not know the underlying distribution of an event and cannot possibly imagine what

information they are missing. Consequently, dispersed knowledge can be related to the notion of distributed knowledge, where information is held by a group of agents and no individual knows it completely (Foss N. and Klein, 2013, p.18).

In an article reviewing some shortcomings of the modern theory of the firm to be investigated from an Austrian perspective, Foss N. and Klein (2013) highlight issues due to different interpretations of the informational problem in both literature streams. The Austrian understanding of the information problem is not described as the costs for searching, identifying, and transmitting information. It is rather linked to information being inherently personal, and part of it being impossible to communicate at any cost (Foss N. and Klein, 2013, p. 13). Analysing the organisational problem with limited and dispersed information hence entails issues which go beyond the modern theory of the firm. For example, if individuals do not hold all necessary information to make optimal decisions, how do they choose the "right" rules that induce efficient firm infrastructure? How do they know what task to attribute to which employee? How do they set standards for performance? In other words, how do they form correct expectations about the future development of their firm? Furthermore, if information is dispersed among people, can a decision-maker combine the information held by organisational members to increase decisional quality?

Discussing the role of information in theory formulation is a general Austrian agenda. The views about this fundamental theoretical building block, however, diverge among Austrian scholars and influence their theoretical investigations. The implication for theory building in organisational studies is a need to better understand the link between dispersed knowledge and decision-making in organisations, to clarify what dispersed knowledge is, to determine micro-foundations for decision-making, and to define clear units of analysis. The research on the organisational problem form an Austrian point of view must describe the reparation of authority and decision-rights in firms and its consequence on coordination and motivation mechanisms. These elements are part of the firm's strategy and architecture and are simultaneously dependent on the firm's decision-mechanisms and individual's willingness to contribute to the organisational goal. Consequently, what links both the entrepreneurial and organisational approaches to economic organisations is human influence on both strategy and architecture, also referred to as management in the below text. According to Foss N. and Klein (2012), "[…] the basic explanation for systematic differences in firm-level performance is that entrepreneurs differ in their abilities to exercise original judgment and to delegate "derived judgment" to subordinates" (p.14–15). They further explain that "[their] approach complements the conventional resource-based literature, which focuses on the returns to individual factors but neglects the returns to the firm, that is, the idiosyncratic combinations of factors selected by particular entrepreneurs (see also Foss et al ., 2008). The ability to organise resources is itself a capability, an ability to create and recognize strategic opportunities in the language of Denrell et al. (2003)".

In the text below, management is considered a capability which includes both organisational and entrepreneurial abilities. Adding an entrepreneurial component to the study of decision-making in organisations hence does not contradict the findings of the modern theory of firm but requires

specifying what characteristics are common and specific to entrepreneurs and organisers. It also opens the field of research to a wider interpretation of information constraints and collective decision-making with limited and dispersed information.

3. The combination of assets and information within organisations

The below work presents the idea that both problems of heterogeneous asset uses and decision-making with limited and dispersed information in firms are problems of assets and information combination in organisations (i.e. a dual problem resulting from the interdependent structural and behavioural components of the firm). As Jost (2013) explains, the study of labour division, coordination mechanisms, and motivation schemes relies on the analysis of economic actors' behaviour in various institutional environments as well as their aggregation. He describes individual behaviours as atomistic elements which impact collective organisational behaviours through interactions. As described below, the implication of such a statement in the current context is that each organisational member's decision precedes any individual action which become the unit of analysis for organisational studies. The goal of the below investigation is to understand firm performance by analysing how economic organisations in general and firms in particular combine heterogenous assets, individual actions and information in order to create value over time.

Chapter 3 : Research plan

The analysis of the dynamic combination of actions, assets, and information in organisations is based on the praxeological perspective because of the explicit link existing between the work of Menger and Mises and the described problems arising when combining assets and information in an entrepreneurial perspective (see Chapter 4 for more on this topic). It is important to note that the understanding of the below theoretical development is conditional to the reader's knowledge of methodological individualism and praxeological subjectivism. Appendix A therefore presents a careful description of these topics as well as a historical review of the Austrian thoughts and an explanation of important features of the praxeological perspective.

The goal of the study is to use praxeological premises to define the following:

(i) The structural dimension of firms: the relation between individual and collective actions in autonomous decisional entities (i.e. the division of labour and the repartition of production means in originations with regard to asset combination);

(ii) The behavioural dimension of firms: human influence on the course of actions in organisations that evolves in an ever-changing environment (i.e. the management of the firm in a praxeological progressing economy with regard to information combination).

The plan proposed to investigate the aggregation of heterogeneous assets and limited and dispersed information in business organisations is presented in this chapter. It comprises both a theoretical and an empirical analysis as presented in Table 1.

Table 1: Structure of the thesis

	Theoretical development (II)	Empirical analysis (III)
Model of firm performance	Chapters 4 and 5	Chapter 8
Managerial interference	Chapters 6 and 7	Chapters 9, 10, and 11

Together, the theoretical development of Part II and the empirical assessment of Part III develop and test a process theory of organisation which dissociates the notion of "entrepreneur" from its organisational unit and clearly distinguishes both entrepreneurial and organisational functions in firms. The thesis then combines both organisational and entrepreneurial aspects of running a firm into one overarching managerial function. It transforms the organisational problem described in NIE into a managerial problem which includes the issues of collective decision-making with limited and dispersed information and heterogeneous uses of assets. It investigates the link between the managerial function and (i) firms' nature, (ii) internal organisation and boundaries in a socially embedded context, (iii) and defines the management of structural changes in business organisations as the solution to the managerial problem.

1. The theoretical development

A description of organisations in general and business organisations in particular from a praxeological perspective

No formal definition of "organisation" exists in the Austrian literature. Chapter 4 develops a process theory of organisation which serves as theoretical framework to extract such a definition and further investigate the focal issue of management. It analyses the praxeological context for the study of organisations based on the Miesian concept of human actions and the Mengerian definition of the economic process. The work of these authors constitutes the theoretical foundation for developing the organisational dimension of praxeology. The chapter further links the description of organisation presented in Chapter 1 to the fundamental Austrian tenets of subjectivity, passing time, and limited and dispersed information. It investigates the underlying structure of the economic activity based on the Mengerian transformation process, defines the fundamental elements constitutive of the economic process, and presents a praxeological definition of organisation.

Chapter 5 refines the definition of organisation in general to that of the firm in particular. It presents the distinction between private and public organisations based on the principle of value-creation and proposes an economic model of firm performance accounting for waste in process execution. Firms are expected to act in seemingly isolation. Their actions are restricted by their individual understanding of their environment. They undergo the social coordination mechanisms of cooperation and competition with limited information. The model shows that, in such a set-up, plan conformity over time—the firm's effectiveness in reaching its goals—is dependent on its efficiency in executing its transformation process. Firm efficiency is further dependent on the firm's embeddedness in a broader system and its subjective decisions about both its strategy and architecture. This model presents the idea that firms' performance is dependent of their degree of effectiveness and efficiency in executing the process after introducing subjectivity in the analysis.

A description of organisational structures and their evolution through time

Chapter 6 discusses the leverages on firm performance after introducing an entrepreneurial dimension to the organisational problem presented in Chapter 1. It describes firms' strategy and architecture as two leverages on firm performance which jointly aim to create market power with respect to customer wants and asset combination. It further investigates firm architecture in this context, defines labour division as the aggregation of individual activities in firms, and describes both coordination and motivation mechanisms as tools to align individual output and goals to the firm's overall objective. The discussion relates the definition of a firm's boundaries to flexible and scalable architectures evolving through time with respect to their environment, introducing the notion of passing time in the theoretical development.

A description of the management of structural changes in business organisations

Chapter 7 introduces managerial influence in the economic model of firm performance presented in Chapter 5. It develops the idea that both entrepreneurial and organisational abilities are determinants of firm performance. The chapter defines these abilities as two interrelated aspects of management. It studies the Austrian definition of the entrepreneurial and managerial functions and finds strong overlapping which impedes a clear distinction in current Austrian texts.[24] The investigation further builds on the literature on decision-making to define clear boundaries for individual functions in firms and proposes a formal definition of the entrepreneurial and organisational functions based on common but specific characteristics of a firm's decision mechanisms. This allows extending the definition of the organisational problem reviewed in Chapter 1 to a managerial problem that entails the two interrelated and yet different dimensions of entrepreneurship and organisation. The chapter concludes by defining the solution of the managerial problem as the management of structural changes in business organisations, introducing decision-making with limited and dispersed information in the theoretical development.

2. The empirical analysis

Part III tests the validity of the economic model of firm performance in an empirical analysis. Prior to translating the economic model into an econometric model, Chapter 8 discusses the use of mathematics and statistics in Austrian studies and explains why the chosen approach does not contradict Austrian premises. It then presents the database and builds the econometric model of firm performance based on the item response theory. It extends an initial Rash model to a latent regression two-parameter model used in building the final multilevel structural equation model of firm performance. This last model accounts for subjectivity in process execution and interdependence between firm and sectorial levels as advocated by the process theory of organisations. The chapter further tests the hypotheses that firm efficiency positively and significantly influences firm effectiveness, that firms evolve in a subjective world, and that their embeddedness in a broader system influences operations.

Chapter 9 and Chapter 10 measure the expression of firms' entrepreneurial and organisational abilities based on an item response framework in order to control for their effect on firm efficiency in Chapter 11. This last chapter tests for the hypotheses that entrepreneurship has a positive and significant impact at the sectorial level (accounting for firms' capacity to create market power based on imagined opportunities) and that organisational abilities have a positive and significant impact at both firm and sectorial levels (accounting for firms' capacity to internalise the benefit of the imagined profit opportunities). Part IV links the findings to current studies in organisational economics and concludes.

[24] The Austrian "managerial" function is close to the focal "organisational" function but overlaps with the "entrepreneurial" function. Chapter 7 studies both Austrian managerial and entrepreneurial functions in order to define the organisational and entrepreneurial functions needed for this study.

3. Scope, limitations, and methodological considerations

3.1. Scope and limitations

What is this thesis about?

The below text develops a theoretical framework to analyse organisational issues and tests for its empirical validity. It follows the Mengerian tradition of avoiding general equilibrium premises. The rationales for this choice are presented in Appendix A which describes the fundamental principles needed to understand general Austrian tenets and their expression in a Mengerian tradition. The theoretical development is based on methodological individualism, subjectivity of being and reasoning, and understanding (see Chapter 7 for more on this point). It is an attempt to develop an analytical tool that allows reproduce the teachings of different economic views and unify the current diversity in approaches. This idea emerges from a believe that many economic views based on imperfect information can, to some extent, be related to the process theory of organisation. While this claim is audacious at this point of the text, it should gain on substance throughout the reading.

What isn't this thesis about?

Because of the present focus on organisation, neither appendix A nor the following chapters assert common Austrian topics such as the formation of prices, interest rates, credit, trade cycles, wages, money, exchange rates, or government interventions. The text presents a partial covering of market mechanisms, exchange relationships, and competition because of their obvious link to the current topic of interest, but it does not intend to systematically and completely treat these subjects. Furthermore, the theoretical framework includes aspects of organisational economics already studied in many literature streams. It can be related to institutional economics, behavioural economics, evolutionary economics, or identity economics, and many related topics such as the resource-based view of the firm, industrial organisations, innovation systems, the research on firm growth and SMEs, and, of course, many branches of entrepreneurship. The below text is, however, no attempt to relate every organisational feature to existing literature. This is out of the scope of the present investigation and should be treated as an agenda for future research on the process theory of organisation.

3.2. Methodological considerations

The study of real phenomena

The praxeological methodological approach is apriorism. Mises believes that some knowledge of the physical world can be derived logically from general principles (see Chapter 4, section 1). Examples of praxeological axioms are the ideas that actions are rational, causal, teleological (i.e. things can be described in terms of their apparent purpose) and take place in time with an uncertain future (Caldwell, 1984, p.363–364). Mises adopts the neo-Kantian perspective that "praxeological axioms are

both a priori true and empirically meaningful". In this view, knowledge is both analytic and contingent (Caldwell, 1984, p.365). In consequence, Mises's understanding of rationality differs from the views traditionally put forth by economists. In praxeology, actions are rational because they are purposeful. Opponents to praxeology have deemed this assertion "dogmatic" because untestable. But as Caldwell (1984) notes, "[i]f one believes that the rationality assumption is testable and that the testing of assumption is important, then by implication the Austrian approach can only be viewed as misguided. If one believes that it is unnecessary to test the assumption, or that it is an untestable metaphysical statement, then praxeology is less objectionable" (p.369).

The below investigation adopts the later point of view and attempts to apply the teachings of early Austrian scholars to modern economic questions. It digs into the Mengerian and Miesian world in order to analyse organisational issues from their perspective. For these authors, "economics was a human science that could derive laws that had the same ontological status as the laws derived in the natural sciences, yet accounted for the complexity of the human experience" (Leerson et al., 2006, p.248). "As Mises's approach implies, economic understanding increases by framing questions in terms of the particular but analysing in terms of the logic of choice. Interpreting the particular by way of the universal yields the *analytical narrative*, which brings the real-world human chooser back to forefront of economic analysis" (Leerson et al., 2006, p.263, emphasis in the original).

Furthermore, the Mengerian tradition recognises a difference between exact and empirical-realist theories. The exact orientation of research on firms is to be understood as follows: "[…] in every economy innumerable uneconomic forms of enterprise are conceivable; however, disregarding economically irrelevant differences, only *one* form of enterprise is conceivable, namely, that in which a strictly determined *economic* orientation prevails" (White, Appendix VI in Menger, 1883, p. 218, emphasis in the original). The exact orientation examines the "abstract economic reality". In opposition to the empirical-realistic orientation, exact laws are no laws of the real. For example, the exact orientation takes the form of theoretical decision making and excludes the role of understanding in increasing decision quality. "The *real* phenomena of human economy, as paradoxical as it may sound at first, are to no small extent of an uneconomic nature, and as a result of this fact are by no means strictly determined phenomena, viewed from the standpoint of economic reality" (White, Appendix VI in Menger, 1883, p. 218). They don't lead to determination of "exact laws", "but only to more or less strict 'regularities' in the coexistence and succession of the real phenomena".

This work's methodological similarities and differences to Mises' praxeology

This investigation limits itself to be a "hypothetical-deductive theory" of organisations. It finds its roots in the purposefulness of actions and does not intend to conform to non-catallactic events (it focuses on the theory of exchange in particular, not the theory of human action in general). This thesis can be seen as "conjectural history" with reference to the specific organisational form of the firm: it makes use of ideal-type constructs, "although their truth follows apodictically wherever all the real-life equivalents of the specified ideal-types are present in given historical circumstances" (Selgin, 1990, p.

27). In this sense, the proposed definition of the firm in Chapter 5 remains an open-ended concept whose sole constraint is the reference to universal characteristics extracted from Menger's definition of the transformation process. I believe that this work can be considered praxeological to the extent that it conforms to methodological individualism and is based on the logic of choice.

A strong difference with traditional Austrian methodology, however, consists of using an extensive econometric analysis in Part III. Mises states, for example, that a theoretical prediction which do not correspond to empirical evidence is due to a misconception of "the verbal chain of logic leading from premises to conclusions", that praxeological theories cannot be "falsified because there are no 'constants' in the social world equivalent to those encountered in natural sciences", and that the "complexity of social phenomena rules out the testing of praxeological theory" (Caldwell, 1984, p.371). Despite these assertions, praxeologists do not imply that empirical work should be eliminated from economic studies. As Leerson and Bootke (2006) note, "Mises's critics wrongly characterize his position as rejecting empirical work" and "his defenders wrongly interpret his stance as rejecting empirical analyses on the grounds that they contradict *apriorism* and push economics towards historicism" (p.247, emphasis in the original). As further emphasised by Caldwell (1984), empirical work can, in particular, help "determine the applicability of a theory to a particular problem" (p.371, emphasis in the original). In a similar vein, Leerson and Bootke (2006) concluded that "[b]orrowing from sociology and anthropology, economics may employ survey, interview, and participant observing techniques to glean new empirical knowledge from its subjects (the narrative) to be analyzed in light of aprioristic rational choice theory (the analytic), leading to analytically rigorous but institutionally rich examinations" (p.263). This particular point is further discussed in Chapter 8.

The logic of choice and the systemic approach to the economy

This work adopts Menger's definition of economics as "the totality of theoretical-practical sciences which are included in common under the concept of political economy" (Menger, 1883, p. 207). As described above, the notion of "theoretical-practical science" is of importance because of its link to observed phenomena. In pure Mengerian terms, this thesis intends to analyse firms' managerial function as one "practical doctrine of individual economy". It studies collective economies in general and firms in particular with decision-making as a basic concern eventually linking the entrepreneurial and organisational functions to the way firms "best institute their economy" (Menger, 1883, p. 211). The aim is to gain insights on these functions as part of a "practical science of private economy".

In this perspective, the following work searches for general economic laws that describe empirical forms of economic phenomena in the study of organisations. The process theory of organisation presented in the next chapter is a pure theory. It presents exact laws within a strict framework expected to be true in all situations. It is used to extract empirical forms from the observed reality in the empirical analyse, which investigates firms' behaviour to compare the model to real historical data. The theory nevertheless does not define how a firm should act. The only assertion made in the below theoretical development is that the collective behaviour of firms is expected to follow a theoretically

defined pattern. One of the most important aspects in staying consistent with the present theoretical challenges is to focus on human actions and choices at any level of collective action and avoid using ideal-types or universal laws based on other criteria than the intrinsic characteristics of economic actions.

Furthermore, this thesis explicitly integrates the following two aspects of the Austrian economic process in the organisational debate: (i) organisations are embedded in a broader system and (ii) system adaptation takes time because the economy is characterised by sequences of unfolding events. Moreover, it is important to note that freedom of action is a cornerstone of the Austrian literature and the content of actions is contingent on society. For Mises (1949), "the content of human action, i.e. the ends aimed at and the means chosen and applied for attainment of these ends, is determined by personal qualities of every active man" (p. 46). He further writes that man "lives not simply as a man *in abstracto*; he lives as a son of his family, his race, his people, and his age; as a citizen of his country; as a member of a definite social group; as a practitioner of a certain vocation; as a follower of a definite religious, metaphysical, philosophical, and political ideas; as a partisan in many feuds and controversies" (p. 46).[25] We can assert that the content of man's economic action is constrained by the availability of productions' means, participation in a society, and subjective context of meaning.

Acts of valuation and choice

At the basis of Austrian economic reasoning is the fact that consuming, producing, and exchanging goods and services are contingent on resource scarcity. At the same time, scarce resources are elements of a system of cooperation and competition. A person has to compose with things and goods at his or her disposal and act within the constrained framework of his or her environment. This initiates the debate on ownership of the means of production and the rule of law as guardians of individual rights which set up the boundaries for human action within the society. A review of these aspects is nevertheless out of scope of the current work. I am rather interested in the fact that the logic of choice presupposes the existence of a set of attainable alternatives among which human beings choose. It is sufficient to recall that the Mengerian tradition places importance on the notion that production means must be "under command" or "directly available". Each individual is thus conscious that he has at disposal a sub-set of goods to be transformed, exchanged, or consumed in order to satisfy his needs.

Praxeological subjectivism supposes that two individuals with the same available goods who live at the exact same time and place and have the same experience can have different subjective contexts of meaning and thus act differently with regards to the available means. The alternative for choices is an open-end concept due to subjectivism. It is, of course, limited to a subsample of possible alternatives for reasons of accessibility and understanding. Human action rests upon a set of possibilities contingent on people's individual situation and interpretation about what can be achieved from this point onwards. Organisations emerge from resource scarcity, dispersed knowledge and

[25] Note that the author does not support Mises's mentioning of "race" in this quotation.

specialisation, and the individual goal of changing a current state of affair into a more satisfying one. Human economic activity thus consists of choosing among combinations of goods or actions to better reach their objective in a subjective world.

The interactions between market participants are further based on acts of valuation and choice. The act of valuation of attainable alternatives is dependent on the actors' most urgently felt needs. The act of choice is dependent on the actors' capacity to enter the exchange. The terms of an exchange are entirely defined by both valuation and choice. They express the common knowledge of all involved actors at the time the exchange is made. In line with epistemological subjectivism or idealism, this view (called the Mengerian realistic theoretical approach) considers that market phenomena are subjective. They result from people's free participation in exchange relationships with the aim of satisfying their needs and exist only because human beings are conscious of these needs. "Thus, value, wealth, profit, loss, and costs are products of human thoughts, having no 'objective' or extensive foundations. One cannot imagine their existence, or conceive their alteration, except in connection of acts of valuation or choice" (Selgin, 1990, p. 22).

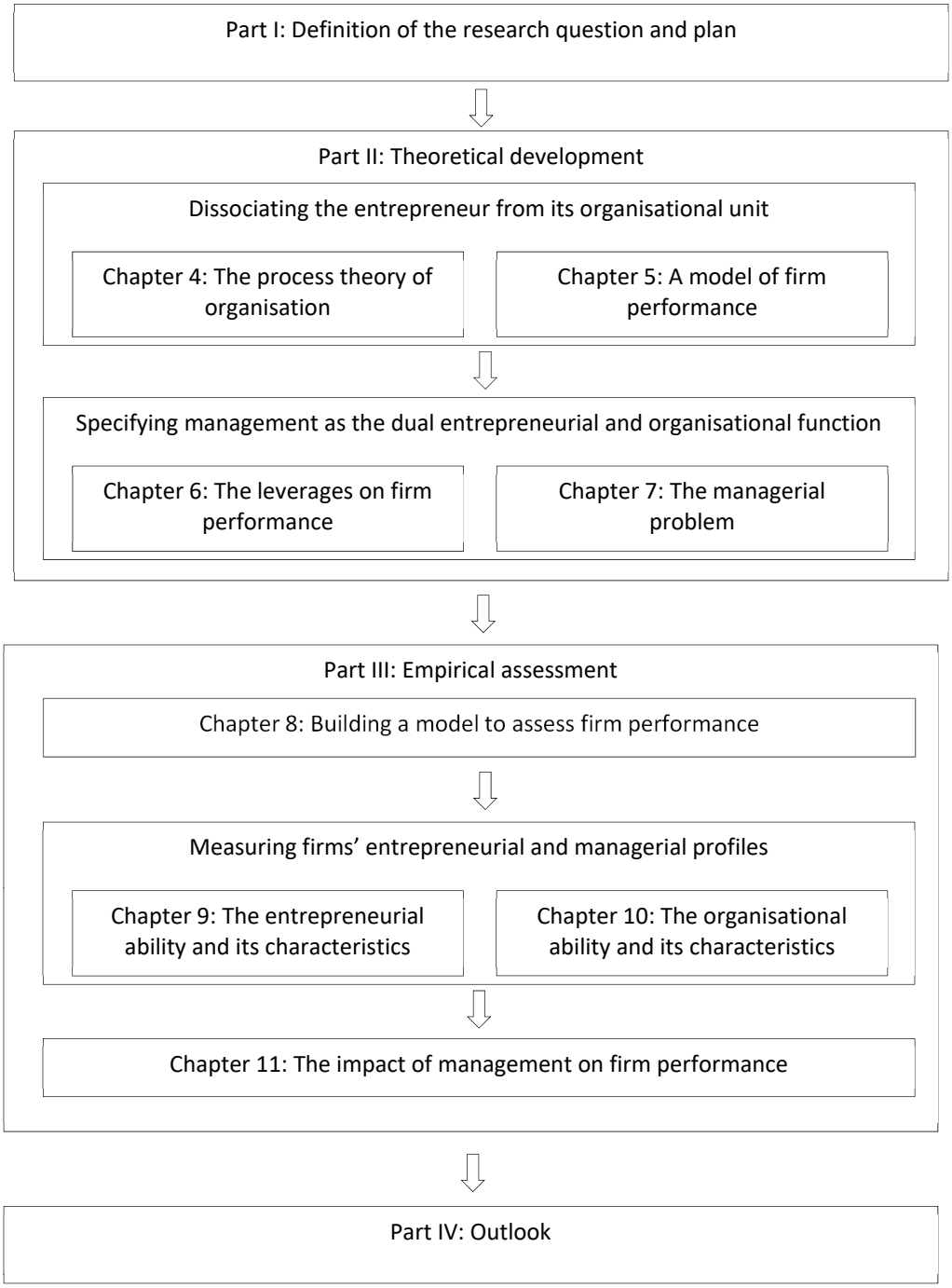
Theory building in praxeology

Human being's expectations about the future depend on their subjective understanding of the environment. Mises's description of "praxeological subjectivism" recognises both the subjectivity of "being" and "reasoning". Human beings are described as subjects with individual perception of given situations. In theory building, their actions and choices have to be distinguished from their content. Praxeology asserts that "concrete ends and values have historical but no theoretical significance" (Selgin, 1990, p. 23). The content of choices and acts of valuation are thus historical data which are deduced from observation. The observation of single occurrences of events has no theoretical meaning in a praxeological subjective world because it depends on each observer's understanding of the given situation. Praxeology therefore has to be distinguished from psychology because it does not seek to identify ends, motivation, or thoughts that trigger actions. Praxeologists are incapable of judging the value of a choice. They cannot identify appropriate actions related to a given situation. They can only state that a particular action has a meaning for his initiator. The theoretical interpretation of an economic phenomenon is independent from the content of the decision that led to its occurrence.

Theory building in line with praxeological subjectivism must be based on the "pure logic of choice" and freed up from any normative assumptions. In this perspective, "[t]here are no laws regarding the *content* of economic behavior, but there are laws universally valid as to its *form*. There is an abstract rationale of all conduct which is rational at all, and a rationale of social relations arising through the organisation of rational activity" (Knight cited in Selgin, 1990, p. 24). In other words, there are no typical content of choices or actions. They can nevertheless be theoretically described with respect to their forms. This is illustrated in the below investigation in an organisational context.

4. Visual representation of the research plan

Figure 1: Overview of the research plan



Part II: Theoretical development

Chapter 4 : The process theory of organisation

Part I mentions the lack of formal definition of "organisation" in the Austrian literature. This chapter reviews the works of Karl Menger, Ludwig Von Mises, and Israel Kirzner to describe economic entities with similar characteristics than those presented in NIE (see Chapter 1). It further presents a praxeological definition of organisations in general and business organisations in particular.

1. A praxeological context for organisational studies

Menger, Mises, and Kirzner belong to the Austrian school of thoughts but have different perspectives on the economic process (See Appendix A for a description). The main difference in Austrian scholars' views is the rejection of all references to general equilibrium theories in the Mengerian tradition (which principally includes Menger and Mises and excludes Schumpeter and Hayek, for example). Menger is considered the father of the Austrian school of thought. He published his *Principles of Economics* in 1871 and *Problems of Economics and Sociology* in 1883. Mises's *Science of Human Action*, which defines praxeology, was published in 1949 and represents the rebirth of the Mengerian tradition after 50 years of incremental oblivion.[26] It solves old Mengerian theoretical flaws and provides modern scholars with a tool for pursuing economic studies in complete independence from classical assumptions.

Both Austrian branches with and without mention of general equilibrium premises co-evolved in the second half of the 20th century. Today, the Austrian literature can be described as one furnished tree with two trunks. An external observer sees a massive bush representing an autonomic body of literature. Following one branch to its origin, however, reveals if it is rooted in general-equilibrium premises or not. Despite the fact that this analogy is appealing, no black and white portrait of Austrian writings can be made, and modern Austrian texts might entail epistemological incompatible views. For example, the existence of Kirzner's "perfect entrepreneur" implies its opposite, a "robinsian market participant", which behaves according to general-equilibrium laws. In a praxeological world, both types of behaviours occur in different epistemological contexts and cannot coexist.

The next subsection presents the praxeological concept of purposeful human action and the Mengerian transformation process to provide a consistent context for a systemic definition of "organisation" in the Mengerian tradition.[27] A great effort is given to respect the praxeological perspective in the below theoretical and econometric developments. The rationale for founding this thesis on the Mengerian transformation process is the belief that Menger's description of an

[26] See Annexe B for more details.

[27] I use the word "systemic" to emphasise the notion of parts and whole. Importantly, however, Mises warns against holistic ideas in range with collectivism for example that presupposes the members to be dull or purposeless. In such views, "of course, an antagonism between the aims of the society and those of its members can emerge" (Mises 1949, 145).

"economy" constitutes a solid base for developing of a process theory of organisation as described in the next subsections.

1.1. Human actions

The very first sentence of Menger's 1871 principle of economics states the apodictic truth that "[a]ll things are subject to the law of cause and effect" (p. 51). This belief is held universally and does not call for justification. Menger adds two more apodictic truths to the foundations of his economic thoughts: people's higher goal in life is the satisfaction of their material needs and they can influence the causal relationship between their actions and their needs. The conjunction of these beliefs led him to infer that a person's activity consists of substituting one state of satisfied needs for a state of unsatisfied needs by orienting the effect of changes in a way that she judges positive. He writes that "[o]ne's own person, […], and any of its states, are links in the great universal structure of relationship. It is impossible to conceive of a change of one's person from one state to another in any way other than one subject to the law of causality". Progress thus occurs through people (they are the "link") because they tend to orient the effect of causal changes in the system toward a state that better suits them.

While the third truth is implicitly theorised by Menger (i.e. the fact that people can influence the outcome of their actions), Mises's praxeology formalises and consolidates it as an "active link". For Mises, people's actions are however further rooted in the fourth apodictic truth that people are conscious beings. He states that people have a will; they choose; they act consistently with predetermined goals. For him, "[a]ction is will put into operation and transformed into an agency, is aiming at ends and goals, is the ego's meaningful response to stimuli and the conditions of its environment, is a person's conscious adjustment to the state of the universe that determines his life" (p.11). This, to be sure, is also considered a reasonable true belief that does not need further justification. Mises even emphasises the importance to leave the definition of "consciousness" to other sciences. It is sufficient to argue that consciousness is an element of human being to theorise on choices and infer that actions are purposeful.[28]

1.2. The transformation process

For Mises, purposeful actions aim at improving one's state of affairs. For Menger, such actions consist of transforming the means under control into ends to satisfy one's needs. Both authors consider human action as the change of a thing's state contingent on human motive.[29] They consider this a general and universally valid law. Despite the fact that Menger is more explicit about the systemic aspect of the economy, both authors describe human actions occurring in a broader system that

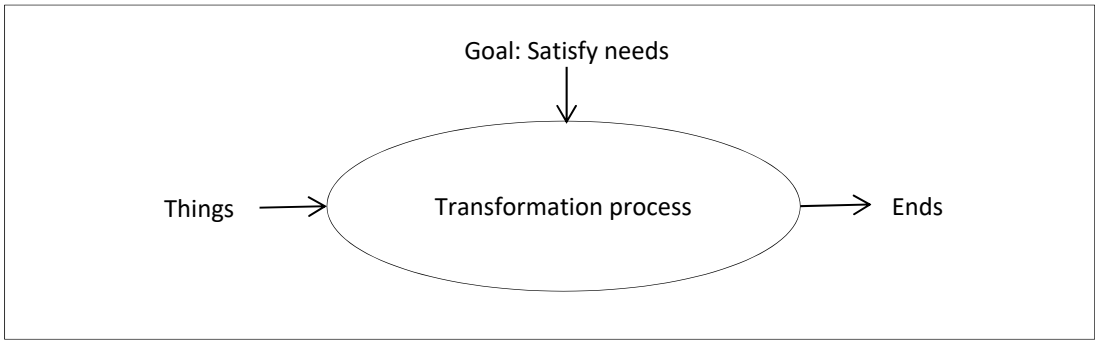
[28] See Mises, 1949, p. 11, for a discussion on conscious and unconscious behaviours. Note that modern research on heuristics and cognition explains that the great majority of decisions are made unconsciously. In my opinion, however, economic decisions are consciously made. This belief justifies the use of Mises' human action in the present context but should be further investigated in supplementary studies.

[29] For more information, see Mises, p.13, on actions and non-actions and p. 28 on the "vegetative man".

contains multiple parts. These parts simultaneously influence the whole and are influenced by the whole. The interconnected subsystems–each and every part of the whole–shape their environment by their actions. At the same time, these actions are constrained in their definition and execution by the system itself.[30] The recognition of this reciprocal relationship applied to economic systems is considered Menger's principal contribution to economic theory.

Figure 2 describes the original Mengerian transformation process. The circle indicates an action and the arrows define the sense of the contingencies between elements. The action is depending on the things being transformed and constrains the end by influencing their state. The goal constrains the action by directing its effects toward a better state of affairs.

Figure 2: The Mengerian transformation process



Source: Author's own representation

1.3. The economic process

Menger and Mises have different understandings of the economic nature of an action. For Menger, the economic nature of a transformation process relates to the good character of the things being transformed. He explains that a thing has a good-character if a human need exists for it, a causal connection between the thing and the need is present, and people have knowledge of that causal relation as well as command over the thing. For Mises, a classification of actions neutral to value judgment is essential to theory building. Consequently, as Selgin (1990) explains, the absence of theorising about the content of choices implies for praxeologists the impossibility to distinguish between categories of actions such as "economical" or "non-economical" (p.23).

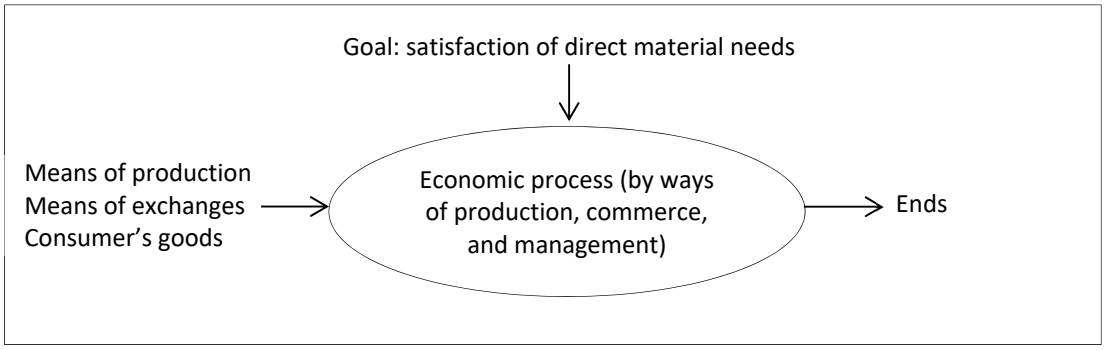
In my understanding, Menger's definition of the economic nature of an action does not contradict the praxeological view because it does not theorise about the reason why actions are pursued (see Chapter 7, section 2.2 on the subjective content of choices and actions). The term "transformation process" is further used as synonym for "action" in a Miesian sense. Its economic nature is, however, borrowed from Menger. An economic action is further considered the purposeful transformation of means into ends with good character. To be sure, no judgment about the purpose of the

[30] Two of Menger's books serve as references in this work: his 1871 *Principles of Economics* and 1883 *Investigation into the Methods of Social Science with Special Reference to Economics*, a book translated in 1963 under the formal title *Problems of Economics and Sociology*.

process/action is made. Furthermore, an entity that carries on an economic action or chain of actions is called an economy in the Mengerian sense and can represent any economic entity, from an individual to a national economy (see next section for details).

In Menger's words: "[t]he stating-point of every economy […] is the goods *directly* available to economic subjects" (emphasis in the original). The "'economy' ultimately means that activity by which we satisfy our direct material needs with the directly available goods (the directly available means of production, means of exchange, consumer's goods, and, indeed, by way of production, commerce and management). Economy is really nothing else than the way which we travel from the previously indicated starting-point of human activity to the previously indicated goal" (Menger, 1883, Appendix VI: p.216ss). An illustration of the Mengerian economic process is presented in Figure 3.

Figure 3: The Mengerian economic process



Source: Author's own representation

1.4. Subjective decision-making, time, and dispersed information

As will be described later, the economic relation presented in Figure 3 is a simplified version of an organisation which consists of one monolithic entity transforming means into ends for a specific goal. It is a simplified view because human action occurs in an intricate environment, not in isolation. By definition, the law of cause and effect implies that people's actions impact their environment and shape it. Praxeological organisations are thus systems of purposeful sub-systems which perpetually interact with one another in causal relationships. These systems further interact with other organisations in their specific environment to form higher-level organisations. In a way consistent with the presentation on organisational studies in Chapter 1, the goal of a praxeological study of organisations can be defined as the understanding of the two basic building blocks of organisations: the organisational participants (called "sub-system" or "parts") and their interactions (called "causal relationships"). The following investigation uses the terminology of the organisational study presented in Chapter 1 for sake of clarity. The organisational structures and behaviours described in a praxeological context, however, depart to some extent from those presented in Chapter 1. This is due to the fact that organisations undergo constant transformations and evolve in a subjective world in perpetual movement. Because time is needed to execute economic actions, system adaptations are non-simultaneous. All occurring changes continually modify the information at hand of economic

actors in a constant flux. Information and knowledge grow heterogeneously and at different rates in various parts of the world. Its spread across space and time renders it limited and dispersed for individuals. It brings people to act subjectively by making choices dependent on their personal understanding of their current state of affairs. This gives rise to heterogeneous action patterns in given economic situations and continuously sends new impulses to the environment, turning the economy into an ever-evolving system. The praxeological study of organisations hence has to add the three Austrian tenets of uncertainty (Chapter 5), passing time (Chapter 6), and dispersed information (Chapter 7) to the analysis of organisational structures and participants' interactions to be complete.

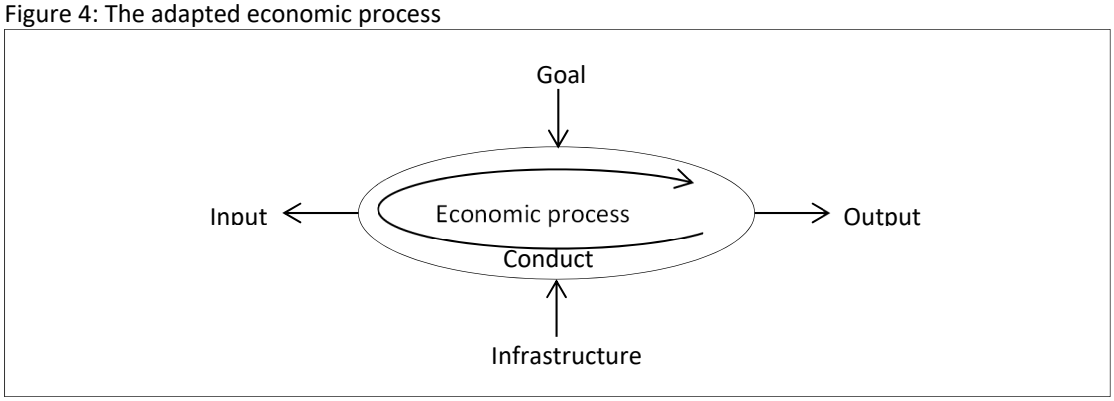
2. Organisations and systems of nested processes

This section describes organisations as systems of elementary units at level 1 nested in clusters at level 2 with interdependence across units and between levels. It extends the description of the economic process to a process theory of organisation in a praxeological context.[31] This work consists of describing the fundamental elements which compose the economic process at all organisational levels, discusses the intended and unintended consequences of process execution, and proposes a praxeological definition of organisation.

2.1. The fundamental elements of the economic process

To offer a theoretical framework useful to the analysis of the problem of combining assets and information in relation to organisational embeddedness discussed in the introduction, this thesis proposes a slight modification to the original Mengerian process. It aims at ensuring consistency in organisational terminology across organisational levels.[32]

Figure 4: The adapted economic process



Source: Author's own representation, inspired from O´Donnell (2002), p. 1206/7

In Figure 4, the Mengerian means are separated into "inputs" and "infrastructure" and the ends are divided into "outputs" and "goals". The element of "conduct" is additionally represented as a circular

[31] Because of the current focus on business organisations (i.e. a class of economic organisations) the below development is primarily illustrated with references to the firm. However, if one considers the transformation of things of a non-economic nature, the below framework can be used to describe non-economic organisations. This aspect of the theory is nevertheless not discussed below.

[32] See Chapter 5 for a discussion on aggregation.

arrow. The next sections describe each of these elements and the theoretical framework later used to investigate the research question.

Inputs and actions

The simplest transformation process is a human action. This action consists of transforming inputs into outputs for a given goal using a certain infrastructure. Inputs are things, goods (raw or transformed), labour, or knowledge that enter the process in order to be transformed into outputs. An action can be either consumption, production, or transfer. Table 2 describes actions linked to different inputs. It uses the example of baking bread in a bakery to illustrate the activity.

Table 2: Examples of input transformation

Economic actions Input	Consumption	Production	Transfer
Things/Goods	Using 1 kilo wheat	Forming the dough	Selling bread
Labour	Spending an hour mixing ingredients	Forming the loaves	-
Knowledge	-	Managing temperature	Teaching a student

Source: Author's own representation

"Consumption" is a one-time use of inputs. The individual consumption of bread satisfies the need for food in a direct way. Once consumed, the bread cannot be used again. Using a kilo of wheat in the production of bread or mixing all ingredients are acts of consumption of goods and labour at the firm level. It directly satisfies the firms' goal to produce bread. The kilo of wheat or the worker's physical activity cannot be used again. Knowledge is a specific input. It can enter the transformation process but cannot be consumed. Its immateriality makes a repeated use of the same piece of information without alteration possible.

"Production" corresponds to the conversion of inputs into ends according to routines. Preparing the dough implies the conversion of all ingredients into the dough following a recipe. Forming the bread converts the dough into loaves following specific practices. Setting the oven's thermostat converts a piece of knowledge into the corresponding use of a piece of equipment as per a procedure. Acts of production necessarily imply acts of consumption. Forming the dough or loaves inevitably consumes goods and labour. It represents the indirect satisfaction of needs through an act of transformation. The produced output has a higher value for the agent than that of direct consumption. This perceived value-added makes individual chose production over consumption.

"Transfer" describes goods changing hands. Selling the bread or teaching someone how to define the right temperature for cooking the bread are acts of transfer. The new possessor of the bread or of the piece of information has command on this good and can enter a new transformation process. Labour is a specific input with respect to acts of transfer. The outcome of a man's work and the procedure he follows are goods and knowledge that can be transferred. The effective activity can however not

change hands; it has been consumed. As for production, actions of transfer imply the indirect satisfaction of needs. The value-added of transfer is perceived as advantageous with regards to direct consumption and brings individuals to enter such a process. Transfer is considered an exchange when a counterpart is required.

Money and time are excluded from the list of inputs. Money is a means allowing for exchange of heterogeneous goods and time is the continued process of existence as affecting people and things. Money is nevertheless closely related to value.[33] The use-value of goods is the value given to means. The exchange-value is defined through exchange. Both time and money can be used as units for measuring mean and ends. Spending an hour mixing ingredients or estimating one day's production of bread to 10,000 CHF are examples.

Infrastructure and conduct

The infrastructure entails production means and institutions. The process is not designed to modify the infrastructure. The infrastructure supports and constrains the process execution. Production means entail the capital and labour force used in the process. The capital represents pieces of equipment, pieces of furniture, buildings, and all physical infrastructures that serve the economic activity. Labour, as a resource, has to be distinguished from labour as an input. The term "force" is attached to "labour" to represent the manpower at disposition in an organisation (as a part of the infrastructure). The labour, on its side, is people's physical activity. While production means impose physical limits to the process, institutions represent immaterial constraints. They can be formal (e.g. laws that limit working hours, restrain the use of commodities, or punish the emissions of CO2) or informal (e.g. cultures or habits). They are also called rules.

The inputs, outputs, and infrastructure are contingent upon people's decisions and actions. The conduct of the process represents all ways of influencing the process prior to initiation and during execution. This constitutes the forces in place that define and performs the process. It could be a mechanical sequence of actions performed by assets or efforts performed by economic subjects aiming at reaching the goal of the process.

Goal, output, outcome, and nested structures

Goals are consciously defined. A baker might, for example, aim at opening a new bakery. A consequence of choosing deliberated goals is a need to identify, monitor, and manage them. Goal identification results either from free will–as in setting individual goals–or from externally defined constraints–as in following individual obligations.[34] Individual goals are clearly defined by Menger as the satisfaction of individual needs. Following self-interest is precisely the economic purpose of human

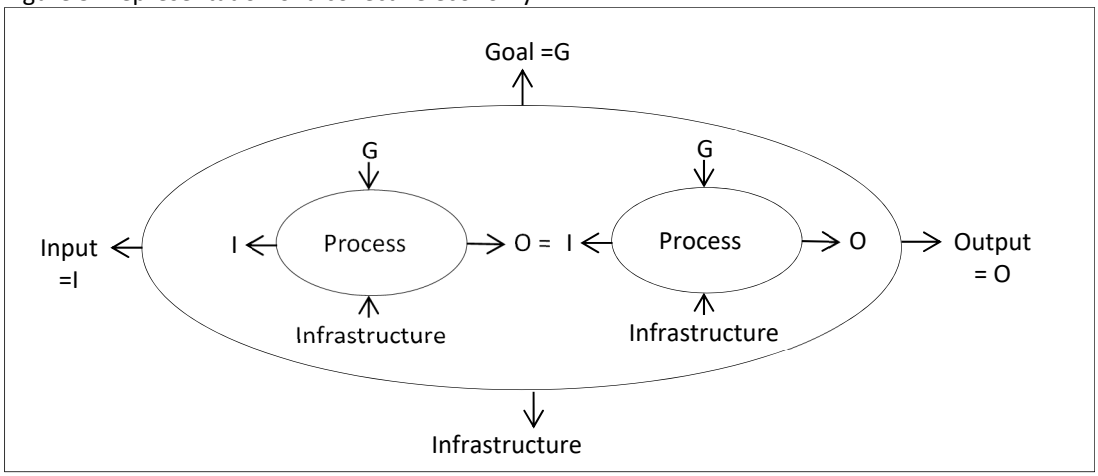
[33] See discussion in Menger(1871, p. 227) for more on the topic.
[34] Obligations are understood in a legal sense here. The question of free will being cognitively annihilated by obligations resulting from social pressure is not discussed here.

beings. As further discussed in Chapter 6, this terminology favours an individualistic understanding of the notion of goal because good's scarcity might lead to a strong focus on rival interests. Satisfying collective interests by individual actions is, however, not excluded from Mengers' definition of an economic activity as long as it also serves the initiator's self-interest. Social recognition can be satisfied by altruism or philanthropy, for example. These behaviours are not excluded from the deliberated goal of satisfying self-interests. To avoid confusion with the individualistic lecture of the process theory of organisations (or selfishness), the term "individual goal" is preferred to "self-interest" even if both phrases designate the same thing for human beings.

Individual and collective actions

Actions are performed by individuals and constitute the basic building blocks of any economy. One individual can perform multiple actions over time. Such a sequence of actions represents the simplest form of a collective economy. In addition, when individuals interact with others at a given time, they also form broader collective economies. Figure 5 presents a situation where two individual economies are part of a collective one. While each individual economy transforms a specific input into a specific output with respect to its infrastructure and goal, the collective economy transforms the aggregated input into an aggregated output with respect to its overall infrastructure and goal. This collective economy can represent a firm in which two employees pursue a personal agenda with respect to the common goal of the firm. It could also represent a sector with two firms or a country with two industries.

Figure 5: Representation of a collective economy



Source: Author's own representation

The interest in presenting such systems of economies lies in the duality of their form: individual and collective. Seen as an individual economy, an object of economic analysis is treated as an entity (i.e. a monolith or a black box). Its internal organisation is implicitly acknowledged for and the study focuses on aggregated elements (e.g. firm, sector, or nation). Seen as a collective economy, an object of economic analysis is dependent on its interacting sub-economies. The internal organisation is explicitly acknowledged for and individual elements are equally important in understanding the whole. Note

that a specific human action is the only economic process that cannot be seen in a collective form because it is the simplest economic process.

The study of a collective economy focuses on lower-level individual economies and their interactions (e.g. individuals within the firm, firms within sectors, sectors within a country). Two types of internal interactions exist in such economies. Between-level (or horizontal) relationships describe the interaction of same-level individual economies within a collective one. Across-level (or vertical) relationships represent the interaction of each individual economy to higher or lower level economies. In an analysis of sectors within a country (i.e. a two-level analysis), between-level relationships represent the interactions of sectors in their individual form, treating their internal structure and processes as given. The data used in such a study would be the aggregated inputs or outputs at sectorial level, treating the influence of each individual firm that compose the different sectors as given. Such a study would, in addition, recognise the existence of a cross-level effect, i.e. country-level elements with heterogeneous impact on sectors (e.g. an institutional framework such as industrial policies, culture, or habits). It represents a bi-directional dependence of the internal structures and their higher-level economy. The internal process, its composition, and its functioning are of interest in the analysis of the collective form.

A consistent distinction between individual and collective economies requires further considerations on centralised/decentralised goal formulation and direct/indirect need satisfaction.

Centralised and decentralised goal definitions

The goal is both the reason why the process is performed and the element that orients its execution. The choice of input, infrastructure, output, and conduct are dependent on the process' goal. Its definition is centralised when the person (or group of persons) that sets the goal can be identified and the goal can be imposed to sub-economies. Clear identification would arise in hierarchical organisations for example. The overall goal is divided into sub-goals carried on by each sub-unit (i.e. department, team, or individuals in firms). Each sub-economy can clearly relate its own output to the overall goal. These are explicitly expressed at the collective level of the economy and each member consciously follows this common objective. The opposite case happens when spontaneous orders are forming. Individual actions spontaneously federate into a greater organisation, but this cannot be related to conscious and explicitly expressed collective goals. The birth of communities is described along these lines by Menger. He sees the trigger for the grouping of people in a geographic place as a pure matter of individual choices. The agglomeration first results from non-coordinated individual actions. It is only after a period of growth that a central power might form to organise the whole.

Most human organisations, however, present imperfectly centralised or decentralised goal formation. Even if a central authority defines the goal for the whole, individual economies retain residual free-will and scope for interpretation due to the presence of people in executing the process. This is especially true in societies built upon the rule of law and private ownership of the means of production. Furthermore, economies might entail central authorities which influence the framework

for economic activities but do not impose a goal to sub-economies. These are groups of people working at the collective level and directing their efforts to influence the whole. Governments, lobbies, or industrial organisations are such entities. The latter, for example, influences the sectorial output without explicitly telling sub-economies (such as firms) what to do. Sub-economies participate in producing the aggregated output of a sector without being explicitly bound to collective objectives. Specific economies with central authority can hence be differentiated from groups of sub-economies which follow their own will. A household, a firm, or a governmental body can be deemed a specific economy with one common goal for all sub-economies. A sector or a nation is a non-specific economy.[35] It coexists with others in a broader system without imposing sub-goals to individual economies.

Direct and indirect need satisfaction

Individual entities participate in collective economies because they can satisfy their needs in an indirect way. While consumption represents a direct satisfaction of needs, production, and exchange lead to their indirect satisfaction. The economies which enter production and exchange relationships value these economic actions in superior terms than direct consumption. The marginal unit of a good has a greater impact on releasing felt uneasiness in an indirect way than it has in a direct way. In the above case of the bakery, for example, the baker can choose to exchange his surplus of bread against money after having retained enough for own satisfaction (and possibly that of his family). He can later exchange this money against other goods he cannot access otherwise (buying the wheat, paying the rent, etc.). If he was to see the exchange value of his bread higher than its use value for own consumption, he would sell the entire production and buy other products to cover his needs for food. The possibility to indirectly cover one's needs opens the opportunity for individuals to enter production or exchange relationship in order to substitute a more favourable state of affairs for a less favourable one.

The first consequence of indirect need satisfaction is the possibility of considering collective economies with different motivations at different organisational levels. The group transforms a set of inputs into outputs following the group's goal. The collective action is designed to satisfy the needs of the group. However, the motivation of an individual or a collective economy, seen in its individual form, can be different from the motivation of its constitutive economies. Employees transform their labour into outputs to satisfy a need for a salary for example. Firm owners transform their means into output to increase profitability, create jobs, or access public recognition. As a collective economy, a firm is free to have a different motivation than the discreet individual economies composing it. Each process is hence purposefully executed at each nested level with individual motivations.

[35] This is expected in a context of rule of law and private ownership of the means of production.

Second, indirect satisfaction of needs also allows coordinating the actions of the parts and imposing externally given goals.[36] Workers probably have no need for the effective output they produce but still find a motivation to execute the process. For example, firms can consciously participate in a subsidised environmental program motivated by money rather than ecological concerns. Motivation mechanisms can be defined in order to orient individual economies toward realisation of collective goals. Furthermore, following a collective goal must not be conscious. Most bakers do not bake to be part of a greater whole. Some could consider themselves a part of the baking industry if they were to compete for best baker in the country for example, but most of them do not have such considerations. They do not work for a collective economy. They do not aim at increasing their industry's aggregate output or follow any collective goal. They follow purely individual goals without being conscious to be part of a greater whole. In specific economies, goals tend to be imposed by the central authority while this is not the case in non-specific ones.

Outcome, objectives, and motivation

A close link exists between goals, objectives, outputs, outcomes, and motivations. The only way for an economy to reach its economic goal is to produce the desired output based on its transformation process. Whatever the complexity of this system, its potential to cover all possible needs is limited. The output must, in a way or another, eventually lead to the satisfaction of the customer's needs. The "output", however, describes the intrinsic product of a process. It is an objective thing which can be consumed, transformed, or exchanged. To the eyes of the customer, this objective thing might entail a subjective value. For example, while two loaves of bread made out of normal and bio meal might taste exactly the same, a customer could prefer the second product for ecological reasons. Despite the fact that the transformation process is the same in both cases, the customer could attach an extrinsic value to the bio bread. The exchange-value of an output is not only derived from its intrinsic use value for the new possessor but entails an extrinsic supplementary value, a value that overwhelms the good itself. It is derived from the customer's individual perception of the use-value of the inputs (e.g. fair trade, bio products, luxury goods, etc.) or infrastructure (use of disabled labour force, label for regional products, carbon compensation, etc.). Consequently, to please customers, firms might include this extrinsic value in designing their organisation and produce a specific outcome rather than a specific output.

The production of the focal outcome, however, depends on the use of specific inputs and infrastructure and results in a given output. Even if a customer buys the outcome of a process, he only receives the corresponding output as a result of an exchange. Hence, to reach his goal of opening a new bakery without external funds, our baker must define how much output (bread) he needs to exchange and organise his transformation process in such a way that generates enough value added to eventually realise his goal. He can translate his goal into clearly measurable objectives, expressed

[36] The absence of individual goal would recall mechanist systems with deterministic execution or unconsciously coordinated behaviour observed in species such as ants. See Mises, p. 145, p. 249 on ants and bees for example.

in term of output, and monitor his evolution toward this objective with respect to his production level. Hence, the goal is to be understood as the reason for an economic process to be performed and the objective is its counterpart expressed in units or value of outputs. Both goals and objectives are distinguished from the "motivation" which is the reason for a human being to execute the process.[37]

2.2. The process' intended and unintended outcomes

As presented above, the goal of individual and collective economies might not be formally expressed before a process occurs. Situations can exist where sub-units of a process without central authority execute coordinated actions by purely following individual goals (e.g. the stock market). Moreover, these sub-units' actions might have repercussions that they haven't anticipated or do not control (e.g. a crash in the stock market). In a world of praxeological subjectivity, the outcome of individual or collective economies can hence be intended or unintended. The intended outcome of a process has been expected and corresponds to what the economy aims at. Three unintended outcomes can, however, emerge from individual actions: spontaneous formation of collective economies, spill overs, and institutions.[38] As discussed above, the formation of collective economies, such as agglomerations or clusters for instance, might not have been imposed by any purposeful agent. In such cases, individual economies deliberately gather to form collective economies. There is no collective plan which induced this phenomenon. Nevertheless, a supplementary economy can later be additionally formed to lead the individual parts. The existence of a sequence of events in time implies that the emergence of the collective form of an economy might not have had any purposeful character at the collective level prior to the formalisation of the focal entity.

The second unintentional outcome is the emergence of spill overs. As a system of interrelated parts, a collective form of an economy is influenced by individual actions. For instance, firms send information to the market or generate forces by interactions that possibly influence the economic process. Individuals who are perceived as opinion leaders influence the actions of others without necessarily pursuing this goal. A firm's individual effort to innovate can increase industrial competition or pollution. Each action has direct and indirect effects of different strength on other parts of the system. Individual deliberate goals set with respect to private interests might affect other economies. Their unintended consequences are positive or negative spill overs that influence the whole system or part of it. In Merger's terms, "[a]s many individuals act, the effects of their actions are seen to comprise elements that no single individual ever contemplated and that were never contemplated by individuals acting in concert since there was no concert to begin with".

The third unintentional aspect is the emergence of institutions (or organic orders).[39] They result from the interaction of the system's parts and evolve though time with the systems and the parts

[37] Goal, objective, and motivation might be used as synonyms in the text. Their difference in meaning is specified when necessary.

[38] See Menger (1883, pp. 133–134) on the intended and unintended consequences of human actions.

[39] For more details on spontaneous or organic orders, see Menger (1883, book 3) on the definition of "organic" and his worries about on misinterpretation of this analogy.

themselves. They represent elements of the economy that interact with the course of action of all economies. Menger gives example of spontaneous orders such as money, languages, or laws which "are unanticipated consequences of purposive social actions".[40] Spontaneous orders are the undeliberate result of social interactions eventually setting up a framework for these interactions.[41] Money allows exchanging heterogeneous goods, languages allow communication, and laws define the common framework for actions.

2.3. A praxeological definition of organisation

The last subsection presents the simplest form of an individual economy as an action. The sequential execution of actions by one human being constitutes a simple form of collective economy. It represents the aggregation of actions through time, called horizontal aggregation. The sum of actions across organisation levels at a given time, called vertical aggregation, represent another simple form of collective economy. It corresponds to the simultaneous execution of actions by individual economies within a collective economy. The economic activity is therefore understood as the vertical or horizontal aggregation of economic actions.

I propose to use the word "organisation" as a synonym for a "collective economy". This implies that the simplest form of organisation is a human being who executes a sequence of tasks or a group of human beings who simultaneously execute their tasks. The possibility to describe one-man organisations is important in the later discussion on entrepreneurship. For the time being, the vertical aggregation of actions into organisational units requires further consideration. Such aggregation is only possible in reference to a unit of time in order to isolate the object of analysis in the sequence of unfolding events. The study of a firms' production in a year analyses its aggregated input and output over that period. Mentioning an organisation thus implicitly refers to all actions executed by sub-units over a given period of time. The vertical aggregation of individual economies over a defined period consequently allows to group the work of many individuals within teams, departments, firms, sectors, national economies, or any unit of analysis which make sense to a researcher, as long as it focuses on actions perpetrated by human beings. In the current view, all of these units of analysis–or collective economies–are organisations.[42]

The new institutional definition of organisation proposed in Chapter 1 can be refined by replacing "entity" by "collective economy" and "people" by "individual economies". Additionally, it has to

[40] *Ibid*., p. 10. Introduction by Schneider

[41] Menger sees agglomerations as spontaneous orders. They are nevertheless described here as a spontaneous economy.

[42] Note that the praxeological focus on human beings in process execution implies that people define the goal of all actions prior to execute them. However, individual and collective goals belong to different organisational levels. A collective economy is composed of individual economies which follow their individual goal. While the current organisational theory recognises that individual goals can be aligned to upper-level collective goals, the possibility that this is not the case is explicitly accepted, avoiding Mises's concern about a systemic theory with dull organisational members.

account for time and differentiate between individual and collective goals. Consequently, I propose the following praxeological definition of organisation:

An organisation is a collective economy in which interdependent individual economies realise chains of actions to reach individual goals.

This definition emphasises the nested level of organisational members, interactions within and between organisational members, and the time passing in a progressing economy. It implies, for example, that firms are simultaneously the following:

1. collective economies in which interdependent employees realise chains of actions to achieve individual goals over a certain period of time;
2. interdependent individual economies which realise chains of actions within a collective economy (e.g. a cluster or a sector) to achieve individual goals over a certain period of time.

This general definition of organisations does not yet allow distinguishing firms from foundations, sports clubs, or public health institutions, for example. Defining a business organisation requires complementary considerations as described in the next chapter.

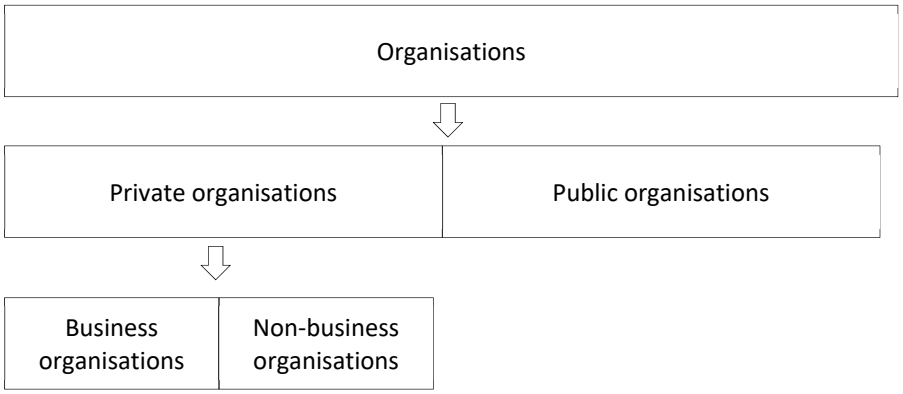
Chapter 5 : A model of firm performance

This chapter defines business organisations based on the principle of value creation. Section 1 presents private organisations and their differences from public organisations or organisations of public interest. Section 2 defines two survival conditions specific to business organisations and proposes a model of firm performance derived from Jost's (2013) value-creation process. Section 3 refines the concept of firms and concludes.

1. A distinction between private and public organisations

This section presents a categorisation of organisations based on their need to create value in the long run to survive. Figure 6 shows a visual representation of four organisational classes: public, private, business, and non-business organisations.

Figure 6: Public, private, business, and non-business organisations



Source: Author's own representation

Intuitively, the distinction between public and private economies refers to the fact that private economies realise commercial activities. It can be said that public organisations don't have such a purpose. They follow goals of a public nature which target the collective interests of the society. They consider their impact on the society in general and primarily aim at producing goods and services with social benefits. They transfer their output to beneficiaries without expecting them to pay a price corresponding to an exchange value. To the opposite, private economies follow private goals and pursue individual interests. They consider the individual impact of their actions and primarily aim at producing goods and services with individual benefits.[43] They transfer their output to customers for a given price which corresponds to an exchange value in the market.

[43] The absence of a clear distinction between individual and collective goals gives birth to mixed entities. For example, an economy which sells both profitable goods at market price and non-profitable goods to beneficiaries can be imagined. Examples are can be found in governmental bodies or philanthropic organisations for example.

Praxeology, however, does not allow distinguishing private from public organisations based on the intention to sell goods or services in a market. The content of choices and actions cannot be used to categorise economies. Menger analyses this issue and proposes a negative definition of a private economy. He says that it wouldn't exist in a socialist world with a perfectly planned economy where individual choice does not influence the economic goal. This definition refers to a collective economy, a socialist nation, with a pure hierarchical coordination mechanism. It has an omnipotent authority which passes down perfectly defined instructions to lower hierarchical levels who execute these commands without deviation from the authority's expectations. The Mengerian negative definition of private economies, however, does not mention if the economic goals are of collective or individual nature. If it refers to individual economic goals, the definition implies that individual freedom in choosing individual goals is suppressed. This doesn't prove true in the current context because the socialist nation can be considered an individual economy and hence make individual decisions about its goals and the ways to reach them. If the definition focuses on collective economic goals, then lower-level economies are to be able to set their own economic goals, which does not correspond to a perfectly planned economy.

The distinction between private and public organisations thus needs further considerations. The below subsections follow this agenda by relying on the new institutional idea presented in Chapter 1 which states that firms need to create value in the long run to survive. It proposes a logical reflection about organisations' economic activities in line with a praxeological perspective and presents a narrative illustrated by functions and diagrams for the sake of clarity. It does not rely on classical assumptions such as the actor's maximisation behaviour, nor does it use a specific production function or mathematical tools such as derivatives. It starts by rewriting Jost's (2013) equation for total value added presented in Chapter 1 in praxeological terms. The "income" on the consumer side of the equation becomes the "use value of the acquired goods for the customer" and the income on the organisation's side of the equation becomes the "exchange value of the exchanged goods" for the organisation. The customer's rent is the difference between the satisfaction procured by the goods and the value paid to acquire them. The organisation's rent is the difference between the exchange value of the exchanged goods and the total production costs.

Eq. 3 Realised value-added = (consumer's satisfaction – use-value of the acquired goods)

+ (exchange value of the exchanged goods – total production costs)

= consumer's rent + organisation's rent

1.1. On public organisations

A public organisation is expected to be financed by means which are not (or only partly) generated by the focal transformation process. A public organisation hence operates without conditionality on the customer and organisation rents. Because the customer is not bound to pay a price at least equal to the cost of transformation, he is called a beneficiary. The organisation's total value-added can be

positive, zero, or negative. Because of the dissociation between the financial means and operations, it is possible to imagine an output which does not meet any requirement in the market and does not cover its costs of production. Furthermore, a focus on collective interests can be reached by compensating a negative organisation's rent by a positive beneficiaries' rent. The proposed conditions on value-creation for public organisations are hence the following:

Beneficiaries' rent $= [-\infty; \infty]$

Public organisation's rent $= [-\infty; \infty]$

A classic example of a public organisation is a public unemployment fund. It is a collective economy in which interdependent employees realise chains of actions to achieve individual goals over a certain period of time. It also interacts with other economies in a broader context to achieve its own goal of helping people out of unemployment. It is, however, not expected to generate any profit. The state finances the organisation because the individual benefit for the beneficiaries is expected to over-compensate the cost of the social insurance. Another example of an organisation which enters this category is a non-government organisation (NGO). Its activity is justified by the expectation of a positive effect on beneficiaries which is greater than the NGO's possible negative organisation's rent. Such organisations are sometimes called organisations of public interest rather public organisations. They are mainly financed by external means which stem from private or public sources and do not need to be reimbursed (e.g. donation or subsidies). Importantly, all public organisations are assumed to aim to provide goods and services useful to beneficiaries. The above conditions only indicate that public organisations might survive in the long run even if their organisation's and beneficiaries' rents are negative.

1.2. On private organisations

In contrast, a private organisation only survives in the long run if both rents are at least equal to zero. To reach this condition for the customer's rent, a private organisation must produce an output which corresponds to the customer needs. It has to imagine a good or service which customers perceive as satisfying enough to enter an exchange relationship. We know form the Austrian texts that the trigger for a buying action is

Eq. 4 $u_c > p,$

where u_c is the customer's perceived use value for the good and p is the price paid by the customer to the organisation. If many customers value their *a priori* satisfaction–or removed felt uneasiness (see Appendix A)–derived from the use of the good higher than the price paid for acquisition over a given period of time, the organisation receives validation for its model and the customer rent can be positive. The following results:

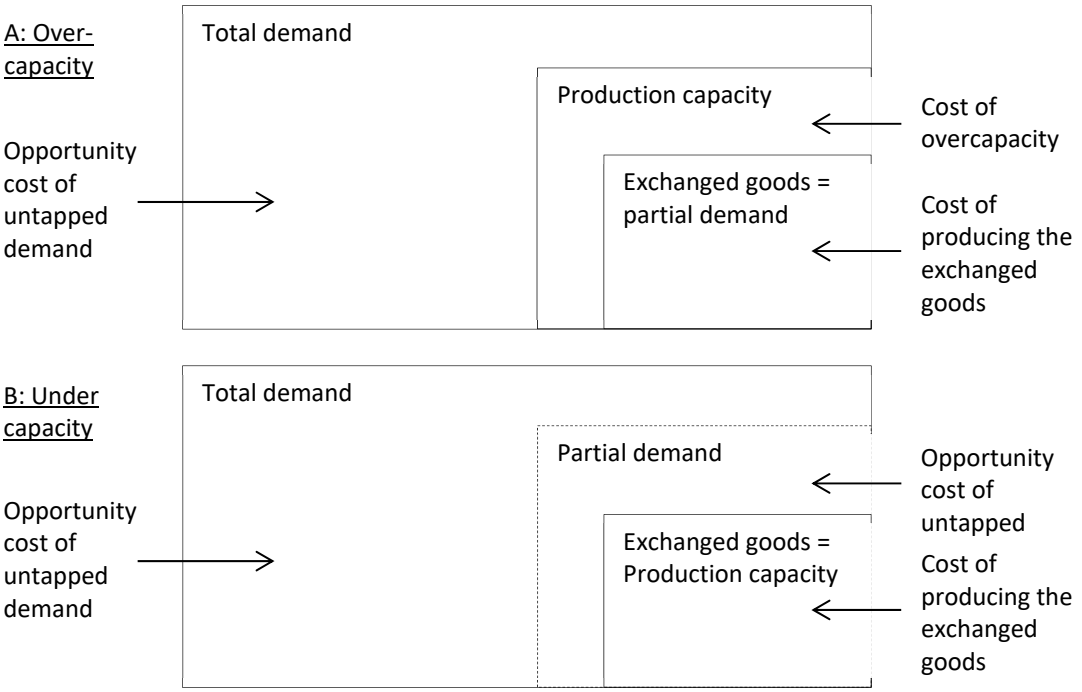
Eq. 5 $\sum u_c > pY_e = EV,$

where $\sum u_c$ is the sum of customer's perceived used value, Y_e is the quantity of exchanged goods, and EV is the exchanged-value of the exchanged goods. If customers stop buying the good or decrease their consumption, they inform the organisation about a change in needs. The organisation must adapt its output to survive. Remembering that customers buy outcomes and organisations produce outputs, the first survival condition for private organisations is a need to constantly ensure conformity of its outcome to the customer wants.

Assuming outcome conformity over the long run, the organisation has to appraise the total quantity of goods the customers are willing to acquire during a focal period of time. Based on its subjective interpretation of the market, it sets a goal of total or partial satisfaction of the demand. Figure 7 presents a visual representation of partial demand satisfaction (e.g. the focus on a regional market). As shown in the left-hand side of the figure, this implies an opportunity cost of not internalizing the whole rent. This might occur if an organisation cannot afford a large enough organisational unit or wants to validate its model prior to increasing its size for example.

The organisation's goal of satisfying all or part of the demand is translated into production objectives (Y^*) which eventually define the total production capacity of the organisation. This target is formalised within an organisational plan which determines the input (X^*) and the infrastructure ($I^* = K^* + L^* + R^*$) to be used in the transformation process. K^* represents total capital, L^* is the labour force, and R^* encompasses the institutional framework in the organisations (such as corporate governance, legal services, etc.).

Figure 7: Total and partial demand, production objectives, and exchanged goods



Source: Author's own representation

An incorrect appraisal of the partial demand leads to over- or undersized organisational units. Assuming the organisation operates at full capacity, an oversized unit leads to production surpluses (situation A in Figure7: Overcapacity). This surplus can constitute a stock to be sold in a later period. It, however, increases the fixed costs per exchanged unit in the focal period, decreases the organisational rent, impedes its liquidity, and thus justifies the common interest in lean management. An undersized production unit implies an additional opportunity cost of not internalising a part of the rent (situation B in Figure 7: Under capacity). The surface for partial demand is depicted with a dotted line to express an increase in the existing opportunity cost of untapped demand. An undersized organisational unit can exchange its full production on the market but could generate a higher organisational rent if extended. In an ideal case, the production capacity corresponds to the demand and all produced goods are exchange in the focal period.

The equation for the exchange-value of the exchanged goods is the following:

Eq. 6 $EV = pY_e = p(Y - surplus)$,

where Y is the quantity of produced goods (the output). For the organisational rent to be equal to zero in situations A and B, the price p multiplied by Y_e has to cover the cost of all units produced, which corresponds to the quantity of exchanged goods plus the produced surplus. In that case, the exchange value of the exchanged goods EV equals the organisation's total production costs, also called the use value of the total production means in the focal period. The corresponding equation is

Eq. 7 $CT = CX + CI = cuY$,

where CT is the total cost of production, CX is the cost of inputs (a variable cost) , CI is the cost of the infrastructure (a fixed cost), and cu is the unitary cost of production. From Eq. 6 and Eq. 7, we can infer that the organisation must at least equal the exchange value of the *exchanged* goods and the cost of production of the *produced* goods. This condition is further called the condition of "value equality":

Eq. 8 $EV = pY_e \geq CT = cuY$.

It is important to note that, in the short run, this condition might not hold. A private organisation's rent can be negative after an investment in infrastructure is made or in challenging times, for example. Such an insufficiency can be financed by other means than those directly generated by the focal transformation process (e.g. debt). In addition, a private organisation might also receive external funds which do not need to be reimbursed (ex: subsidies). In any case, in the long run, the exchange value of the exchanged goods must at least compensate for the use value of all inputs and infrastructure (including debt reimbursement and interests).

The distinction between private and public organisations relies on both conditions of outcome conformity and value equality holding for a private organisation to survive in the long run. This implies that the total value-added generated by private organisations cannot be negative in the long run and the organisation's rent must at least be greater than zero.

Customers' rent = $[0; +\infty]$

Private organisation's rent = $[0; +\infty]$

2. On business organisations

Private organisations encompass business and non-business organisations. Their distinction relies on the idea that business organisations must generate a strictly positive organisational rent in the long run for economic actors to be willing to keep them alive. In other words, economic actors would choose not to further exploit a business organisation which has a negative or zero organisation rent in the long run. The profitability condition for business organisation is hence:

Business organisation's rent > 0

A typical example of a non-business organisation is a recreational sports club. It is a collective economy in which interdependent people realise chains of actions to achieve individual goals over a certain period of time. It also interacts with other economies in a broader context to achieve its goal of offering recreational activities. It exists as long as people have an interest in participating but does not aim at making profit. On their side, business organisations are for-profit organisations commonly named firms in their lower-level form as explained in subsection 3. For their organisation's rent to be above zero, the exchange value of the exchanged output must be higher than total production costs. For this to happen, the value-equality condition needs to be replaced as explained below.

2.1. A need for an adequate plan

In an Austrian world without entrepreneurs (i.e. an evenly rotating economy, see Appendix A), the act of exchange generates static and homogenous prices for all goods in the economy. No price differences exist and thus no divergence in valuation is possible. There are no information differentials and thus no opportunity to be imagined by entrepreneurs. The economy is functioning, people make decisions and act, but the market conditions never change, and the economy is stationary.

In contrast, information differentials exist in a progressing economy. They are understood as sources of value creation. Entrepreneurs imagine entrepreneurial opportunities based on agents' different understandings of given economic situations. They aim at exploiting these differentials to make "profit or, at least, avoid losses" (Mises, 1949, p.259). In the word of Schneider in the introduction of Menger (1883): "[w]hat individual economic actors want is to do as well in the market as they can" (p. 11). Their ability to exploit information makes each of them an "acting man in regard to the changes occurring in the data of the market" and pushes them to undertake actions according to their personal interpretation of the signs of the market (Mises, 1949, p.255). Consequently, actors do much more than exchanging goods and services in markets. They reveal pieces of information which constantly maintain a fertile soil for further entrepreneurial opportunities to be imagined. The source for entrepreneurial profit is therefore defined as the people's ability to better anticipate the future

demand of the customers than others (Mises, 1949, p.288). As long as entrepreneurs correctly react to market signals, they make an entrepreneurial profit and the economy progresses.

In a praxeological world, the customer does not know the use value of the purchased good prior to using it. He probably doesn't even know this value after having used the good. He is only expected to feel removed uneasiness if the good or service satisfies his needs. By observing a customer's behaviour in relation to a certain price level in the long run, an organisation learns about the adequacy of its offer. It is possible for an organisation to generate a positive rent by setting the exchange price higher than its production costs. Austrian organisations are thus price-makers which fix the exchange price to the best of their knowledge.

To understand this point, consider the following inequalities. If *p1*, the price paid by the customer, is higher than the production cost of one unit, the organisation expects to make profit. However, if *p1* is higher than the use value for the acquired goods to the eyes of the customer, he won't enter the exchange relationship.

Eq. 9 $u_c < p1 > cu \rightarrow customers\ don't\ buy$

If the organisation fixes the exchange price at *p2*, which equals the production costs and is lower than the use value for the customer, the customer buys the good or service, but the organisation doesn't make any profit.

Eq. 10 $u_c > p2 = cu \rightarrow customers\ buy,\ no\ organisational\ rent$

To generate a profit, the organisation needs to define an exchange price *p* which is lower than *p1*, higher than *p2*, and lower than the customer's use value:

Eq. 11 $p1 > p > p2 < u_c$

Hence, the customer only buys the product if he considers it worthwhile for the given exchange price. The existence of a price *p* corresponding to Eq. 11 constitutes a profit opportunity for the organisation. In the subjective world, the only possible situation in which a positive organisation's rent is generated is when customers are ready to buy a product at a price higher than its production cost. A positive rent is thus dependent on the organisation's right appraisal of a profit opportunity, which implies the following:

- a sufficient customer demand and an adequate price *p;*
- the possibility to produce an output for a lower cost than the customer's perceived use-value for the acquired good or service.

This condition is further called the condition of value creation and simply means that the organisation's plan must make room for profit generation.

A single process model

The organisational plan for a single process is represented by Eq. 12 to Eq. 15. The lowercase letters represent variables and parameters in a single process. The uppercase letters used in the above introduction refer to their vertical aggregation at the highest organisational level, which is discussed later in the section.

Eq. 12 $c^* = cx^* + i^*$

Eq. 13 $ev^* = \frac{c^*}{1-m}$

Eq. 14 $r^* = ev^* - c^* = \frac{mc^*}{(1-m)}$

Eq. 15 $p = \frac{1}{(1-m)} \frac{c^*}{y^*}$

The narrative behind the above equations is the following: an organisation chooses a given infrastructure and input in order to realise its imagined profit opportunity in this single process. It defines the planned production cost c^* in Eq. 12 as the sum of planned cost of input cx^* and the planned cost of infrastructure i^*. The cost of input is the price paid for acquisition multiplied by the quantity x^* to be transformed in the process. The organisation decides which margin $\mathrm{m} = [0, 1]$ it wishes to earn and measures its planned income in relation (Eq. 13). The expected rent r^* then represents the difference between the income and the production costs in Eq. 14. In this view, the planned infrastructure defines the size of the production unit and consequently the production capacity (the quantity y^*). The organisation can thus set its selling price in relation to the expected margin, total production costs, and planed quantity of output in Eq. 15.

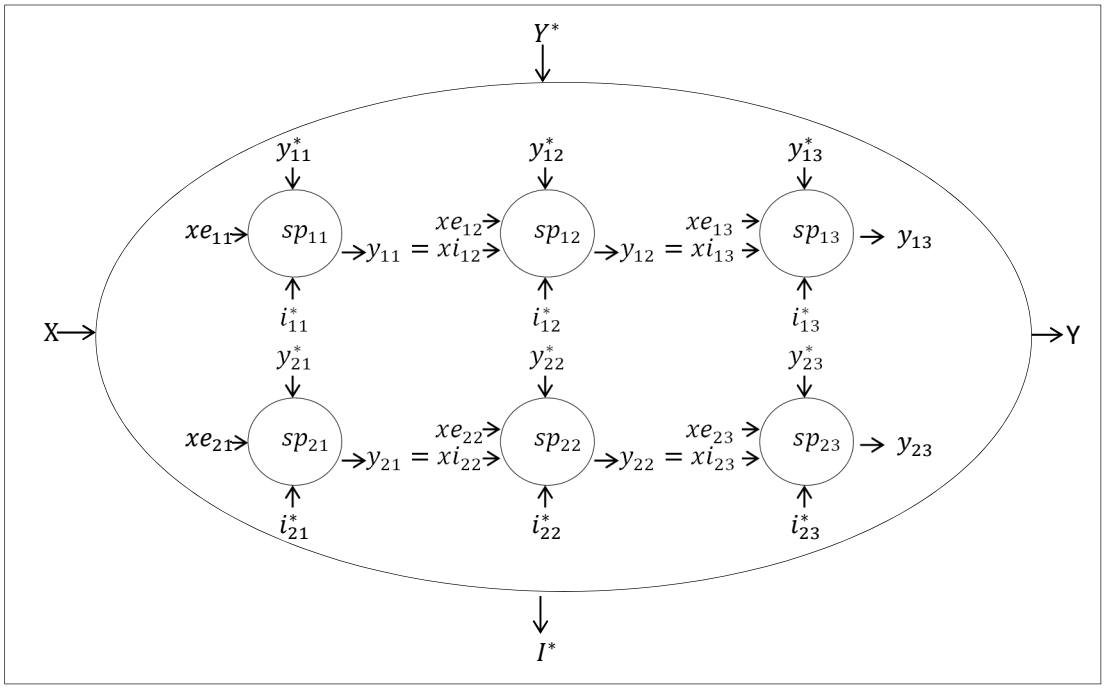
The issue of process aggregation

Individual economies interact vertically (between-level interactions) and horizontally (across-level interactions). Firms' horizontal interactions represent all relations to external economic actors (procurement companies, customers, competitors, governmental bodies, etc.). Their vertical interactions represent relations to the higher and lower-level units. These lower-level units (department, teams, employees, etc.) also experience vertical and horizontal interactions with one another. If an organisation entails more than one chain of sequential processes, it can be described as a collective economy composed of N parallel and independent processes which are composed of n_N sequential and interdependent sub-processes. Figure 8 below proposes a visual representation of such an organisation with $N = 2$ and $n_N = 3$ for all N. Appendix B proposes an example of calculated values for this organisation derived from the equations proposed in this chapter.

Prior to explaining the development of the firm model, this subsection presents a simplified description of the aggregation principle of the five process elements. It focuses on the firm in its collective form over an imaginary time period. The firm represents the higher organisational level composed of lower-level economies which can be departments, teams, or employees. Each mentioned

economy can be described in its collective or individual form. Viewed in its collective form, a firm has an individual (higher-level) goal and is composed of sub-units with their own individual lower-level goals. The goal of the firm and those of each lower-level unit are individual goals but refer to different organisational levels. The difficulty of analysing such an organisation resides in aggregating the effective transformation activities of the lower-level units within their higher-level organisation based on the fundamental elements of the process.

Figure 8: Example of an organisation with sequential and parallel process chains



Source: Author's own representation

While inputs and outputs of sub-processes can be summed up in terms of quantities, use value, or exchange value, the infrastructure, the goal, and the conduct cannot be aggregated in a simple way. For example, the infrastructure can be either specific to an individual economy or common to many individual economies. Some parts of the infrastructures can support the transformation process of sub-economies only, while others support the collective entity in its whole. If a firm employs two teams that transform inputs in two sequences, the sub economies' infrastructure entails the two groups of workers and their individual equipment. The firm probably also needs an infrastructure common to the two teams, such as a building for example, and other employees and equipment that cannot be attributed to one of the two teams. This represents the firm's support activities (non-core or non-production related activities) such as sales and administration.

In money terms, the use value of inputs plus the use value of specific infrastructures for a given time correspond to the direct cost of production. The use value of common infrastructure is the costs of

sales plus the indirect costs of production.[44] In some cases, it can be attributed to single processes using repartition keys. The difference between the use value of inputs and infrastructure (the total costs) and the exchange-value of the output (the income) represents the process value added (or the organisation's rent).

As previously described, goals are defined by each individual economy, not summed up. In the above firm example, the firm sets up its own goals such as surviving or being number one in the market for example. In order to reach this goal, the firm has to produce a specific output. It defines the relative objectives for the teams in two separated sub-objectives. Each employee, on his side, has his own reason to participate to the process. One part of the "conduct tasks" is hence to ensure employees execute what they are expected to do. The conduct activities can thus not be linearly aggregated. Each organisational level makes decisions and executes actions that ensure the process reaches its goals. As will be discussed later, this is a task attributed to firm's management and, to some extent, to each employee. The costs related to the conduct are thus already entailed in the direct and indirect costs of production (in the costs of the labour force and support activities).

Finally, the individual and collective form of an economy also impacts the interpretation of ownership. The aggregated input or infrastructure can be defined in a firm, an industry, or a nation. The collective economy, however, only has ownership rights on part of them. Specific inputs and pieces of infrastructure might be used by the collective economy while being under the control of other parts of the systems. For example, an employees' knowledge cannot formally be acquired by its employer and public infrastructures might ease a firm's economic activity, but the firm doesn't own them. Private economies hence use means in their economic process that do not belong to them.

Horizontal aggregation

In a multiple process organisation with one chain of actions, sub-processes pass over their output to the next participant. A sequence of sub-processes (a chain of *n* sub-processes) can hence be assessed by horizontal aggregation, which implies that the produced output of the first sub-process in the chain is used in the second sub-process as an internal input (supplier-customer relationship). As presented in Eq. 16, the total cost of production of process *n* now entails the cost of external inputs $\mathrm{cxe}_{\mathrm{n}}^{*}$ bought in the market, the exchanged value of the output produced by process *n-1* (equivalent to the cost of internal input cxi_{n}^{*} = $\mathrm{ev}_{\mathrm{n}-1}^{*}$), and the cost of its specific infrastructure $\mathrm{i}_{\mathrm{n}}^{*}$.

Eq. 16 $c_n^* = cxe_n^* + ev_{n-1}^* + i_n^*$.

This model assumes that the cost of common infrastructure is distributed among sub-processes using repartition keys. Subsequent sub-processes set their output prices in relation to their expected margin and production capacity. As a consequence, the exchange value of any internal output increases at a

[44] The issues related to stocks and depreciation are not considered here.

rate of $1/(1-m)$ each time a subsequent sub-process is executed within the chain. The exchange value ev_{n}^{*} for *n*=3 can thus be written as follows:

Eq. 17 $ev_3^* = \frac{c_3^*}{(1-m)} + \frac{c_2^*}{(1-m)^2} + \frac{c_1^*}{(1-m)^3}$.

The horizontal aggregation of the activity of *n* sub-processes yields the following equations for the planned exchanged value (Eq. 18), rent (Eq. 19), and price (Eq. 20):

Eq. 18 Expected income: $ev_n^* = \sum_{i=1}^{n} \frac{1}{(1-m)^{n-1+1}} (cxe_i^* + i_i^*) = py_n^*$

Eq. 19 Expected rent: $r_n^* = \sum_{i=1}^{n} \frac{m}{(1-m)^{n-1+1}} (cxe_i^* + i_i^*) = mev_n^*$

Eq. 20 Price: $p_n = \sum_{i=1}^{n} \frac{1}{(1-m)^{n-1+1}} \frac{(cxe_i^* + i_i^*)}{y_i^*}$

These equations imply that the objective of the organisation for this chain of sub-processes is to produce a planned quantity of output exchanged at an a priori determined exchange price. The expected income represents the quantity of the output exchanged multiplied by the exchange price. The expected rent represents the expected margin in percent multiplied by the income. This model assumes equal contribution of all process in generating the rent, such as the following is chosen:

Eq. 21 Expected margin: $m_i = m \ \ for\ all\ i.$

In praxeological terms, these equations indicate that the chosen asset combination is expected to generate sufficient value for the customer in order for the organisation to realise its imagined profit opportunity. However, the problem in a subjective world is that process execution doesn't always follow the plan, as explained in the next subsection.

2.2. A need to correctly execute the plan

In a progressing economy, people might know, or have a fairly good idea of, the motives for economic actions, the ends people aim for, and the means they intend to use in their economic activities. Actors might have a definitive opinion about each factor of production and the expected outcome. A perfect prevision of any process' outcome is, however, impossible because unexpected effects inherent to the process execution are to occur prior to completion. "We cannot exclude beforehand the possibility that we have erred in the appraisal of their influence or have failed to take into consideration some factors whose interference we did not foresee at all, or not in a correct way" (Mises, 1949, p. 112). Opportunity imagination and exploitation can thus fail to generate profit. By extension, "[i]f all entrepreneurs were to anticipate correctly the future state of the market, there would be neither profit, nor losses" (Mises, 1949, p. 291). Because uncertainty exists in a world of unfolding events, the Miesian concept of human action is an open-end framework where actors speculate about forthcoming situations and actions might fail to create the anticipated value (Mises, 1949, p.251, p.325).

Introducing uncertainty in the model

The entrepreneurial profit and losses are not pure quantitative appraisals of an economic situation. They are "[…] not produced by the quantity of physical output. They depend on the adjustment of output to the most urgent wants of the customer" (Mises, 1949, p.290). They represent a positive or negative "price margin" added to the evenly rotating market price. In the progressing economy, entrepreneurs only make profit and losses on perceived price differences (Mises, 1949, p.256). The resulting consumer and producer rents are smaller or larger than those of a stationary economy.

In the context of the firm, the organisation's rent is called the producer rent. In Mises, the consumer rent could be under- or overcompensated by the producer rent in the short term, leading to a social surplus or deficit. The sign of the composite total producer/consumer effect on the social welfare results from the quality of entrepreneurs' anticipation of future needs. In a case where consumers overvalue the correspondence between their needs and a product, they are willing to buy it at a higher price than they could. They offer entrepreneurs potential for profit. In a case where producers misinterpret the market, they might value the customers' needs higher than they should and offer inappropriate quantities or prices. The probability of the combined effect to be systematically zero is very low if the economy is not evenly rotating. This inequality implies that goods and services can be sold to a higher or lower price than the hypothetical market price, depending on entrepreneurial expectations being right (generating entrepreneurial profits) or wrong (generating entrepreneurial losses). Consequently, the actors' entrepreneurial activity consists of appropriately appraising the customers' needs to best satisfy them. The customer's willingness to buy a product is, however, linked to the firms' capacity to offer goods or services which are better or cheaper than their competitors. A firm can achieve such a result by influencing its transformation process as described below.

Let's assume outcome conformity and correspondence between production objectives and demand in the long run (no surplus). In this hypothetical ideal case, the organisation can specify the ideal exchange value for the exchanged goods and design a perfectly-sized organisational unit which minimizes the fixed cost per exchanged output. That being said, to realise the expected rent, the organisation must run at full capacity and avoid any waste in the production process. This might be difficult in a world of praxeological subjectivity because processes do not ineluctably yield the desired output due to the presence of uncertainty in process execution.

Waste in the production process implies that the effective quantity of output $\mathrm{y_n}$ is smaller than expectation such as the following occurs:

Eq. 22 Effective output : $y_n = \frac{y_n^*}{1+w}$,

Eq. 23 percentage of waste: $w_i = w$,

where $\mathrm{w} = [0,1]$ is the percentage of waste in execution of each sub-process. Assuming equal waste in each sub-process, Eq. 16, Eq. 18 and Eq. 19 can be rewritten as follows:

Eq. 24 Effective cost of production: $c_n = cxe_n^*(1+w) + ev_{n-1}^* + i_n^*$,

Eq. 25 Effective income: $ev_n = p\frac{y_n^*}{1+w} = \sum_{i=1}^{n} \frac{1}{(1-m)^{n-1+1}} \frac{(cxe_i^* + i_i^*)}{(1+w)}$,

Eq. 26 Effective rent: $r_n = r_n^* - cw_n$,

where cw_n is the cost of waste. Eq. 24 assumes that the waste in external input can be compensated by buying more of them. Because a percentage of internal output is lost in each sub-process, the internal input cannot be replaced. Moreover, because the infrastructure costs are fixed in a single period of time, the model keeps them constant and all equations entail the planned cost of capital, labour force, and rules (i_n^* is a fix cost). The price *p* is also assumed to be defined prior to executing the process and is fixed for a period of time. The model thus implies that customers pay the expected price *p* for the quantity of produced output $\mathrm{y_n}$ in Eq. 25. This yields an effective rent which equals the expected rent minus the costs of waste in Eq. 26.

The cost of waste can be decomposed into two components as shown in Eq. 27 to Eq. 29.

Eq. 27 Cost of waste: $cw_n = waste_n + loss_n$

Eq. 28 Waste in input and spare capacities: $waste_n = wcxe_n^* + \frac{w}{1+w}(cxe_n^* + i_n^*)$

Eq. 29 Loss of margin: $loss_n = \frac{w}{1+w} r_n^*.$

$\mathrm{waste_n}$ represents the waste occurring in the last sub-process of the chain described in Eq. 28. It entails the cost of buying more external inputs ($\mathrm{wcxe_n^*}$), the cost of a loss of input in the last sub-process ($\frac{\mathrm{w}}{1+\mathrm{w}}\mathrm{cxe_n^*}$), and the cost of spare capacities ($\frac{\mathrm{w}}{1+\mathrm{w}} i_\mathrm{n}^*$). This cost represents an increase in unitary production cost due to the presence of unused infrastructure after experiencing input waste. In other words, if a process is supposed to transform $\mathrm{x_{n-1}^*} = 100$ pieces of input in a given period of time but only receives $\mathrm{x_{n-1}} = 90$ pieces to transform, the already in place infrastructure of the process *n* will not be used at full capacity.

The second type of cost of waste is presented in Eq. 29. It represents the loss of margin occurring in each sub-process in the chain as a consequence of producing a reduced output level in each process. Because this loss is a function of the rent, it increases at a rate of $1/(1-m)$ with each passing sub-process and thus represents a cumulated value.

Vertical aggregation

To draw a complete image of the process theory of organisation, we have to account for the fact that an organisation can be composed of many parallel chains of processes. The uppercase letters used in the below equations represent the vertical aggregation of N chains of processes within one collective organisation. The equations at the collective level are the following:

Eq. 30 Total costs of production: $C = \sum_{j=1}^{N} cxe_{jn} + cxi_{jn} + i_{jn}^*$,

Eq. 31 *Mean margin:* $M = \sum_{j=1}^{N} \frac{m_{jn}}{N}$,

Eq. 32 *Total output:* $Y = \sum_{j=1}^{N} y_{jn}$,

Eq. 33 *Total cost of waste:* $CW = \sum_{j=1}^{N} cw_{jn}$,

where *n* indicates the last process of the N chains. This implies that all information created within a chain of process is summarised in its last step. We can now calculate the following values at the collective level:

Eq. 34 *Expected income:* $EV^* = \frac{C}{1-M}$

Eq. 35 *Expected rent:* $R^* = \frac{MC}{1-M}$

Eq. 36 *Effective income:* $EV = pY$

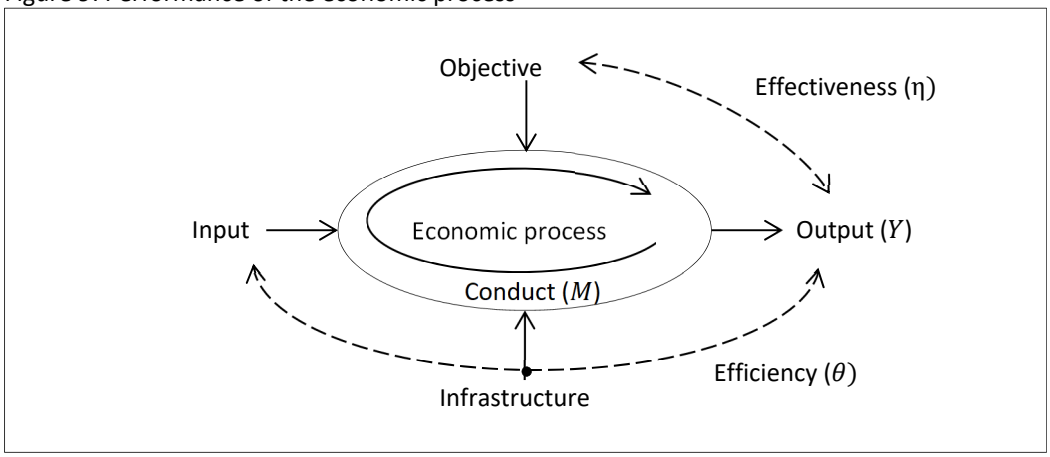
Eq. 37 *Effective rent:* $R = \frac{MC}{1-M} - CW$

This last equation is further studied below in order to calculate the organisation's effectiveness in generating income and efficiency in creating value.

2.3. Plan conformity, effectiveness, and efficiency

Mises states that "[t]he task that action men want to achieve with economic calculation is to establish the outcome of an action by contrasting inputs and outputs" (Mises, 1949, p. 201). The separation of inputs from infrastructure and outputs form goals in the process theory of organisations, however, allows a deeper understanding of firm' activity by measuring the outcome of a process in terms of performance, as presented in Figure 9.

Figure 9: Performance of the economic process



Source: Author's own representation inspired from O´Donnell (2002) Figures 3 and 4: Efficiency (II) and Effectiveness (II), p. 1206/7

This description of process performance echoes the "activity model" presented in O´Donnell and Duffy (2002). They define an activity as the use of "resources to transform input to outputs under the direction of a goal and constraints".[45] In the terminology used in this thesis, each economic process consists in transforming inputs (X) into outputs (Y) subject to an objective (Y^*) and an infrastructure (I). As described above, the infrastructure is composed of capital (K), labour force (L), and a set of rules (R). In addition to O'Donnell's model, the economic process can be driven while executed in order to avoid wastes. The component of conduct (M) is mentioned here for completeness of the diagram but will only be discussed in later chapters. At this point, we can infer that the effectiveness (η) of such a process is a function of efficiency (θ) as developed below.

The equation for planned and expected income at the collective level can be rewritten as follows:

Eq. 38 Planned income: $EV^* = pY^* = R^* + C^*$

Eq. 39 Effective income: $EV = pY = R^* - CW + C$

The comparison of both equations provides information on the organisation's ability to execute its economic process with respect to the plan. Dividing Eq. 39 by Eq. 38 yields the following equations:

Eq. 40 $\eta = \frac{EV}{EV^*} = \theta M + Z$,

Eq. 41 $\theta = 1 - \frac{CW}{mEV^*}$,

Eq. 42 $Z = \frac{C}{EV^*}$,

where η and θ are the organisation's effectiveness in generating income and efficiency in creating value and Z is the ratio of effective cost of production to planed income.

Effectiveness represents the degree to which the objective is reached. It is the ratio of effective to expected income. The process' efficiency in creating value represents the degree to which the rent is generated. It is a ratio of effective to expected rent. It is function of the input, output, and infrastructure. We know from Eq. 30, Eq. 36, and Eq. 41 that C, EV, and θ are functions of the waste. If *w* tends toward zero in Eq. 40, the efficiency in creating value tends toward 100% and the effective costs C, margin M, and income EV tend toward C^*, M^*, and EV^*. These equations inform that plan conformity over time (100% effectiveness) result from a perfectly efficient process execution. Processes need to be conducted in such a way that input wastes, spare capacities, and loss of margin are avoided in each sub-process. In a collective economy, the fact that each process participates to some extent in generating both income and rent implies that each individual process influences the degree of effectiveness and efficiency at the collective level.

To conclude on the distinction between public, private, and business and non-business organisations, in the long run, while public organisations can have a negative organisation and customer rent, private organisations cannot. While all private organisations need to ensure the price paid by customers is at

[45] In contrast to O'Donnel and Duffy's (2002) E^2 model the unit of inputs and outputs can differ.

least equal to the production cost of the exchanged output plus the cost of waste, this condition is strictly positive for a business organisation. Hence, to satisfy the survival condition of creating value in the long run, business organisations need to ensure their plan conforms to the customer needs (outcome conformity) and is properly executed (plan conformity).

3. On firms

Organisations are described above as collective economies in which individual economies interact over a specific period of time to reach individual goals. According to this definition, business organisations can be either firms in which employees interact to earn a salary or a group of firms which interact while executing their economic process. A business organisation thus describes the aggregated economic activity in a collective economy at a chosen organisational level. Furthermore, their "business" nature implies a need to create value in the long run to survive by ensuring outcome and plan conformity. By extension, the collective form of firms, such as a cluster or a sector, is bound to the same constraints. They only survive in the long run if they serve the market and effectively create value.

In the following text, "firms", "companies", "enterprises", and "market participants" are synonyms. They are the framework that conditions the production of goods and services in business economies, from idea generation to product delivery. Their existence is conditioned by the market economy in which they operate and the survival rules of outcome and plan conformity. These rules influence the firms' behaviour in the market and force them to consciously and deliberately reach predefined commercial objectives to survive. Firms' intention to sell their services and products is hence no characteristic that qualifies them as business organisations. It is rather a consequence of their participation to a market economy.

The emphasis on business activities excludes from this definition any privately organised structures that do not produce goods and services in order to reach financial autonomy (such as religious services or not-for-profit organisations). The empirical form of firms is further restricted to legal entities in the econometric study. A firm starts to be a firm when officially registered and stops being a firm when officially radiated. This definition entails no restriction due to size, age, or sectorial considerations. The degree of horizontal and vertical integration does not influence what a firm is. In the process theory of organisations, firms are only distinguished from other organisations by their firm's need to create value over the long run and their consequent complex organisational structure discussed in the next chapter.

Chapter 6 : Leverages on firm performance

Chapter 1 describes firm's strategy and architecture as instruments to influence the value-creation process. It defines a firm as the lowest organisational level with full decisional autonomy on both elements. This chapter links this definition to the development in Chapter 5 to explain that both strategy and infrastructure participate to the overall realisation of the firm's imagined profit opportunity and thus constitute leverages on firm performance. Section 1 relates the first survival condition of outcome conformity to the firm's entrepreneurial ability and the second condition of plan conformity to its organisational ability. It extends the definition of both abilities to their expression at all organisational levels in collective economies. The next sections focus on these abilities at a firm level to stay consistent with the unit of analysis commonly used in the literature on the organisational problem. Section 2 shows how a firm's strategy and architecture aim at creating market power when the entrepreneur is accounted for in the organisational equation. Section 3 presents (i) the division of labour as a problem of aggregating individual activities in firms and (ii) the design of the coordination and motivation mechanism as a problem of aligning individual outputs and goals to the collective objectives. It concludes with a description of firm boundaries in relation to their organisational structure.

1. Introducing the entrepreneur in the organisational problem

The Mengerian one-man organisation which transforms means into ends for an economic purpose is called an entrepreneur. He imagines profit opportunities and takes the necessary initiatives to benefit from them. By acting, he gives impulses to the economy which eventually generate value. The source for value-creation in the business process lies within people's subjective understanding of their environment. Value creation in firms is therefore not only dependent on good organisational skills as implied by the new theory of the firm. Firm performance relies on two sets of abilities:

- An entrepreneurial ability: designing and executing individual activities in search for value creation potentials.
- An organisational ability: designing and executing individual activities in order to internalise the imagined value potentials.[46]

The effective perception of potentials for value-creation relates to all activities in the collective organisation. Any person with at least some level of entrepreneurial ability is expected to execute his individual actions in a way that creates more value than an individual without entrepreneurship. Its expression at the collective level of a firm is the imagination of business ideas which determine the organisation's overall goal and trigger the effective opportunity exploitation. Its expression at

[46] The following text relates both abilities to the organisational and entrepreneurial functions. Chapter 7 nevertheless mentions a third "operative" function which could be described as the mere "execution of individual activities" without entrepreneurial or organisational dimension. A full analysis of this third function is however out of scope for this study.

individual levels is a creative way of executing individual processes with the aim to increase the difference between individual contribution and execution costs. Each sub-process of a collective organisation hence participates to some extent to creating value at the higher organisational level and therefore also contributes to ensure outcome conformity over time.

The adequacy of a plan design and execution is a relative notion dependent on the entrepreneurial imagined opportunity. A right plan design and execution might not lead to success if the entrepreneurial vision turns to be flawed. However, assuming a real potential for value creation in a firm, any person with at least some organisational ability is expected to influence its own activity in a way that ensures plan conformity over time. Its expression at the collective level of the firm is the existence of a plan intended to tap the entrepreneurial profit opportunity and some mechanisms expected to influence each individual participating to the value-creation process. Its expression at individual levels is an effective and efficient way of executing individual processes with the aim to realise the potential for value creation. Each sub-process of a collective organisation participates to some extent to internalising the value potential and therefore also contributes to ensuring plan conformity over time.

Because collective organisations are composed of a multitude of individual economies with residual decisional autonomy (which is inherent from the presence of human beings in process execution as explained below), both entrepreneurial and organisational abilities are expressed at each organisational level. In the process theory of organisation, the process of value creation has to be understood as the result of the joined entrepreneurial and organisational abilities in individual process execution. Despite the fact that the generic entrepreneurial and organisational ability can be described as the imagination of value-creation potentials and their effective exploitation, their expression at different organisational levels can take various forms. The next sections focus on the expression of theses abilities at the firm level in order to stay consistent with the study of the new institutional organisational problem from a praxeological perspective.

2. Firm's strategy and architecture

Table 3 on next page describes firms' strategy and architecture from the perspective of the process theory of organisation at the firm level and includes both organisational and entrepreneurial dimensions. It is reviewed in the following subsections by first describing the lines (firms' strategy and architecture) and then the columns (organisational ability and entrepreneurial ability). The term "architecture" is further understood as the five process elements composing each sub-process. The conduct at the firm level is further referred to as "management".

2.1. Firm's strategy and the positive consequences of incomplete information

The pure organisational approach describes strategy as the definition of what to produce, how to produce, and for whom to produce. It consists of formalising the firm's business model with respect to the entrepreneurial vision. The task of imagining the strategic mission and defining the firm's goal nevertheless has an entrepreneurial character. In the Austrian literature, this corresponds to realising entrepreneurial judgment about innovative ways of earning profit. Indeed, the entrepreneur is considered "[…] the agency that prevents the persistence of a state of production unsuitable to fill the most urgent wants of the consumers in the cheapest way" (Mises, 1949, p.333). The firm's strategic goal is to unveil unexploited information differentials and imagine opportunities to benefit from them. The innovation in products, services, use of resources, or production means helps the firm to create a competitive advantage in its market. The translation of the imagined opportunities into a business model aims at setting the necessary conditions to benefit from the consequences of incomplete information in the firm's environment, also called information differentials.

Table 3: Firm's strategy and architecture with entrepreneurial ability

	Organisational ability	Entrepreneurial ability	Raison d'être
Strategy	Formalising a business plan to internalise the imagined profit opportunity.	Imagining opportunities related to the input, output, infrastructure, and conduct in order to create value. It orients the production effort.	Benefit from the positive consequences of incomplete information
Architecture	The division of labour, coordination mechanisms, and motivation schemes resulting from the plan intended to frame people's interactions. It serves as value enhancement mechanisms.	Scalable and flexible organisational structures resulting from the entrepreneurial vision with bilateral relationship to the environment.	Avoid the negative consequences of incomplete information
Raison d'être	Ensures plan conformity	Ensures outcome conformity	Creates market power

Source: Author's own representation.

2.2. Firm's architecture and the negative consequences of incomplete information

In NIE, strategic uncertainty induces a possible misfit between the organisational structures and strategy. The design of the firm's architecture entails the three elements of labour division, coordination mechanisms, and motivation schemes. These organisational structures aim to frame individuals' interactions within the firm in order to direct their actions toward realisation of the goal. The next subsections argue that the Austrian firm's internal structure can be described with the same elements, which serve as value enhancement mechanisms. They are not explicitly theorised in the Austrian literature but can be extracted from a close analysis of the nested structure of the Mengerian economies, the Austrian mechanisms of social coordination and competition, and the importance of

the goal in the Mengerian definition of an economy or the Miesian purpose of human action. Moreover, the introduction of innovative processes, marketing methods, organisational methods, business practices, workplace organisation, or relations to external participants aim to reduce the negative consequences of incomplete information in the process of value creation, also called opportunistic behaviours.

2.3. Firms' raison d'être is to create market power

Table 3 proposes that new institutional economists focus on ways to avoiding the negative consequences of imperfect information through adequate organisational design while Austrian scholars focus on imagining ways to internalise the benefits linked to situations of imperfect information though adequate strategies. The pure organisational approach to firm strategy and architecture (column 2 in Table 3) hence analyses how firms create efficient production processes. In accordance to the new theory of the firm, this consists of defining independent modules with clear goals and objectives, effective incentive, sanction, control, delegation, and monitoring mechanisms with adequate risk allocation, repartition of decision rights, and distribution of responsibilities and authority. It aims at ensuring efficient dependence between organisational participants while minimising transaction costs. The structural component of the firms has to be specified in such a way that the organisational rent is maximised. The definition of the firm's strategy and architecture serves to find ways to best institute an economy through time (ensure plan conformity). In the process theory of organisation, the quality of the resulting value-creation process results from the firm's organisational ability.

This view, however, lacks explanation about how firms set their potential income level. How do they define what to produce, how, and for whom? In other words, where do people see potential for profit and how do they imagine it? The Austrian perspective (column 3 in Table 3) shows the extra dimension of entrepreneurship in the firms' organisational problem. Its insertion creates a need to theorise about firms' innovation activities which result in a relative advantageous position in the market with regard to a firm's products and services, resources and means of production, and internal organisation. Each of these sources for competitive advantages represents potential for profit generation. The existence of such advantages results from a firm's entrepreneurial ability and allows the firm to ensure customer satisfaction over the long run (ensure outcome conformity).

Market power with regard to customer wants

Mises writes that entrepreneurs are bound to follow the law of the market and offer better or cheaper goods and services to customers. The entrepreneur's survival in the market depends on customers buying his products (customer sovereignty). The customer does so as long as he considers a product's degree of satisfaction high enough to covering his needs. The entrepreneur "can succeed only by best serving the customer. His profit depends on the approval of his conduct by the customer" (Mises, 1949, p.288). Moreover, the producer is bound by the most urgently felt needs of the customer. "It is

not the fault of the entrepreneur that the consumer–the people, the common man–prefer liquor to Bibles and detective stories to serious books, and that government prefer guns to butter" (Mises, 1949, p.297). According to these lines, customer sovereignty orients the producer's choices.

Interesting discussions in the works of Kirzner and Mises nevertheless question the unilateral influence of demand on offer based on the existence of marketing campaigns and communication. Such actions convey subjective contents of meaning to customers with the aim to influence their choices. The discussion focusses on the communication of non-objective characteristics of a good or service. From my point of view, a bilateral relationship between producer and customer does not change the fact that the customer ultimately buys the product. As described in Austrian texts, the interaction between both types of participants orients the productive effort. The customer approach to the creation of market power thus refers to firms being better able to provide the customers with goods and services they want.

Market power with respect to firm resources, means of production, and technology

Extreme situations of market power arise when a firm possesses every bit of a resource. In such cases, firms become "true monopolies" and send disequilibrating impulses to the market by preventing any other market participant to have command over that resource (Mises, 1949). This situation happens when a participant decides to buy all resources of one type and constrains its use or when one participant is alone to know a piece of information that is relevant to the market. The first situation is a permanent state linked to the possession of resources. The second situation is a temporary monopoly with a duration that depends on the speed of learning of others. The possibility to react is the reason for distinguishing short- from long-run situations. In a short-run view, a third monopoly type may, however, be defined as a situation where a market participant starts with a given resource endowment. The firm might gain full power on a specific market for a period of time, but this should not last. The evolution of the market and its capacity to adapt to new situations leads other participants to use the resource in the same way and cut out the incumbent advantage. All three types of monopolies result from a purposive use of resources. Firm's raison d'être is hence to gain market power and create at least temporary monopolistic situations. In essence, a monopoly results from the competitive forces present in the market, and firms are formal structures created by individuals to benefit from any imagined opportunity in the market (Kirzner, 1973).

A close link exists between such monopoly situations and the common understanding of innovation and technology. The level of technology in firms has a direct impact on its behaviour in the market. Technologies can be part of the infrastructure supporting the economic process (i.e. the production means), an essential characteristic of the input and output (i.e. technological product or service), or a facilitator for firm's support activities (i.e. the use of information systems or online sales platforms). In fact, technologies influence all elements of the transformation process.

Technologies can be deemed radical innovations when first introduced in the market (Schumpeter, 1911) and incremental innovations when gradually adopted by actors. Innovation creates monopoly situations in which market participants have momentary market power over others. These firms can better serve customers with no, or little, competition. The decision to employ or produce an innovation is the expression of entrepreneurship and allows a firm to make entrepreneurial profit. The implementation of an innovation and the adaptation of an existent structure reflect entrepreneurial decisions to cope with new states of affairs. In any case, technologies in general, or innovation in particular, supports the attainment of firm's goal and the execution of the economic process. A positive return on technologies is a natural remuneration for the entrepreneur. Mises (1949) writes: "[a]s far as his own technological activities contribute to the returns earned and increases his net income, we are confronted with a compensation for the work rendered" (p.288). Employing adequate technologies with respect to the perceived market opportunities is what Austrian entrepreneurial organisations aim to do.

The entrepreneur's technological ability and knowledge of profitable opportunities are directly related to the entrepreneurial profit. Both elements are expected to be positive margins considered in price valuation (Mises, 1949, pp. 288–289). The same is true for elements assumed to have a negative impact on the production such as accidents. It is expected from firms to entail them in production prices.[47] "At any rate, the risk incurred by accidents does not introduce uncertainty into the conduct of the technological processes. If an entrepreneur neglects to deal with them duly, he gives proof of his technical insufficiencies. The losses thus incurred are to be debited to bad technics applied, not to his entrepreneurial function" (Mises, 1949, p. 289). A "wrong" appraisal of risks is thus to be attributed to bad technological implementation (or organisational ability in this thesis) rather than poor appraisal of a future state of affairs (or entrepreneurial ability). As Casson (2005) notes, the use of the adequate technologies in the production process results from sound judgemental decision and leads to entrepreneurial success.

In conclusion, the creation of market power represents a way to (at least partially and temporarily) lock out competitors. The firms' strategy either aims at better satisfying the customer's needs or better instituting its organisation by adequate asset combination. The satisfaction of customers' needs represents more than the common demand-side strategy. It can include production elements that please the customer in addition to the characteristics of the products and services (e.g. fair trade, sustainable phones, etc.). Consequently, asset combination represents more than an offer-side strategy because it includes selling arguments which might aim at satisfying the customer's needs. Both strategy and architecture influence each other and exist in interrelation. The process theory of organisations implies that the firm's architecture is its strategy and its strategy is its architecture.

In summary, the combination of the current discussion and that of Chapter 1 shows that the design of a firm's strategy and infrastructure needs to account for information differentials in order to (i) create

[47] See Mises(1949., pp. 288–289) on contingency reserves and insurances.

efficient production processes and (ii) satisfy customer needs over the time. The reason why a firm simultaneously works at improving its efficiency level and the fit between its outcome and customer demand is to generate a better business model than its competitors, thus increasing its market power. This description nevertheless mainly focuses on the entrepreneurial opportunity imagination and implementation. For the time being, it lacks explanation about the concrete issues that firms face in effectively running operations which are generally discussed in organisational studies. The next subsection describes what organisational structures are with the goal to understand how human beings express organisational and entrepreneurial decision-making in relation to ever evolving market conditions.

3. Firms' organisational structures

This section argues that a firm's potential for value creation relies on the fit between its organisational structures and their progressing environment. According to Austrian thoughts, economic progress results from the interaction of specialised agents that aim at improving their individual state of affair. Collective economies arise because individual economies find an advantage at collaborating. The collective economies are systems of specialised entities with implicit "labour division" and consequent "individual lack of autonomy". This lack of autonomy forces (i) individuals to interact within organisations and (ii) organisations to coordinate these interactions and align individual actions to collective goals. The first element refers to the aggregation of individual economies into collective organisations described in subsection 3.1. The second element refers to the interaction of purposeful sub-units and the need to coordinate and motivate them as described in subsections 3.2.

3.1. Labour division or the aggregation of individual activities

Human beings constantly make choices about which action to undertake because they live in a constrained environment. Depending on their situation, they have more or less of the goods necessary to satisfy their needs. Their limited access to goods forces them to compose with what is available. They can only act upon a small subset of goods to reach their individual goals. Each organisation involved in the economic process consequently produces specific outcomes. They concentrate on specialised tasks which results in fragmented sub-systems. Each part is a specialist that influences the whole on its own way. The economic corollary regarding human actions in the economic process is the division of labour. This dimension of the organisational problem mirrors its precedent description in the context of the modern theory of the firm as the pure quantitative division of the tasks to be executed in order to achieve the firm's goal. Its consequence in the study of firms is a need to align individual output and goals to collective objectives at each organisational level.

3.2. Output and goal alignment

Each lower-level unit interacts with one another within the collective economy. They experience horizontal interactions with units of the same organisational level and vertical interactions with the units above and below. In some cases, interactions are purposefully influenced. This results from a deliberate activity of coordination and motivation which aims at aligning individual outputs and goals across economies. They are complemented by a spontaneous component which influences the organisation to some degree and results from the unintentional consequences of purposeful actions. This spontaneous component of organisational development results from uncertainty in the production process and can have positive or negative consequence, such as the generation of new opportunities or the inducement of opportunistic behaviours. As White points out on Menger's writings for instance, institutions are a mixture of "organic" and "positive" forces (Menger, 1883, p. xvii). It would be "naïve to regard the actual function of the Federal Reserve System as having been comprehensively designed as it would be to regard the system as a spontaneous outgrowth of free market forces". A similar argument can be made about any economy. The need for time for spontaneous components to appear implies that organisations are partly emerging from a purposeful plan and a spontaneous order. While all interactions generate planned and unplanned consequences, some can be influenced to various degrees as described below.

Coordination mechanisms

Actors participate in the system to compensate for their lack of autonomy. According to Mises, this gives the direction of evolution: "progress, not retrogression" (Mises, 1949, p. 192). Actions, however, can be classified in various categories with respect to their interdependence with other human being. For Mises (1949), isolated or selfish men act in order to improve their situation only. Their exchanges are directed toward their own advantage. They focus on their individual rights and do not consider collective obligations. Such exchanges are called "autistic" (Mises, 1949, p.195). They are categorised as exchanges because they have a counterpart in the system. They are however no interpersonal or social exchanges. These represent modes of cooperation with reference to other individuals. In such situations, "[m]an gives to other men in order to receive from them. Mutuality emerges. Man serves in order to be served" (Mises, 1949, p.195).

Two categories of social exchanges exist in Mises (1949): "cooperation by virtue of contracts and coordination, and cooperation by virtue of command and subordination or hegemony" (p.196). While the former is considered a symmetric relationship, the latter is asymmetric with respect to the rights and obligations of each party. Economic exchanges based on a contractual relationship happen in an "order of right and law" (p.199). Social cooperation means interacting with other economic actors within an accepted framework of institutions. In the context of economic exchanges, individual actions of entrepreneurs consist of finding the best possible combination of production factors to best serve the customer. "The resultant of these endeavours is not only the price structure but no less the social

structure, the assignment of definite tasks to the various individuals" (p.308). The competition resulting from information differentials and the cooperation resulting from exchanges coexist in the progressing economy. Their existence structures the economic process. In fact, the effect of competition in cooperation and cooperation in competition are (i) price determination, (ii) direction of the production effort, and (iii) distribution of wealth among actors.[48]

In the current context, individual economies which interact in a non-specific economy (i.e. without central authority) follow individual goals. They are free to define these goals in the broader framework of their society and undergo what Mises calls social coordination. Their actions, and the anticipation of their actions by other participants, set the economy on a progressive path. Specific economies (i.e. with central authority) need to orient sub-economies' actions toward a collective goal by means of coordination and motivation mechanisms. Both horizontal and vertical relationships (between and across level) can be represented by both praxeological modes of cooperation: contracts and command. For example, in a firm evolving in a market economy, a horizontal contractual relationship can refer to acts of buying or selling and a vertical contractual relationship can represent an employment contract. The use of a contract aims to ensure that the contractual parties align their goals and, hence, that the exchanged output corresponds to the predetermined objectives. Commands appear in vertical relationships when a court obliges a firm to follow legal directives or managers transfer instructions to employees. The use of command aims at ensuring the output of an economy corresponds to the expectations of an authority. In all cases, coordination mechanisms aim at aligning individual outputs to predefined expectations at the collective level.

Motivation mechanisms

The praxeological motivation to act is the reduction of felt uneasiness. From an economic point of view, while materialistic considerations are with no doubt the main focus of a majority of scholars, the possibility to extend them to the satisfaction of immaterial needs has to be considered.[49] Mises (1949) insists on the fact that "economics is not about tangible material objects, it is about men, their meanings, their actions" (p.92). He writes that "the popular saying according to which economics deals with the material conditions of human life is entirely mistaken" (p. 142). Individual actions are always "an attempt to substitute a more satisfactory state of affairs for a less satisfactory one" (p.98). The view adopted in this thesis is that human's economic motives for transforming means under command into ends is the satisfaction of material and immaterial needs (such as the need for food and social recognition, for example). Furthermore, the approach on economic motives is different from the common idea that man follows his well-understood "self-interest". Early Austrians see this assertion as reductive and inappropriate in describing human action. It is reductive because "custom, public spirit, feeling for justice, and love for one fellow man cannot be separated from economy". It is inappropriate because men are often "in error" about their interest or "ignorant" about the state of

[48] See Mises (1949, p. 335) for a detailed description of this concept.

[49] See Maslow's pyramid, for example.

affairs (Menger, 1883, p. 84). The focus on self-interest is, however, simultaneously useful in theorising and hazardous in interpreting. It is useful because it allows describing exact economic laws which exclude other–difficult to theorise–aspects of human motives. It is hazardous because this simplification can be interpreted as a full, "infallible" and "omniscient" veracity (Menger, 1883, p.88). This shortcut often leads self-interest to be confused with selfishness.

Self-interest is further considered the expression of free will in market economies. "The term will means nothing else than man's faculty to choose between different states of affairs, to prefer one, to set aside the other, and to behave according to the decision made in aiming at the chosen state and forsaking the other" (Mises, 1949, p. 13). Free will hence represents men's free exercise of decision-making in his society.[50] Societies in which the Austrian economic man lives are characterised by the rule of law, market-based exchange mechanisms, labour division, and private ownership of the means of production. In such a framework, free will is the individual pursuit of personal goals—i.e. satisfaction of one's needs—in his acknowledged limited environment. Individual rights are complemented by collective obligations intrinsic to a life in society. People need to balance their individual choices between playing along with the societies' rules and satisfying their personal needs. A limiting framework for action is implied by social interaction and people's freedom of action needs to be guaranteed within these boundaries.[51]

This description of human goals lies at the centre of the proposed definition of organisation. Whatever the goal, self-defined or imposed, it orients human action. A distinction is however made between goal and motivation. While the goal sets the objective of an action, the motivation is the reason why an individual executes the action. Tools are used in societies to motivate organisations to make some actions rather than others. In a firm evolving in a market economy, motivation mechanisms in a horizontal relationship can be seen in governmental subsidies or price strategies for example. Motivation in a vertical relationship can take the form of profit sharing or the right to access specific resources for example. Such mechanisms aim to align various economic goals. The initiator uses such mechanisms to federate others around his individual goal. Organisations indeed result in institutions that influence human behaviour (Picot, 2012, p. 27).

To sum up, it can be said that contracts would be sufficient to ensure clear relationships between individual economies and define their role in a world of perfect information. In a world of imperfect information and subjective contents of meaning, however, contracts are incomplete. The coordination mechanism has to be complemented by elements of command and motivation. Both aim at forcing individual economies to produce the collective output and reach the collective goal. Hence, in the firm example, the firm defines its relationship to employees, contractors, and clients by means of contracts in order to reach its goal. However, it develops motivation and subordination mechanisms to ensure that organisational participants produce the expected outcome. In market economies, the complete

[50] See methodological considerations in Chapter 3, Section 3.

[51] See, for example, L. Rougier's thesis, cited in Dardot (2010, p. 166).

coordination and motivation mechanism (including command and incentives) aims at ensuring that people reach an externally given goal and directly impacts the degree of performance of the collective economy.

3.3. On firm boundaries

As presented in subsection 2.3 of Chapter 4, the praxeological study of organisations needs to introduce uncertainty, time, and dispersed information in the analysis of organisational structures and participants' interactions to be complete. Chapter 5 has introduced uncertainty in process execution in the form of waste. By adding an entrepreneurial component to the organisational problem, Chapter 6 introduced the creation of market power as the result of designing both strategy and architecture in a progressive economy.

In a praxeological world, firms are hence no static frameworks. They define their strategy to the best of their knowledge at every point of time and their transactions depend on their dynamic knowledge of their environment. When a firm revises its set of decisions, it sends a new signal to the market that can be integrated by other participants. According to Kirzner (1973), the systematic alteration of decisions between periods creates information differentials that serve participants in adjusting their choices. The most entrepreneurial participants react faster than their competitors to a new piece of information, implying a possible multiplicity of prices for factors of production or commodities at a given time. New entrants place pressure on the prices and "[m]arket participants are therefore forced to gravitate closer to the limits of their ability to participate gainfully in the market" (Kirzner, 1973, p. 12). Firms endorse the function of an equilibrating force in a constantly altering environment through their role of opportunity exploitation. Action is thus "essentially the exchange of one state of affairs for another state of affairs" (Mises, 1949, p.195).

The adaptation of the firm's goal to new customer needs has repercussions on its internal organisations. New opportunity exploitation can modify the functioning of the firm over the time. The firms' architecture is thus expected to evolve in reaction to changes in the environment until it ceases to adequately fulfil customer needs. When designing their architecture, firms need to consider their ever-evolving system. Once implemented, they constantly need to redesign, drive, and monitor their relations to other participants and their internal organisation, which results in constant structural changes. Some elements of the structural component of an organisation are nevertheless inflexible and express imperfect substitutability. For example, a specialist working on specific R&D projects can hardly be relocated to the accounting department. The R&D and accounting department, however, have to be able to adapt to strategic changes or external shocks such as a modification in regulation, for example. Adaptability and scalability are necessary for organisations to survive in an evolving economy but generate problems of inertia and improper substitution. The adaptive ability of organisational structures thus depends on the quality of the firm's anticipation of its needs in the future and its decision-making process regarding these needs and their changes over time. This capacity to adapt influences firm's performance over the time. Firms which are relatively more

effective and efficient in coping with changes are expected to continually better ensure outcome and plan conformity.

Firm boundaries are therefore to be considered scalable and adaptable. They are determined by firms' architecture and its evolution through time. Their definition depends on the combined effect of both entrepreneurial and organisational abilities in firms. The entrepreneurial ability affects both strategy and architecture at each organisational level and aims at creating value to the eyes of the customer. Its introduction in the model defines the firm's organisational ability as an activity that ensures plan conformity over time. It also affects both strategy and infrastructure but has a different focus. It aims at designing an adequate plan with respect to the entrepreneurial vision and driving operations in order to effectively create value in the long run. The combination of both entrepreneurial and organisational decisions in firms therefore determines the firm's organisational structures. These structures are composed of heterogeneous assets and coordination mechanisms which enhance value creation during process execution. Furthermore, the structural changes can be either changes from non-existing to existing structures (creation) or modifications of the state of a structure into another state (adaptation). Activities of creation serve both purposes of outcome and plan conformity when they correspond to novel needs. Activities of adaptation serve the purpose of following the market incremental evolution in the praxeological environment of unfolding events.

Consequentially, the process theory of organisation cannot borrow the abstract definition of organisational boundaries from NIE described in Chapter 1. In the current context, a firm's adequate strategy defines an adequate architecture by combining assets in such a way that market power is created and value potential internalised in the long run. The proposed definition of the firm is hence the following:

The firm is the lowest organisational level with full decision autonomy about designing and driving its strategy and architecture according to its long-run goal of value-creation.

This definition implicitly describes firms as specific collective economies with centralised goal definition (see section 2.1 of Chapter 4). They entail a central authority which decides which actions have to be undertaken in order to reach their goal and have inherent organisational structures supporting operations. As discussed in the next chapter, these structures entail implicit or explicit delegation mechanisms, repartition of decision rights, and incentive schemes dependent on individual decision-making in firms. To form a complete understanding of the functioning of business organisations, we need to understand what decision autonomy means and how it is expressed in firms. The next chapter presents this topic under the umbrella of management and extends the above theoretical development to a discussion on decision-making with limited and dispersed information.

Chapter 7 : The managerial problem

According to Chapter 5, being effective in creating value implies finding ways to satisfy the customers demand and designing a plan which makes room for profit generation in opportunity exploitation. Being efficient in creating value implies finding ways to best institute the organisation with respect to the entrepreneurial vision. Both efficiency and effectiveness levels are influenced by the ways the process is conducted. At the firm level, this represents the activities devolved at orienting people's activities toward the collective goal. It represents all ways to influence the process prior to initiation and during execution. It is a force that defines the economic process and ensures it is performant.

Section 1 introduces the firm's managerial abilities in the model of firm performance and extends its definition to entail both entrepreneurial and organisational functions. Section 2 presents collective decision-making in firms based on an analysis of Austrian functions and decision-making literature. It exposes the limits of Austrian functions and proposes a generic definition of individual functions in firms in a praxeological context. Sections 3 and 4 propose praxeological definitions for both entrepreneurial and organisational functions in business organisations. Section 5 summarises the current theoretical development, replaces the concept of "organisational problem" by that of "managerial problem", and describes its solution as the management of structural changes in business organisations.

1. Introducing managerial ability in the model of firm performance

The existence of waste in process execution is presented as the result of the managerial activity in firms. Consequently, the role of management refers to people's interference with the process which aims to ensure the profit opportunity is realised. Defining the waste in production process as the result of the managerial activities leads to rewriting Eq. 23 as the following:

Eq. 43 managerial ability: $w = 1 - a,$

where a$= [0, 1]$. Perfect plan design and execution ($a = 1$) should lead to the absence of waste in the production process and hence full effectiveness and efficiency. Substituting Eq. 43 in Eq. 41 yields efficiency in creating value to be determined by a general managerial ability ($1 - \mathrm{A1}$) and an element linked to the use of production means ($A1\mathrm{A2}$):

Eq. 44 $\theta = \underbrace{1 - A1}_{\text{General managerial ability at the collective level}} \underbrace{- A1A2}_{\text{Difficulty in planning and executing each process}}$, *where*

Eq. 45 $A1 = \left(\frac{1-a}{2-a}\right)$, *and*

Eq. 46 $A2 = (3 - a)\left(\frac{CXE^* + I^*}{R^*}\right)$.

$A1$ accounts for the general difficulty to exploit the firm and influences all organisational levels at the same rate. It has a negative impact on efficiency in creating value and is independent from all process elements. $1 - A1$ consequently, represents the general managerial ability of the firm with a positive impact on its degree of effectiveness. The higher this term is, the better the firm is able to reach plan conformity over time. The second term, $A1\mathrm{A}2$, represents the difficulty to plan and execute each process and sub-process in the system. It is dependent on the general efficiency level and a specific component representing the combined vertical and horizontal aggregation of value generation at individual levels $\left(\frac{\mathrm{CXE}^{*}+\mathrm{I}^{*}}{\mathrm{R}^{*}}\right)$. If this ratio of expected costs of external inputs and infrastructure to expected rent takes a value of 1, a given investment in production means over a period of time is expected to yield a value just as high. This ratio is multiplied by $(3 - \mathrm{a})$ to express its dependence on managerial ability at each level. The higher this ability, the smaller is the impact of $A1\mathrm{A}2$ on effectiveness at the firm level. Finally, the negative sign of $A1\mathrm{A}2$ implies that a low level of a is detrimental to effectiveness.

$A1$ represents a fixed effect at the highest organisational level with influence on each lower level. $\mathrm{A}2$ is an individual component which is independent from its nesting in a greater system. In the current setup, the ratio of expected costs of production means to expected rent takes a different value for each process (see Appendix B for a calculated example). However, it is influenced by two fixed effects ($A1$ and $(3 - \mathrm{a})$). The real value creation is hence determined by the specific decisions regarding the production means at individual levels and the general managerial ability at a collective level. The model could be improved by relaxing the assumption of equal w across processes. This would imply the existence of individual waste levels in each process and possible negative wastes resulting from finding ways to beat expectations during process execution. Similarly, relaxing the assumption of equal m across processes would account for the presence of costs centres in the collective economy and allowing some processes to be especially important in creating value at the firm level. These two changes would make the individual managerial ability in a chain of actions dependent on the managerial ability of the preceding process. In the current setup, however, equal w in processes implies equal managerial ability all process level and the consequent seemingly fixed effect of a.

Combining Eq. 40 for effectiveness and Eq. 44 for efficiency in one system of equations and reintroducing subscripts yields the following equations to be measured in the empirical analysis: [52]

Eq. 47 $\eta_{fs} = \theta_{fs}^{(1)} M_{fs} + Z_{fs}$ *(measurment model)*

$\theta_{fs}^{(1)} = \xi_{fs}^{(1)} + \theta_{s}^{(2)}$, *(structural model)*

where *j* and *i* are replaced by *f* and *s* for firm and sector, $\xi_{\mathrm{fs}}^{(1)} = -A1A2$ and $\theta_{\mathrm{s}}^{(2)} = 1 - A1$, $j = 1, N$ processes, $i = 1, n$ sub-processes, and (1) and (2) represent the equation levels (process or sub-process) for the sake of clarity. Eq. 47 shows that effectiveness at lower levels (η_{ji}) is dependent on

[52] See Part III for information on measurement and structural models.

the efficiency in creating value multiplied by the expected margin ($\theta_{\mathrm{ji}}^{(1)} M_{\mathrm{ji}}$) and the effective use of production means (Z_{ji}). The efficiency $\theta_{\mathrm{ji}}^{(1)}$ at sublevels is influenced by the lower level efficiency in planning and executing each individual process $\xi_{\mathrm{ji}}^{(1)}$ and a higher-level efficiency score $\theta_{\mathrm{j}}^{(2)}$.

The narrative behind the above model has described a firm in its collective form (composes of chains of sub-processes). The definition of business organisations, however, describes firms in both their individual and collective forms. A collective organisation composed of individual firms is presented as a group of firms (i.e. sector). A sectorial study raises the unit of analysis of one organisational level to treat sectors as the higher-level economy and firms as parts of the sectorial system. Eq. 47 therefor also represents individual firms' effectiveness as (i) a function of firms' efficiency and their use of production means and (ii) the firms' efficiency as a function of a firm-level and sectorial-level component.

The equation for $\theta_{\mathrm{ji}}^{(1)}$ is furthermore a function of a_{ij}. If this parameter reaches unity at all sub-levels (perfect managerial ability), the collective organisation tends to be fully efficient and effective. According to Chapter 6, the level of a_{ij} can be deemed a function of both entrepreneurial and organisational abilities. By influencing process execution, the conduct—or managerial ability in firms—represents an influence on efficiency and thus on plan conformity. Both abilities have been described as leverages on firm performance, but no formal definition has been given so far. The next subsections therefore discuss these topics in order to specify both entrepreneurial and organisational functions as constituents of firm management.

2. Collective decision-making in firms

This section proposes a reflection on decision-making with limited and dispersed information. It aims at defining functions as groups of decisions with specific relevance to the firm. Subsection 2.1 reviews the Austrian description of functions, refines it, and proposes a generic definition for functions executed by human beings in firms. Subsection 2.2 links this definition to decision-making. It reviews the mechanism which allows individuals to form correct expectations about the future, the logic of choice in a praxeological perspective, and the aggregation of limited and dispersed information in organisations. The proposed view on decision-making in firms explains both entrepreneurial judgments and organisational decision-making made by a person or a group of persons in collective economies.

2.1. On individual functions in firms

A functional approach to individuals' actions within the firm

Austrian texts propose a functional description of people's actions in firms based on a trait approach. From a praxeological point of view, the ability to gain market control through exploitation of information differentials, the entrepreneurial function, is unevenly distributed among individuals.

People who lack the necessary aptitude to act as entrepreneurs fulfil other functions such as "resource owner", "managers", or "shareholders" (Kirzner, 1973, p. 45). Their denomination depends on individual characteristics such as resource endowment, degree of control over production, or financial power. In Mises's words, "[…] every function is nicely integrated: the entrepreneur earns profit and suffers losses; the owners of means of production (capital goods or land) earn originary interests; the workers earn wages" (Mises, 1949). The implicit distinction between functions resides in what actors do in the economy. No actor can nevertheless truly express one unique function. For example, "[i]n a real and living economy every actor is always an entrepreneur and a speculator" (Kirzner, 1973, p. 253). Following this logic, people need to combine individual traits to combine functions. An entrepreneur who grasps the future is de facto a speculator. His faculty of imagining and setting the conditions for exploiting opportunities is complemented by an ability to gain information about the future and speculate on the possible outcome of his actions. Furthermore, an entrepreneur can put his own capital to use and thus simultaneously be a resource owner. This is in fact necessary because the pure entrepreneurial opportunity imagination needs to be complemented by activities of production and distribution in order for entrepreneurs to benefit from the perceived information differential. Production activities render *de facto* all firms resource-owners. An organisation evolving in a complex environment hence requires his members to have abilities attributed to different functions. A short review of the main Austrian functions is given below.

Technicians, speculators, promoters, capitalists, and directors

Technicians are "people who have the ability and the skills to perform definite kinds and quantities of work" (Kirzner, 1973, p.300). They realise highly specific tasks that demand special knowledge. These tasks can be of any degree of complexity, from scientific or sportive achievement to very simple duties. Technicians are hired by the entrepreneur who "directs [their] labor toward definite goals" (Kirzner, 1973, p.300). These goals are set by speculators. Their role is to define "the best possible supplying of the consumers with the goods they are asking for most urgently" (p.300). The function of the speculator is to make the best possible valuation of future states of affairs. It is the role of the promoter to actively market the products and services that will bring change in the economy. He is "aggressively pushing forward" the entrepreneur's idea to allow the firm to benefit from its economic activity.[53] The role of the capital owner is to "care for the best possible employment of capital goods".[54] Owners expose their properties, wealth, and possibly social position in financially supporting a project. They accept to suffer a loss to the height of their participation. Shareholders and directors take strategic decisions. "The general direction of a corporation's conduct of business is exercised by stockholders and their elected mandataries, the directors" (Mises, 1949, p.303).

The Austrian entrepreneurial function

[53] See Mises(1949, p. 309ss) and his discussion on marketing activities for more on the topic.

[54] Here, Mises (1949, p. 303) speaks about owners of capital and land.

The central protagonist of the Austrian economy, the entrepreneur, has partly been described above. His pure function can be summarised as solely making profit on information differentials. For Kirzner, the pure entrepreneur does not make anything else than discovering an opportunity and putting to use the resources at disposal to generate profit. For Mises, "[t]he entrepreneur decides alone, without any managerial inference, in what line of business to employ capital and how much capital to employ" (Mises, 1949, p. 304). A firm's level of entrepreneurship depends on the entrepreneur's ability to use information differentials and to exploit them. Market participants have a distinct degree of entrepreneurship that varies from a very low to a potentially very high level. Entrepreneurs are active and creative. They carry on initiatives and implement novelty. The higher their propensity to move the lines and innovate, the higher is their entrepreneurship. The role of the entrepreneur is, however, not only to imagine opportunities; it is also to create the condition necessary to exploit them. It is part of the entrepreneurs' role to define "the expansion and contraction of the size of the business and its main actions" or to determine "the enterprise's financial structure" (Mises, 1949, p.304). Furthermore, the entrepreneurs' role of control over the production processes is exacerbated into an ability to put "resources to a superior use (and 'profitable') as yet unnoticed by others" (Kirzner, 1973, p. 62).

The Austrian managerial function

The economic process has to be executed by "way of production, commerce and management".[55] The only mention of the word "management" in both of Menger's books mentioned in the introduction of Chapter 3 is found in his description of an "economy". The author, however, gives no real definition of the word. A thorough reading of the books nevertheless makes it clear that individuals influence the course of actions. When he speaks about intended actions, the notion of structuring the available goods in a way that allows the economic subject to reach his goal is present. The notion of structuring and orchestrating resources implies their purposive use. Menger says: "We control the real world in that, on the basis of our theoretical knowledge, we set the conditions of a phenomenon which are in our control, and are able in such a way to produce the phenomenon itself" (Menger, 1883, p. 56).

For Mises, the role of managers is to execute the tasks entrepreneurs delegate to them. They act as "junior partners" but can never substitute for the entrepreneur. Managers lack entrepreneurship and cannot take control over the factors of production. "The final decision implying a judgment about the future state of the market rests with [the entrepreneur] alone". Only the execution of the decision "may then be entrusted to managers" (Mises, 1949, p. 304). For Kirzner, resource orchestration requires the creation of an organising structure for securing operations (Kirzner, 1973, p. 52). Even "[i]f our producer is to be a pure entrepreneur, we must view him as hiring all the talent needed to organise factors of production into a smoothly working team and buying all the resources needed to effectively complete the transactions which his entrepreneurship suggests he enters into" (Kirzner, 1973, p. 45).

[55] See Menger's definition of the economy in Chapter 4, section 1.1

Problems related to the Austrian definition of functions

While the above definitions of functions seem to have clear boundaries, their description in original texts is rather unclear. The characteristics of functions often overlap because their categorisation is based on personal characteristics. Consider the following incoherence derived from the analysis of a trait approach to functions in Austrian writings. On the one hand, the manager has no scope for judgment and only follows the entrepreneur's will. However, on the other hand, Mises expects the manager to "[..] adjust–within the limited scope left to his discretion–the operation of his section to the state of the market" (Mises, 1949, p. 302). Furthermore, he must "[…]attend to the best of his abilities to the entrepreneurial functions which are assigned to him within a limited and precisely determined sphere of actions" (p.301). It seems that managers are sometimes automations, sometimes individuals endowed with the capacity to make entrepreneurial judgment. The latter case contradicts the Miesian idea that managers cannot substitute for entrepreneurs or that they completely lack entrepreneurship. In addition, Mises's writings are never clear about the question of knowing if promoters are a special kind of entrepreneurs—those with the highest entrepreneurial level—or if they perform another function—that of actively pushing forward the products and services to the market. In the same way, the distinction between capital owners, shareholders, directors, and their relation to the entrepreneur is unclear.

Two problems linked to the Austrian use on functions arise. First, the combination of functions leads to incoherent statements. For example, an individual with such a trait as entrepreneurship performs duties related to the entrepreneurial function. When his economic activity requires him to realise a task from the managerial function, however, he must act with zero entrepreneurship and mechanically exploit the idea he previously had as a wishful subordinate would do. When he needs to deploy his technical skills to execute a specific production task, he cannot use the little scope for judgment possibly left to him to rethink the way the process is executed. This is one of the main critiques to all trait approaches to economic phenomena. It describes types of people with characteristics supposedly invariant over time and leads to such inanities as individuals switching off their brain after having made some decision. Furthermore, how can we call an owner-entrepreneur who loses his material goods? Or a manager-specialist who finds a way to smooth up the production process?

The second problem is linked to the absence of definition of what a function is. Indeed, what does the word "function" refer to? It has been previously assumed that functions are executed by groups of people with similar characteristics. But the formal definition of economic notions must rely on general laws or general elements that are true in any situation, independent of time and paradigm. Categories that possess clear boundaries are segregated by a common reference or set of references. For example, the European definition of SME depends on the firm's number of employees (unidimensional scale) and their juridical form depends on conditions defined in the law (multiple criteria allowing a firm's inclusion in—or exclusion from—a category). The above traits are not based on any underlying invariant element which characteristics can be used to define functional boundaries. The definitions

of Austrian functions refer to elements very different from one another, such as capital ownership, ability to imagine opportunities, delegated roles, or specific skills. There is no primary constituent underlying each of these notions. No element relates to all functions and nevertheless allows to theoretically distinguish each of them. Such a lack of clearly defined boundaries for economic phenomena is a recurring critique in economic theorising. Studies on firms, for example, often avoid defining what a firm is.[56] They rarely describe the elements which are common to all firms, and yet specific to them.

Among all functional overlaps in the Austrian literature, the main obstacle to understanding the role of entrepreneurship and management in the business process is the impression that entrepreneurs are responsible for organising and running the firm. Montanye (2006) even explains that Mises distinguishes between managerial and entrepreneurial activities but makes management a part of the entrepreneurial function (p. 553). Outside the world of entrepreneurship research, however, the organisational activities are intuitively considered managerial rather than entrepreneurial. The functional description of firm's activities is thus further discussed in the next subsection.

Refining the notion of function

The basic proposition underlying the functional definitions of individual activity in firms consists of basing each function on decisional characteristics rather than personal ones. The rationale to choose this description of functions is that decisions are followed by actions that result in changes in the system. A function hence needs to describe all three elements: the decisions made by human beings prior to acting, the action itself, and the outcome of the action. Figure 10 proposes a representation of these three functional elements. Groups of decisions, actions, and outcomes are respectively called "decision classes", "activities", and "phenomena".

Figure 10: The three functional elements: decision classes, activities, phenomena

	Element1	Element 2	Element 3
Description:	Individuals make decisions	Individuals act according to the decision made	The outcome of actions affects the environment
Classification:	Decision classes	Activities	Phenomena

Source: Author's own representation

The meaning of Figure 10 is the following: each decision can be attributed to a decision class. The resulting actions participate to corresponding activities. The impact of activities can be observed in the economy as phenomena. Following this view, a function can be analysed from the point of view of its trigger, the effective form it takes in the economy, or its impact on the environment. For example, an individual's organisational decision in a firm results in a particular set of activities that bring changes

[56] See the discussion on Spulber's model in Hart (2011).

to the current structure of the firm. These activities are executed by human beings, participate in the overall goal of the company, and influence its aggregated output.

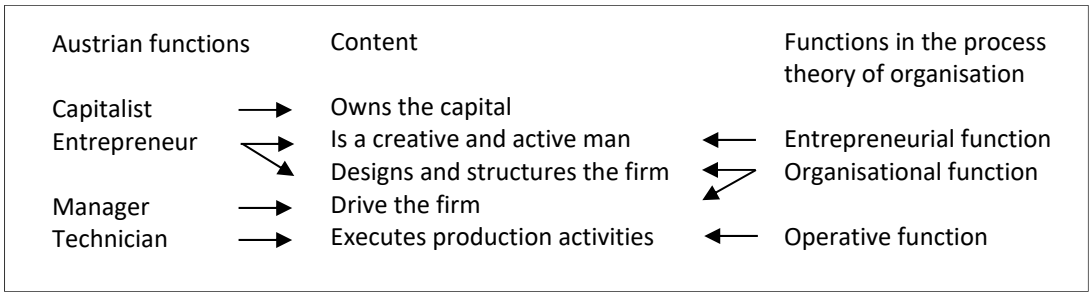
Each functional element is expected to be bound to the following one by a unidirectional relationship representing a chronological chain of events. The logical backward corollary tells that phenomena result from actions which result from decisions. This thesis hence focuses on decisions as the elementary building block of economic phenomena. This is consistent with Austrian texts which mention individual decision-making as the trigger for economic activity in all contexts. As stated by Kirzner (1973) for example, a firm is that what results from entrepreneurial decision-making. The economic process explicitly results from chains of events that start with decisions and end with an impact on the environment. Austrian writings clearly explain the existence of these three interrelated dimensions (what people think, what people do, what people observe) and place human beings at their centre. Mises (1949) consequently states in the business context that "[…] human labour is both suitable and indispensable for the performance of all thinkable process and modes of production".

The theoretical focus on decision-making is especially clear in Austrian discussions about the logic of choice presented in the methodological considerations in Chapter 3 and Appendix A. It shows that economic progress is due to human beings' tendency to execute actions that improve their situation. They select the next move in a set of alternatives thanks to decision rules based on taste and preferences. Austrians are not alone in seeing "choices" in such a way. It has been investigated in parallel by Herbert Simon in his theories of bounded rationality as presented the next sections.

A definition of function executed by human beings in firms

This section defines functional boundaries with respect to decision classes determined by the boundaries of the problem sets in which the choice for the underlying decisions is located (see Appendix C on problem set and decision rules). The boundaries represent an element common to all functions and yet specific to each of them. The difficulty faced below resides in defining coherent groups of decisions that eventually form the organisational and entrepreneurial functions without theorising on their content.

Figure 11: Simplified description of Individual functions in a firm



Source: Author's own representation

This work rests upon the idea that three distinct and objective functions exist in firms: the entrepreneurial, organisational, and operative functions (see Figure 11 above). The operative function is assumed to entail all decisions linked to the realisation of the core business activities (execution, not influence). It is separated from the current interest in management and is not further discussed in this text.

As presented in Chapter 6, I propose splitting the role of "imagining opportunities and designing the process that supports their exploitation" attributed to the Austrian entrepreneur in two distinct parts. I attribute the "imagination activities" to the entrepreneurial function and the "designing activities" to the organisational function.[57] The entrepreneurial function is to be understood as an element inherent from a process view of the economy which aims at finding ways to benefit from the consequences of actors' limited and dispersed information in a progressing economy. The organisational function is understood as the firms' response to the negative consequences of living in a world of imperfect information. Because the economic activity has to be coordinated and economic actors need to be motivated, a complementary activity of the organisational function consists of driving the process through execution to ensure plan conformity over time. As already explained, the entrepreneurial and organisational functions are expected to jointly compose the managerial function.

The rationale for defining these functions is deduced from the literature on entrepreneurship and organisations written by non-Austrian authors (see e.g. the literature on the entrepreneurial process, the views of NIE, and the theories of bounded rationality). Analysing if such texts simultaneously attribute organisational activities to entrepreneurs and entrepreneurial activities to people in charge of a firm's organisation yields no such confusion as that of Austrian scholars.[58] It can easily be shown that, while the writings on entrepreneurship unanimously attribute organisational tasks to entrepreneurs, those on organisation do not even talk about entrepreneurs. In addition, while the term "management" is mentioned in all reviewed literature, none of them proposes a clear and consistent definition for it.

Furthermore, the overlap between entrepreneurship and management in Austrian texts impedes a praxeological investigation of one dimension alone. The search for coherent decisional characteristics defining functions requires clearly separated definitions of the role of entrepreneurs and managers in firms. Indeed, a simple reflexion on the current Austrian role attributed to the entrepreneur demonstrates its internal inconsistency. It is easy to interpret from Austrian writings that entrepreneurs have the overall responsibility over economic evolution. A simple reasoning by means of the epistemological regress problem based on the statement that "pure entrepreneurs must hire all the necessary talent to exploit opportunities" proves this wrong. If there are no entrepreneurs, nobody gets hired and exploitation is impossible. Hence, to the limit, the above assertion simply implies that people do not act without entrepreneurs. If there were none of them, human beings

[57] The other Austrian functions of owner, promoter, speculator, shareholder, and director are not represented in Figure 11. They are not seen as root functions in the current theoretical development.

[58] Details on this research are available on demand.

would be inanimate objects and lose their status of social subjects. If this were to be true, an evenly rotating economy wouldn't even exist, and the world would be static. If a non-evenly rotating economy were nevertheless to exists, then an entrepreneur would have perpetrated the very first action to set the economy in movement and stop existing soon after. Both conclusions are clearly not what praxeology is about. Man can act without entrepreneurs.

There is a need to clearly define the entrepreneurial role in a way that allows the economic system to be independent of the presence of any entrepreneur. The next section further investigates this issue based on decision-making.

2.2. Linking decision-making to the definition of functions

This section aims at clarifying what dispersed and limited knowledge is in order to determine micro-foundations for decision-making mechanisms in firms in the current context and define clear unit of analysis for organisational studies. It proposes a general definition of functional boundaries based on decision-making mechanisms. It first shows that some decisional outcomes must correspond to prior expectations in order for the economy to progress in the long run. If this wasn't the case, decisions would be mere haphazard, and the resulting economy would be a zero-sum game (see Appendix A on the kaleidoscopic view). Furthermore, specialised decision-makers in organisations face complex decision problems and have only limited information to form expectations. Distributed information in collective economies must be aggregated in order to increase the decision-maker's knowledge of the decisional context and the probable outcome. Theorising about decision-making in a progressing economy hence only makes sense if individuals are able to form correct expectations about the future and organisation can rely on information dispersed in its specialised member's head to increase the probability of its decisions to be correct. Both issues are presented in the next subsections.

The formation of correct expectations about the future

Austrian economic phenomena are subjective and exist only in human minds. This implies that each individual possesses specific bits of information and is ignorant about the rest. In this context, the question of forming correct expectations about the future is valid. This issue is discussed in the literature on judgmental decision-making. For example, Foss N. and Klein (2012, p.77) see judgment as "[…] residual, controlling decision-making about resources deployed to achieve some objectives; it is manifest in the actions of individual entrepreneurs; and it cannot be bought and sold on the market, such that its exercise requires the entrepreneur to own and control a firm". As such, judgment in firms entails acts of imagining and evaluating opportunities as well as ways to orchestrate resources in order to realise the imagined opportunity. For Casson (1982), judgment is a "meaningful notion of decision-making that is intermediate between decision-making via formalized rules and pure luck or random behaviour". For him, the use of formalized rules fully determines the decision-making process and generates a certain outcome. In this context, a repeated decisional problem always leads to an optimal solution. A purely random event is fully separated from the decision-making process and produces a

random outcome. Its repetition leads to a zero-sum game. While these authors agree that judgment leads to positive decisional outcomes, the mechanisms which lead to the correct decisions are rather unclear. Hence, what mechanism lies between Casson's two extreme decisional modes of pure control and luck? How can we define a mechanism for decision-making that is not fully determined or haphazard?

On ideal types and empirical forms

The praxeological answer to this question relies on Schultz description of ideal types (Schultz, 1975). He defines ideal types as mind constructs used by individuals to categorise events and outcomes in order to increase individual chances to make sound decisions and engage in successful actions. Ideal types are learned by experience and transferred by culture and institutions (see Appendix A for a definition). Furthermore, according to Schultz, the objects of ideal types refer to the characteristics of actions and not individuals or groups of individuals.[59] This specificity allows the correct imagining of the outcome of individual actions, thus predicting the probability of success of an event with a certain degree of certitude. Opponents to the ideal type approach argue that, by assuming conformity to ideal-types, "economic laws become contingent rather than necessary, and the ideal types approach fails to provide economic theory with an epistemological basis that frees it from the defects of positivism and historicism".[60]

Menger gives an implicit answer to this critic by distinguishing empirical regularities from exact laws. To understand this point, let's start with White's critique to Menger's dual theoretical orientation (i.e. exact and empirical-realist theories).[61] White writes: "The two sorts of 'laws' are on different epistemological planes. So, without too much dissent for Menger's thought we may divide economic theory from economic history where he divided strict theory from what he considered an empirical sort of theory. What is empirical is really historical, and that accounts for its different status from what is deductive".

The distinction between exact and empirical theories, however, plays an important role in theorising about correct expectations. An exact law is understood as an abstract consideration of the reality. It allows defining the state of a phenomenon by considering predetermined fundamental conditions. An exact phenomenon is what is expected to be observed given such conditions. The real empirical form that this phenomenon can take in time and space is, however, shaped by the diversity of economic subjects influencing the occurrence of the phenomenon. Its empirical form is the result of human activity. It is *deducted* from observation. An emphasis on "deduction" is important to distinguish between both approaches. White says that what is empirical is historical and this "accounts for its different status from what is deductive". The terminology used below, however, makes a distinction between "status" and "form". A form is a class of empirical statuses. It is a category of specific

[59] Schultz, cited in Selgin (1990, p. 25)

[60] Kirzner's critique reported by Selgin (1990, p. 24)

[61] White in the introduction of Menger (1883)

outcomes. A variety of empirical statuses can be observed in the real world. Some distinctive characteristics can bring an observer to attribute them to one category or another. Furthermore, some statuses—or empirical outcomes—can belong to the same form because they express similar characteristics as presented in the pool table example below.

The pool table example

The difference between statuses and forms can be illustrated by plotting the experiment of repeatedly trying to stop a ball on a target point on a pool table. A player can rely on an exact theory to define how to hit the ball in order to reach the target point (strength and direction in this two-dimensional plan). In reality, the ball rarely stops precisely on the focal point. Even if a player knows how to hit the ball, the place where the ball stops depends on the player's execution of the shot. In the current example we accept that this depends on the player's ability only, whose sole determinant is the player's number of years of experience.

In a repeated game, the distribution of the distance between the place where the ball stops, and the point of interest can be described by its moments. Let's imagine that this distribution can be subdivided into two sub-distributions for players with more or less than one year of experience. The mean distance to the target point of the first group will probably be smaller than that of the second group. Hence, if X and Y are the mean distance for players in group 1 and 2, a probable regularity to be observed in this game is that players in group 1 have results close to X and players in group 2 close to Y, while X<Y. This law is no positive theory describing what to do to trigger a focal outcome. It is a normative theory which describes some characteristics of an outcome. In Mengerian terms, this is an empirical theory which states that players from the first group tend to be closer to the target point than players from the second group. This is deduced from observation, from history.

Of course, each time a player plays (each occurrence) can lead to another result (a status). The status of a single occurrence can be anything. A shot can be classified as expert or beginner, depending on its distance to the point and independently on the player's experience. To define empirical universal laws, we have to rely on the characteristics of the action and not those of the individual. Despite the fact that our intuition leads us to name group 1 and 2 "experts" and "beginners", praxeology and Schultz ideal-types remind us that the shot of an expert can end up in the beginner range. The unit of analysis of a praxeological law is hence the shot itself, not the players. An empirical form can be described as "expert shots" or "beginner shots" if the distance to the target point is close to X or Y. A form is thus a synonym for an ideal-type.

Moreover, human beings learn by experience and have the faculty of understanding. If an observer sees a player making nine expert shots out of ten, he might decide to call that person an expert. He bases his judgment on observed actions and categorises the player in a way that makes sense to him. Hence, if he has historical data, the observer can form expectations about the future and imagine that the next shot has a 90% chance of being classified as "expert shot". In fact, history teaches us two things: first that an expert-shot is close to X and, second, that people with over one year of experience

tend to shoot close to the target point. By knowing the number of years of practice of a player, an observer can infer the probability of the event's outcome by relying on the player's personal characteristics. The observer forms expectation. He can increase his knowledge about the probable future status of the outcome thanks to his "understanding" of the situation. Nevertheless, the observer must bear in mind that the empirical status of the next shot can be anything. He cannot predict the outcome of the event with perfect accuracy.

In conclusion, the formation of ideal types tells us that expert shots are close to X and our understanding tells us that experts tend to do experts shots. Forming ideal types thus consists of extracting information patterns from the environment due to characteristics of events or actions. Understanding consists of linking these ideal types to possible outcomes of an event or action in order to form correct expectations. The recognition of an ideal type thus increases the probability of making a correct decision. For an "understanding man", using ideal types in decision-making transforms observations into laws with predictive power.

The important consequence for theory building is that categorising (or defining empirical forms) represents a gain of information. By extension, however, an individual doesn't need to consciously know the distribution of an event to form expectations in the real world. Defining empirical forms only refines one's information about the probability of an outcome. Knowing that the next player is an expert greatly reduces the odd that the ball ends up far from the target point. If the room includes only experts, there is no need to expect the mean distance to the target point to end up in a non-expert zone. In short, while statuses are purely historical, empirical forms are not. They represent categories of probable future statuses. In praxeology, these empirical forms are used by individuals to imagine the outcome of an event and increase the probability of forming correct expectations about subjective economic phenomena.

The logic of choice and the aggregation of information within organisations

The last section presented the praxeological individual decision-making mechanism which leads to the formation of correct expectations by referring to ideal-types and understanding. Increasing the quality of decision-making thus refers to improving one's knowledge of the decisional context and probable outcome of the decision. Individual learning is one way of doing so. However, because of labour division and specialisation, specialising in one domain of competence results in a lack of autonomy (ignorance about other facts) and a need to exchange (access information held by others). In complex decision-making situations, such as those observed in organisations, the Austrian information problem is extended to a problem of making sound decision based on information dispersed in its member's head.

On individual and collective decision-making

The problem of individual decision-making in collective economies is a problem of information aggregation. This aspect of decision-making has not fully been investigated from an Austrian point of

view. There is a lack of theorising about the relationship between individual choices and their expression at collective levels. In the context of the firm, for example, it is difficult to relate a multinational's procurement strategy to its owner's choice and valuation principle in a simple way. This raises the question of the functioning of decision-making in collective entities and the consequent use of informational coordination mechanisms, and the consequent repartition of responsibilities and of authority.

Foss N. and Klein (2012, p.77) state that decision-making (or judgmental decision-making in their text) is currently a black box. Praxeological subjectivism, however, describes abstract elements that underline the mechanism of choice-making: the motivation, the attainable alternatives, and the selection rules. The motivation is expected to orient the choice with respect to man's needs. The alternatives represent the set of perceived possibilities from which individuals can choose. The selection rules are laws used by individuals to select between options. Placed in the context of methodological individualism, praxeological subjectivism and non-simultaneous system adaptations, the logic of choice describes general choice mechanisms that help individuals to define their actions at individual and collective levels.

On functional boundaries

Appendix C presents the Austrian view on decision-making as the process of selecting alternatives in a perceived informational silo. The existence of both a problem set and decision rules is common to any choice but specific to each of them. The below text focuses on decisional boundaries and decision rules to differentiate functions. For example, an engineer and a bookkeeper might locate the choice to buy a new piece of machinery into different problem spaces. The former might justify the investment with respect to productivity increase while the latter might only see an increase in costs. The former situates the object of his decision within a technical problem space—an operative decision—and the latter within a financial one, an accounting decision. If the importance is given to the operative point of view at the collective level, the investment is made. In a real-life situation, these two individuals endorse conflicting positions with respect to one unique object of choice.

Furthermore, two people with the same understanding of a situation might use different decision rules. For example, differences in decision-making about the same object can be observed when people are risk lovers or risk adverse. The praxeological subjectivism, however, goes beyond and accounts for different contexts of meaning; this explains, for example, why entrepreneurs simply do not perceive some situations as risky (see, for example, Baker and Nelson (2005) on "bricolage"). The existence of different contexts of meaning in organisations impedes information sharing because of the difference in understanding of a given situation. Information sharing thus implies acceptation of other individuals' implicit authority in decision-making due to their possession of specific knowledge perceived relevant in a given context.

One implication of the existence of subjective problem sets and decision rules is that the system firm (and its implicit division of labour) needs to have an overall decision mechanism allowing it to make

decisions at the collective level based on different individual specialised points of views. It could have a participative approach and ask all participants with different understanding of the question to debate, vote, and choose. This approach would aim at increasing the size of the problem space to that of the cumulative knowledge of the group. It favours a collective decision based on the global problem set. Alternatively, the firm could use a third party, mediator, or superior authority to settle the decision. This second approach makes use of an external judgment based on the two problem sets. It favours an individual decision based on the presented set of alternatives.[62] Finally, it could attribute decision rights to relevant specialist. This corresponds to the repartition of residual decision rights to lower-level economies which are better able to make the focal decision due to their specific knowledge. The aggregation of information in organisations thus relies on internal decision mechanisms (even a possible combination of the three above propositions) which aim at conciliating different points of view resulting from subjectivity and specialisation.

The existence of different points of view on one object of decision results from the subjective understanding of decision classes. These classes are expected to group decisions based on a common problem spaces such as engineering, accounting, or operative decisions. The use of such names to distinguish between decision classes purely serves an illustrative purpose here. I expect such words to be distinct categorises in the readers' mind but do not intend to define them. Indeed, the object of decisions belonging to a decision class in firms can be anything from executing simple operative tasks to selecting a new strategic orientation. It could be attached to any dimension of running a firm. Additionally, each individual uses his own toolbox to find his way in a definite context. People rely on proper decision mechanisms that help then to make particular decisions in all situations. In Gigerenzer's words, generality contrasts with specificity. He writes: "What works to make quick and accurate inferences in one domain may well not work in another. Thus, different environments can have different specific fast and frugal heuristics that exploit their particular information structure to make adaptive decisions. But specificity can also be a danger: if a different heuristic were required for every slightly different decision-making environment, we would need an unworkable multitude of heuristics to reason with, and we would not be able to generalize to previously-unencountered environments" (Gigerenzer, 2002, pp. 12–13). Real-world decision-making represents a trade-off between the application of general rules to all types of decisions and the use of specific rules to each problem set. The definition of decision classes is subjective and relies on each individual understanding of a problem. Hence, to the extent that the degree of specificity of processes leads to the definition of either clear or fuzzy boundaries, the degree of specificity of knowledge on a definite subject influences the boundaries of what an actual decision classes could be.

The concrete definition of decision classes—as probably experienced in real business situations—is thus not the point of this discussion. This task belongs to experts in various fields who focus on the

[62] The problem set is, of course, extended to that of the third party. But she can also consciously or unconsciously orient the final choice and introduce a bias in the decision outcome. This could also happen in a participative approach, however probably in a lesser extent. Developing a positive theory of a participative or authoritative approach to choose is nevertheless out of the scope of this study.

content of decision in firms. The interest of this study is that problem spaces have boundaries, these boundaries vary with respect to the specific knowledge of each participant taking part to the decision process, and they can evolve through time by means of learning. In short, the interest lies in the idea that problem spaces represent the dynamic collective knowledge of organisations. The below work proposes to use abstract decision classes to define the functions with importance in the present context. It does not describe the content of the decisions belonging to each class but links the classes to the elements of the transformation process in order for the definition to be consistent across economic decisions and organisational levels. This is expected to allow segregating between the current fuzzy Austrian definitions of the entrepreneurial and managerial functions based on objective characteristics of the business process.

3. A definition of the entrepreneurial function

The terms “firm creation”, “young firms”, “SME”, or “firm survival” are often used as synonyms to “entrepreneurship”. However, while all young firms have been created and survive a given time, all of them cannot claim having taken actions that creatively influenced the economic environment. The next section therefore describes entrepreneurship as the “*emergence of new economic activity*” in line with Wiklund (2011, p. 9) and Davidsson (2002).

This subsection explains that the term “emergence” refers to variation of the economic activity, while the word “new” describes the innovative content of the changes. The distinction between the variation of the economic tissue and innovation can be observed in different entrepreneurship literatures strands. An example where the innovation content of the economic activity plays a secondary role can be found in research focusing on getting out of unemployment, women entrepreneurs, or ethnic entrepreneurship. This type of new activity is deemed “entrepreneurial” because it represents a change of status from “non-economically” to “economically” active, and it therefore results in a change of the economic system. Starting a business reflects people’s necessity to change their situation, their will to act, or their desired to reach an objective. But these features do not belong to entrepreneurs only. Example of non-entrepreneurs who can possess this characteristic could be professional athletes, military aircraft pilots, or religious leaders. They share a common entrepreneurial characteristic but are not commonly called entrepreneurs.

Following the Austrian definition of the entrepreneurial phenomenon, new economic activity doesn’t reduce to creating new firms. The innovative content of the activity takes a predominant significance in the definition of entrepreneurship. An example with implicit variation of the economy and explicit focus on innovation is the literature on technological change. Innovation becomes the source of new economic activity and the firm’s capacity to innovate is the economic engine. This approach is closely related to entrepreneurship viewed as a phenomenon.[63] Here, entrepreneurship exists because changes can be observed in the economy. Entrepreneurship is thus not constrained to be the work of

[63] See Gartner (1985, p. 698), for example, for a review of a classification of entrepreneurs.

one person (i.e. trait approach), nor is it the creation of a firm (i.e. SME creation). New economic activity can result from the conjunction of multiple persons' knowledge and represent additional or new products, services, processes, or markets. Entrepreneurship is a phenomenon which is the observable outcome of a functional chain starting with a decision. The unit of analysis of entrepreneurship at the firm level is therefore no individual or organisation. It is the sum of all entrepreneurial decisions taken within a firm. These decisions result in outcomes which are different from currently observed in the market. But what makes these decisions special? What formal element of the transformation process can be used to categorise a decision as entrepreneurial?

3.1. The common and specific characteristics of entrepreneurs

Reserve on entrepreneurial theories is regularly expressed because this literature stream suffers from a lack of common definitions of terms used in studies. The discipline is "fragmented among specialists who make little use of each other's work" (Ucbasaran, 2001, p. 3). According to Morrow (2012), the solution to this issue lies in determining characteristics which are common to all entrepreneurs and distinct from non-entrepreneurs. Furthermore, according to Foss N. and Klein (2012), some of the aspects of that fragmented research field have been addressed over time by classical economists, but "at least since WWII entrepreneurship has been left out of the economic mainstream, only to be stressed out by prolific and perhaps well-known, yet 'heterodox' (and therefor rather uninfluential) economists", notably Austrians (p.12). Consequently, viewing entrepreneurship as a phenomenon in an Austrian vein implies defining the entrepreneurial character of actions in relation to their relative degree of creativity. In the words of Shane (2003), "[e]ntrepreneurship is an activity that involves the discovery, evaluation and exploitation of opportunities to introduce new goods and services, ways of organising, markets, processes, and raw materials through organising efforts that previously had not existed" (p.4). The entrepreneurial activity thus involves a number of steps that lead to the emergence of new economic activity. The focus on these steps is the actual difference to the trait approach. It is the observation of effective actions which transform the market that is eventually deemed entrepreneurial.

Seeing entrepreneurship as a phenomenon is closely bound to the Austrian view that entrepreneurship is the engine of the economy. It, however, does not bridge the gap between the entrepreneurship literature and the Austrian entrepreneurial function yet. There is a need to understand how the function is expressed within organisations and its relation to the process theory of organisation.

The expression of entrepreneurship

Seen as a phenomenon, entrepreneurship is not bound by any organisational form such as small firms or new venture creation, neither is it limited to any individual status such as being self-employed, or owner-manager. Entrepreneurs are individuals, or groups of individuals, that enable new economic activity. They stay entrepreneurs as long as they act in an entrepreneurial way and generate mew

economic activity. The adjective “new” entails both dimensions of “additional” and “novel”. This can be seen in the following sentence: “The new department is responsible for developing the new technology”. The first “new” (new department) implies the creation of an entity, an additional department. The second “new” (new technology) implies the development of a technology that differs from what has been done so far. “Additional” represents the change from a status of “nothing” to “something”; “novel” represents the degree to which the activity or its result differs from the existing.

This thesis hence argues that the common and distinctive characteristic of entrepreneurs is their ability to enact novel business activities. The definition of entrepreneurship relies on entrepreneurs’ capacity to move the lines; to think differently. While entrepreneurs and managers might possess the same knowledge of a definite problem, an individual’s ability to modify the boundaries of the problem set or use a decision rule unexpected by non-entrepreneurs is eventually deemed entrepreneurial. The difference between entrepreneurs and non-entrepreneurs thus lies in the incapacity for the latter to extend the boundaries of their informational silo or adapt their decision rules before the former does so. In a simplified example, we could say that two individuals with no entrepreneurship and the exact same knowledge and experience would perceive very similar problem sets in a given economic situation at a given point in time. Their knowledge and experience allow them to locate the solution of a problem in a specific region of the problem set and eventually decide. They might make different choices due to their subjectivity, but they should perceive similar options for that choice. If one of them were to instantly acquire a small degree of entrepreneurship, he could interpret the boundaries of the problem set in a different way, combine information in a creative manner, and possibly choose an option located outside the first individual’s problem set.

According to the literature, however, the entrepreneurial function is not “creativity only”. Painters, writers, and artists in general are not necessarily entrepreneurs, while they surely are creative. In fact, entrepreneurship entails decisions issued from a creative understanding of the problem set and the decisions rule which prepare the conditions for exploiting the imagined opportunities. Entrepreneurship therefore entails a creative and active component as presented below.

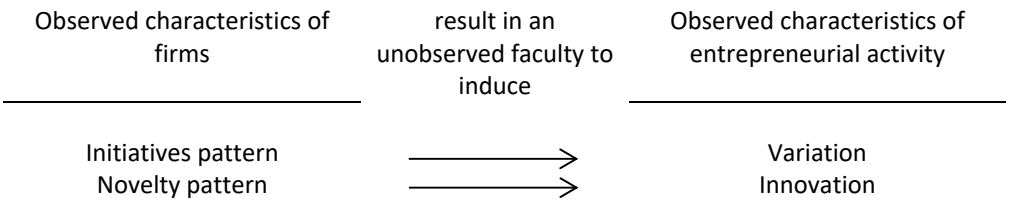
3.2. The entrepreneurial function in the process theory of organisations

With respect to the process theory of organisation, the entrepreneurial function entails all decisions that lead to a creative definition of the five elements of the process at each organisational level. This concept is in line with Foss N. and Klein’s (2012, p.103) view —drawn on modern entrepreneurship research and its behavioural foundations —that “while there is indeed a significant element of ‘intuition’ and ‘creativity’ to judgment (and entrepreneurial appraisal), judgment can still meaningfully be thought of in terms of certain skilled behaviors, developed through experiential learning, and the confidence that one is capable of dealing with uncertain situations”.

The corresponding decisions are consciously taken over the firm’s life cycle. Each firm is regarded as a decision unit that aims at delivering a product or service to the end users. They combine resources in

an attempt to reach their goal. Their decisions are framed by their capacity to evaluate their economic environment and react to external shocks. As shown in Figure 12, entrepreneurship is expressed in firms' behaviours (or behavioural patterns), which either implies a variation in the economy (a change without innovative content) or the implementation of an activity that is novel to the economic environment (a change that expresses novelty). A broad caricature of both elements could depict variations as the opening of a new hairdresser's shop in the neighbourhood (replication) and innovation as the apparition of smart phones in our daily lives (innovation).

Figure 12: Observed and unobserved characteristics of the entrepreneurial activity



Source: Author's own representation

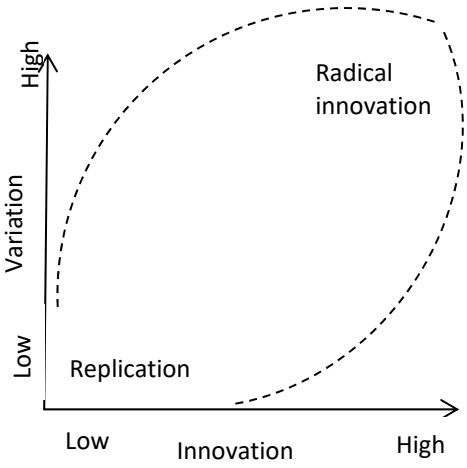
A firm's entrepreneurial profile reflects its entrepreneurial status at a given time. As presented in the below empirical study, surveying real firms in order to collect information about their entrepreneurial profile de facto renders the records historical data. The study of these statuses is, however, expected to unveil an entrepreneurial ideal type. Knowing one firm's tendency to be entrepreneurial or not should help observers gain information on its potential activity in the future and improve the probability of forming correct expectations. As shown in Figure 12, the firm's observed patterns of initiative and novelty result in a faculty to induce variation and innovation, which are unobserved characteristics of the entrepreneurial activity of a firm.

The Austrian literature describes entrepreneurs as active and creative men. Because the role of action is central to all above theoretical developments, the current definition of the entrepreneurial function chooses to label "initiative" the active component of entrepreneurship. It is defined as entrepreneurs' capacity to understand their environment, uncover potentials, and propose solutions; be a precursor; and be able to implement and operate the implicit changes. The noun "initiative" is understood in a wide sense that covers all of the above notions combined in "the early assessment and effective implementation of business ideas" rather than the usual sense focusing on triggering a change without considering its final effect. The term "novelty" is derived from "novel", defined as interestingly new or unusual. This choice underlines a relative notion of novelty based on the observers' interpretation of the focal economic activity. It allows extending the strict view on innovation from a radical change perspective to a wider concept including assessment of information differential. The entrepreneurial activity, therefore, also includes the incremental introduction of new services, the use of new resources, or the implementation of new processes. Finally, being creative might result from a different understanding of one's environment or unusual combination of the existing. The "novelty"

trait of firms thus represents anything that is implemented in a different way than observed in the firm's specific environment.

Firms' capacity to enact novel ideas in the market allows them to generate (at least) temporary market power. They aim at inducing a variation of the economic environment or introducing innovation to secure the realisation of their goals. Firms, however, do not possess the same ability to take initiative or trigger novelty. Figure 13 shows a hypothetical representation of the two dimensions.

Figure 13: Representation of firms' variation and innovation patterns



Source: Author's own representation

The axes in Figure 13 represent the initiative and novelty impact on the economy (expressed in the environment as variation and innovation) on a scale going form low to high. The definition of innovation is borrowed from the OECD's Oslo Manual (2005). It is ''the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations'' (p.47).[64] Each firm in the economy could be represented in the surface in Figure 13, describing a theoretical ellipse around the diagonal between replication and radical innovation.

In conclusion, this thesis refers to entrepreneurial phenomena as "the emergence of new economic activity" (Wiklund, 2011). This definition is based on the simple idea that entrepreneurship is a phenomenon resulting from firms' decisions. Their decisions to act creatively and bring novelty to the market are deemed entrepreneurial when they induce changes in the economy. For example, the changes induced by the iPhone in people's lives make Apple an entrepreneurial firm and lead the public to recognise Steve Jobs as an entrepreneur. The causal link from a genius or poor idea to a genius or poor entrepreneur is chronological. It emerges from a sequence of unfolding events. The entrepreneurial phenomenon is the result of a sometimes very long process of bringing untested ideas to the market. Moreover, in market economies, this phenomenon can only be observed after

[64] Cited in Ciabuschi (2012).

commercialisation. The term “entrepreneur” is attached to the people responsible for having made this success possible and to the firm that have supported its production. The reality of entrepreneurship is a phenomenon deemed as such after changes have been observed in the market.

4. A definition of the organisational function

An organisational structure supports the exploitation of entrepreneurial opportunities. It aims at ensuring efficient transformation of inputs into outputs in order to reach the goal set by the entrepreneurial vision. The division of labour induced by collective economic activities implies a need to design mechanisms to avoid the negative consequences of imperfect information. These are coordination and motivation mechanisms which limit the impact of agents’ potential inability or unwillingness to act according to expectations. While the organisational design defines the general framework for operations, the driving activities focus on ensuring action execution within this framework. Changes in firm architecture are called second-order changes in traditional organisational theories. They represent a “change in the underlying structure itself” (Ethiraj, 2004, p.406).

The goal of the organisational function is to structure the process with respect to the entrepreneurial vision and drive it until completion. Entrepreneur might have creative ideas related to one or more elements of the process. Consequently, the role of the design activities is to make sure the organisation efficiently produces what results from the entrepreneurial vision. As presented below, the coordination and motivation mechanisms entail a hard and soft component. The hard component is formally described in contracts and rules and the soft component is not. It represents the driving activity in the firm.

4.1. Designing the process: defining and adapting its constitutive elements

The acceptation of imperfect information as theoretical premise for the study of organisations implies the rejection of classical rationality and the consequent impossibility of knowing the outcome of an event with perfect accuracy. Organisations are to be considered in their dual sense of activity (organising) and the result of this activity (interacting sub-processes). In the first sense, organising represents actions aiming at structuring an undertaking. It is a process of defining the framework in which the undertaking is taking place. The term “strategy” has to be understood as “structuring activity” in order to highlight the difference between the common sense given to “strategy” and “strategic decision-making”. A strategy is generally understood as a plan defined at the higher organisational level and imposed through instructions and contracts to other parts of the system. Despite the fact that each praxeological organisation follows its proper strategy by definition (it acts purposely to realise a goal), the structuring activity has a wider sense. It encompasses all decisions from organisational members which aim at coping with internal and external uncertainty. Indeed, as long as members interact with one another and possess some degree of decision autonomy, they have to cope with some degree of uncertainty and make decisions prior to realise a task. The structuring activity is thus defined as a response to uncertainty in process execution. It results from organisational

decision-making and is executed at every organisational level to the extent of members' degree of autonomy.

On strategic decision-making and organisational design

The complexity of organised systems raises the issue of people's capacity to analyse and understand them. "Simon's (1962) work on the architecture of complexity provides the foundation for viewing organisations, as well as other systems such as products or technologies, as complex adaptive systems" (Ethiraj, 2004, p.404). The two basic concepts underlying Simon's view on organisational architecture are hierarchy and near-decomposability. Hierarchy implies that upper-level structures impose constraints on lower-level structures. Near-decomposability stands for the fact that elements of the organisation tend to cluster into nearly isolated sub-systems. According to Ethiraj (2004), "two contrasting themes on organisational theory" about peoples' perception of their environment provides a starting point for Simon's theoretical analysis (p. 405). On one side, contingency arguments assume that higher-level actors understand their milieu and design adapted organisations. On the other side, "population ecologists" theorise on the difficulty for individuals to identify the adequate organisational form. "This perspective highlights the limits on the degree of strategic choices and the capacity of organisation to adapt to different niches" (p.405).

Ethiraj's argument presents the common confusion regarding individual functions in firms. Recalling the introduction in subsection 2.4 of this chapter, organisational theorists do not mention the role of entrepreneurs in their texts. They, however, recognise the need for members of the organisations to find the best fit between their structure and the environment. Without the above defined concept of entrepreneur in mind, Ethiraj (2004) writes about contingency theories that the organisational fit depends "crucially on the ability of managers to discover and achieve such a fit" (p.405). He even concedes in the conclusion that he has "[..] treated the design problem as one of discovering an unknown but generative structure" (p.432).

A clear (but implicit) link to the firm's novelty and action patterns with regard to changes in the environment and organisational adaptation exists. It is thus important to stress that the role attributed in this thesis to the organisational function is distinct from that of the entrepreneur to the extent that it focuses on structuring the firm with respect to the entrepreneurial visions. For example, in the case of a technological spin-off at a university, the entrepreneurial function helps defining the use of a technology to gain temporary market power and the organisational design activities defines the organisational structure expected to efficiently capture the related gains.

This distinction is partly discussed in the literature on strategic management and entrepreneurship. In "Strategic Management and Entrepreneurship: Friends or Foes?" Kraus (2009) points out that the two disciplines are overlapping but separated. They both focus on "the process of adapting to change and exploiting opportunities" and intercept with the notion of entrepreneurial strategies that aim at competing and surviving by value and wealth creation (p. 38). The essence of these fields, however,

differs because entrepreneurship focuses on discovering and exploiting opportunities and strategic management focuses on the transformation of these opportunities into sustainable competitive advantage. As a consequence, entrepreneurship contributes to wealth creation by exploiting an advantage, while strategic management contributes to wealth creation by forming an advantage in a given organisation.[65] In other words, in this view, entrepreneurs exploit advantages that exist in the environment while managers actively create advantages in their organisation. This perspective expresses an epistemological shortcoming commonly found in the Austrian texts when authors state that opportunities objectively exist "out there". An economic theory based on praxeological subjectivism, however, cannot assess that entrepreneurs are opportunity-takers and managers opportunity-makers because opportunities are formed in human beings' head.

According to the process theory of organisation, all opportunity imagining activities are part of the entrepreneurial functions. The organisational design activities consist of structuring the process in line with the entrepreneurial expectations and driving the process. Both functions can be held by one unique person that exercises his entrepreneurship to define creative process elements and then exercise organisational abilities by designing the plan and executing it. They can also be held by a group of persons who consciously aim at internalising the value creation potential of the process. Taken to the extreme, each individual active in a process can improve one or more of its fundamental elements in a creative way (and thus act entrepreneurially) and adapt the others in consequence (and thus influence the organisational design).

Labour division, hard coordination and motivation mechanisms, and their adaptation through time

The organisational structure entails the hard components of the firm's structure, also called architecture. Defining the labour division consists of decomposing the firm's activity in sub-activities carried on by sub-units. The hard component of the coordination mechanisms represents the formal distribution of authority, responsibilities, and residual decision rights described in contracts and rules. The hard motivation schemes are the inherent motivational elements such as the payment of a salary or the participation to the results also described in contract.

The internal organisation has to be structured in such a way that the potential for productivity is fully exploited while the need for additional resources allocated to the functioning of the internal mechanisms is reduced (Picot, 2012). The role of the organisational design is dual. It needs to define the above elements in order for the firm to be efficient and adapt them through time. Because of the interdependence between the firm's strategy and its infrastructure, both elements are constantly evolving with respect to the firms' ever-changing economic framework.

[65] Hitt (2011). For further considerations, see Moroz (2012, p. 783), on the link between entrepreneurship and strategic management, citing Hitt, Ireland, Camp, and Sexton (2001); Shane and Venkataraman (2001); and Zahra and Dess (2001).

Common organisational theories name such changes “first-order changes”. They are “incremental local adaptation within a given structure (changes in price policies, product launch or withdrawal, changes in investments in research and development or advertising) […]” (Ethiraj, 2004, p. 406). They imply an adaptation of firm’s strategy with respect to the evolution of its economic environment.

The distinction between organisational participants and members implies the existence of internally and externally induced changes. Internally induced changes exist within the boundaries of the firm with respect to the individual evolution of the process’ internal elements (such as changes in the labour force or alteration of the production means). The labour division and hard coordination and motivational mechanisms hence always have to allow an efficient output production in order for the firm to be able to survive or make profit. Constant organisational design is required to ensure the realised output matches the expected output.

Externally induced changes result in reaction to, or anticipation of, changes in the perceived environment. A reaction is necessary to ensure constant efficiency and effectiveness when changes in the environment lead to inadequate production with respect to the most urgently felt needs in the global economy. Anticipation is to be observed when the entrepreneurial vision implies an organisational adaptation. In both cases, the internal changes arise because the environment evolves. Process adaptation can nevertheless be put at risk by the possible use of inadequate information in decision-making. This makes room for inadequate organisational designs and possible deviation from expected outcomes. The role of the design activities is to structure the firm’s architecture in order to minimise the effect of incomplete information on the firm’s efficient process execution.

4.2. Running the process: implementing changes and driving the process

According to the Austrian perspective, interference with the course of action is needed to ensure task execution, even if it should be minimized. According to the new institutional economics, this is especially the case in non-pure market coordination system where instructions need to be passed over to other participants to ensure attainment of the goal. While this is clearly described in the literature, most economic theories imagine that individuals take the expected measures to act optimally when informed about them. A resulting chain of events is thus mechanically—and sometimes simultaneously—executed. This can also be read in the Austrian literature where opportunity discovery automatically triggers exploitation. The automatic response to any stimuli does, however, not hold in the current context. Talking about automation while acknowledging for the presence of human beings in the system implicitly considers that people are willing to—and capable of—taking the necessary steps to execute the automatic adaptation. They are, in fact, part of a greater machinery and have no individual autonomy. They receive an order, execute it without deviation from expectation, and wait for the next “order”. This is an acceptable proposition under the neoclassical premises where time is non-existent, systems simultaneously adjust, and no scope for error, doubts, or incapacities to execute a task exist. In such a theoretical framework than that proposed by Austrian scholars however, the attention given to human beings and the importance of time in the economic

process should make room for a form of organisational problem even in an imaginary state of evenly rotating economy.

Relaxing the assumption of the automatic link between stimuli and reaction means that people might not act accordingly to expectations even if they know what to do. They might not take the necessary steps for the system to adapt even if they have complete information about the state of affairs in the next period of time. They might fail to implement a plan for personal reasons such as a lack of will, motivation, attention, or even destructive motives. Leaving the imaginary construct of a perfectly known world makes it improbable that each and every individual makes the right choice at the right time to produce the expected system adaptation. In the context of firms, it implies a need to drive the organisation day after day. Because people's actions rely on an individual choice to act, the notion of automation is a fallacy under any circumstance. The organisational problem is thus completed by a need to drive the activities of non-automated participants involved in a production process.

Soft coordination and motivation mechanisms

The driving activities represent a supplementary force needed to ensure efficient process realisation through time because of the presence of errors, uncertainty, and subjective contents of meaning. Actions need to be controlled and monitored; actors need to be oriented and motivated. There exist structural motivational tools such as money incentives, but a constant energy is needed to remind people where the organisation goes and what is expected from them. The presence of limited and dispersed information, limited rationality, and opportunistic behaviours implies that organisations need to be driven. Mises (1949) states it in the following comment: "The leader directs people toward the goal they want to reach" (p.139). The result of a process can hence be influenced within the organisational framework through driving activities. It represents the energy deployed by individuals to ensure the process is performed. The soft component of the coordination and motivation mechanisms in firms can take the form of command and instruction in horizontal relationships and team spirit or internal competition in vertical interactions. While the entrepreneurial function aims at imagining opportunities for creating temporary market power, the organisational design serves to define the structure that allows taping this potential and the driving activities support process execution until completion.

Ensuring process execution through time

The driving activities in firms consist of developing a constant energy to ensure the process is executed and entails firms' support and driving activities. Their link to firm performance has raised interest among scholars in the near past but, according to Barbero's (2011) article on internal organisation of high-growth firms, "[a]lthough the literature on high-growth businesses has been growing in both quantity and quality, an integrative global model has not yet been developed" (p. 672). In order to study the impact of the driving activities on firm performance in the process theory of organisation, this section presents Barbero's resource orchestration approach and links it to knowledge

management (KM), a firm's internal organisation, access to external resources, and small firms' financing issues.

Barbero et al.'s (2011) work emanates from Penrose's (1959) analysis of managerial capacities. They ask if "different growth strategies require different functional capabilities of managers" (p. 672). Barbero et al. (2011) argue that "[o]f all the various kinds of productive services, managerial services are the only type which every firm, because of its very nature as an administrative organisation, must make use of" (p.673). They define four managerial functional capabilities: human resources (HR), organisation, marketing, and finance. Their analysis shows that organisational capacities do not discriminate firms with respect to their growth strategies. In other words, all firms need to get organised independent of the strategy they follow. Firms with strong HR and marketing capabilities, however, tend to follow strategies leading to higher growth. In addition, HR capacities are determinants for implementing successful innovation strategies. They infer from their results that different managerial capabilities have different impacts on firms' growth. Barbero et al.'s work therefore indicates that firms' decision to attribute a definite amount of time and effort to one managerial capability or another impacts their performance. According to Ishak et al. (2010), these decisions are directly linked to a firm's KM systems. Ishak and al. (2010) work on the role played by information in defining and implementing adequate strategies. They focus on KM and HR and "propose that firms that develop and apply strong KM culture would be able to achieve consistent high performance. In addition, when a firm is able to perform better than competitors, such a firm would be able to achieve sustainable advantage". They conclude that human capital practitioners have to apply standards to "finding and retaining the best talent in the market, along with capturing as much as possible employee's knowledge before they leave the firm" (Ishak et al., 2010, p. 12). Firms' learning process and capacity to retain information in independence from the presence of individuals in the structure is thus expected to be positively linked to performance. Both Barbero et al. and Ishack et al. point out that successful firms invest time to manage and monitor their evolution in order to adapt to the system.

Furthermore, Sirmon and al. (2011) propose a definition of the manager's role in an integrated framework combining the literature on resource management and asset orchestration. They describe resource orchestration across the scope of the firm (breadth), at various stages of firm maturity (life cycle), and across levels of the firm (depth) (p. 1390). They describe "how different strategies at the corporate and business levels require a unique set of capabilities to effectively implement them" (p. 1407). They find that managers need to "orchestrate the firm's assets and configure the capabilities to achieve a competitive advantage" (p. 1400), understand "the requirement for success in each state of the firm's life cycle" (p. 1404), and that "middle managers are critical to ensuring that structuring, bundling, and leveraging actions are congruent" (p.1406). In short, they suggest that the action of running the firm in its day-to-day activities and at each organisational level is essential in increasing firm performance.

Viljamaa (2011) adds to this view the need to access external expertise through purchasing activities. These are knowledge and competencies limited in the client firms. Viljamaa (2011) explains that the process of acquiring external expertise is contextual and socially embedded. Owner-manager's decisions are linked to the various networks, levels of education and expertise, past experience, perception of uncertainty, trust and their risk profile (p. 475). Such activities are, however, inherently linked to firms' capacity to purchase external expertise. Firms may not have enough liquidity to complement their internal set of capacities. Pellón (2012) points out that the solution to liquidity problems in small firms tends to be found in the debt market. However, such financial resources are accessed at a high cost, they demand a "fair amount of assets as collaterals, and require complex contracts" (Viljamaa, 2011, p. 475). Small firms thus tend to turn to government support initiatives, family, or friends to cover their needs. When not possible, an additional option is to address venture capitalists to finance expansion. As explained by Nurbani (2011), the challenges facing SMEs in finding external funds can be a lack of information on existing possibilities, strong bureaucratic processes, or a long waiting time before effectively cashing in the funds. Each of these shortcomings of the financial markets for small firms may lead to liquidity issues (p. 166). The internal organisation of the firms as well as their choice and possibility to access external expertise is thus expected to have a direct impact on firm performance. The way they manage and monitor these aspects of their daily activities help them to cope with their environment and survive over time.

This rapid overview on a firm's driving and support activities can be summarised as follows: the effective attainment of the firm's goal depends in its capacity to efficiently implement its strategy. This capacity turns out to be directly linked to managers' knowledge of adequate solutions regarding HR, administration, marketing, and finance. This knowledge constitutes a way to ensure the imagined entrepreneurial market potential can be effectively tapped. In Hadjimanolis's (2000) words, the features of managerial capabilities are "knowledge-based and largely intangible resources accumulated over time through gradual learning process […]" (p. 278). They are "unique to the firm and hard to copy" (p. 278). They thus constitute a direct source of competitive advantages.

5. A description of the managerial problem

Chapter 4 develops the process theory of organisations in which individual economies transform inputs into outputs using a given infrastructure and following a predetermined goal. This theoretical framework leads to defining organisations as collective economies in which interdependent individual economies realise chains of actions to reach individual goals. Their study in a praxeological context further implies a need to add uncertainty, passing time, and limited and dispersed information to the study of organisational participants and their interactions to be complete.

Chapter 5 presents a model of firm performance with uncertainty in process execution. It defines firms as a specific type of organisation which needs to create value to survive in the long run. This is realised by ensuring both outcome and plan conformity over time. Outcome conformity consists of ensuring the firm's output constantly corresponds to the customer wants over the long run. Plan conformity

refers to the firm's ability to design a plan which effectively leads to internalising the imagine profit opportunity and efficiently execute the production process. The firm's performance is defined as a function of effectiveness in reaching the organisational goals and efficiency in executing the process.

Chapter 6 discusses the leverages on firm performance and the effect of passing time on firm boundaries. It adds entrepreneurship to the new institutional discussions on the influence of the firm's strategy and architecture on the process of value creation. Adding this dimension to the organisational problem creates a clear interdependence between firm strategy and architecture. Both need to be designed and implemented in order to create (at least temporary) market power for the firm. The firm's strategy consists of transforming the entrepreneurial vision into a business plan and aims at benefiting from the positive consequences of imperfect information in the praxeological world (the existence of information differentials). Firms' architecture entails the organisational structures used to effectively internalise the profit opportunities. The concrete labour division represents the way individual activities are aggregated within the firm (tasks and production means). The implicit lack of autonomy of specialised sub-economies leads to a need to align individual outputs and goals to the collective objectives. The firm uses hard and soft coordination and motivation mechanisms to achieve this task. Hard mechanisms are part of the organisational structure and take the form of contracts and rules which formally determine the labour division and the repartition of decision-rights among sub-economies. Soft components take the form of command and institutional framework (such as team spirit and internal competition) and aim to influence individual actions in daily operations. Both types of coordination and motivation mechanisms aim to avoid the negative consequences of imperfect information, such as opportunistic behaviours.

Both organisational and entrepreneurial abilities are expressed at individual and collective levels in firms. The generic entrepreneurial ability consists of designing and executing individual activities in search for value creation potentials. The generic organisational ability consists of designing and executing individual activities in order to effectively create value. Their expression at each organisational level is dependent on residual decisional autonomy. A firm has, by definition, full decisional autonomy about designing and driving its strategy and architecture in order to reach its goal of value creation in the long run. This system of nested processes entails mixed hierarchical and market coordination mechanisms (contracts and command). Some decisional autonomy is delegated to sub-levels which apply residual judgment about potential ways to create value and effectively internalise it. The scope of residual decisional autonomy attributed to them results from the firm's chosen delegation mechanism. Such mechanisms are composed of vertical and horizontal coordination and motivation mechanisms consisting of instructions and incentives aiming to align individual outputs and goals to collective objective between and across organisational levels.

The expression of the firm's entrepreneurial and organisational abilities consists of ensuring outcome and plan conformity by structuring the organisation in a way consistent with the entrepreneurial vision. The firm's embeddedness in a broader context further implies a bilateral relationship between the firm and its environment. The firms consequently need to adapt its strategy and architecture over

time. The management of the induced structural changes consists of perpetually and simultaneously designing the firm's strategy and architecture while driving process execution to ensure value creation in the long run.

Chapter 7 introduces management in the model of firm performance and discusses decision-making with limited and dispersed information. It describes the waste in process execution as the result of the firm's managerial ability. A well-managed process consequently yields individual contribution and costs close to expectation. According to the process theory of organisation, the firm's management ability results from the expression of the combined entrepreneurial and organisational functions at the firm level. A function is defined as a decision class with specific informational boundaries and decision rules common to all decisions belonging to that function. It entails all decision made in firms by one person or a group of persons. This dispersed knowledge is accessible through determination of functions. The quality of its aggregation depends on the information exchange mechanisms in place in the firm and the delegation mechanisms. Both characterises the micro-foundations for the analysis of collective decision-making mechanisms in firms by allowing to defining clear units of analysis for economic analysis with respect to coherent groups of decisions.

Remembering that praxeological definitions cannot refer to the content of purposive action in theorising, this chapter defines both entrepreneurial and organisational function with respect to the generic elements of the process. The entrepreneurial function entails all decisions which lead to a creative definition of the five elements of the process at each organisational level. Its expression can be observed when changes are induced in the system. These changes can be either a variation (additional economic activity) or innovation (novel economic activity).

The organisational function consists of designing and driving the organisational structures in order to internalise the imagined profit opportunity. It aims at avoiding deviation from the production objectives by defining the "right" output; select accurate equipment and human resources; structure the necessary support activities such as administration, marketing, and distribution; and choose the optimal coordination and motivation tools to condition the execution of the process. The design activities entail both activities of defining and adapting the structure. Running the firm entails both activities of implementing changes and driving operations.

The study of the organisational problem from a praxeological point of view hence reveals more complex elements than its study from a new institutional point of view. Firms are explicitly described as parts of a global economic chain that starts with natural resources extraction and ends with good consumption. Organisations need to be conducted by individuals to ensure that each element of the system participates to the overall vision. This activity happens in each individual economy with some degree of autonomy in decision-making. The organisational problem becomes a managerial problem consisting of simultaneously defining and driving organisations with the aim to create value and effectively internalise the imagined profit. Solving the managerial problem consists of finding ways to benefit from information differentials while avoiding deviation from the plan. This problem is

considered a decisional problem with ultimate responsibility attributed to the highest decisional level with full decisional autonomy about this collective economy. It happens in a dynamic praxeological economy which perpetually evolves as a result of decisions being made in organisations. The changes induced by the environmental evolution need to be managed over time to ensure outcome and plan conformity at each organisational level. The embeddedness of economic actors in a broader system thus influences performance at each organisational level.

In conclusion, based on the simple idea that the economic process consists of transforming inputs into outputs with respect to a goal and an infrastructure, the process theory of organisations describes the solution to the managerial problem as the management of structural changes in business organisation. The organisational aspect of the managerial problem entails characteristics very similar to its description from a new institutional point of view. Its entrepreneurial aspect also closely relates to the existing literature on entrepreneurship. This thesis' contribution to the literature hence consists of offering an analytical framework which allows combining both entrepreneurial and organisational functions at each organisational level of a firm into one coherent subset of decisions which aims to constantly design and drive the economic process in order to create value in the long run.

Part III: Empirical analysis

Chapter 8 : Building a model to assess firm performance

Chapter 5 and Chapter 7 present an economic model of firm performance derived from the process theory of organisation. The below sections present an empirical application of this model with $N = 17$ sectors and $n = 10'077$ firms. Prior to developing the econometric model, section 1 discusses the use of mathematics and econometrics in Austrian studies and explains why this study can be considered praxeological even if technical. Section 2 presents the dataset and general descriptive statistics. Section 3 develops the econometric approach and section 4 proposes the final econometric model of firm performance.

1. On the use of econometrics in Austrian studies

The econometric analysis presented in the next sections measures firm efficiency in executing the transformation process as a latent construct. Using a multilevel structural equation model (MLSEM), it combines latent regression models with structural equation models (SEM) to consider the nested structure of the economy and treat efficiency as an unobserved construct at both firm and sector levels. MLSEM models are required for valid statistical inference when the units of observation form a hierarchy of nested clusters and some variables of interest are measured by a set of items or fallible instruments (Rabe-Hesketh et al., 2012). The use of statistical tools in Austrian studies is, however, mainly banned. Huerta de Soto writes that "Austrians reject the use of mathematics in economics" (p. 43). He explains that formal mathematical models cannot account for entrepreneurial creativity or subjectivity in general. For Austrians, he writes, "only the verbal languages that human beings creatively evolve in the course of their daily entrepreneurial tasks provides a suitable vehicle for scientifically analysing the real-world facts that pertain to spontaneous market orders, which are never in equilibrium" (p. 43). To my eyes, such a critique refers to the classical use of mathematics and econometrics in model formulation. The orthodox model derivation is strictly codified and indeed allows no room for subjectivity. Limiting mathematics—and thus econometrics—to its classical use in economics is, however, reductive. This formal language is used in a bright array of social sciences. The mathematical and statistical analyses used in these sciences are very rich and it is highly probable that many formal statistical tools that fit the Austrian premises exist.

Having that in mind, a mere rejection of mathematics in Austrian analysis is a strong simplification of what the fathers of the school have reported. For example, Mises makes economic calculation the keystone of market phenomena. He criticises the classical use of statistics and mathematics but still points out that "acting man" must use calculation in the appraisal of his environment. The sense given to formal mathematic models nevertheless has to be carefully studied prior to accepting their validity. This task can be very difficult at first sight as shown in the following example. Mises makes a distinction between class and case probabilities which is difficult to grasp. "Class probabilities means: We know or assume to know, with regard to the problem concerned, everything about the behavior of a whole

class of events or phenomena; but about the actual singular events or phenomena we know nothing but that they are elements of this class" (Mises, 1949, p. 107). "Case probabilities means: We know, with regard to a particular event, some of the factors which determine its outcome; but there are other determining factors about which we know nothing" (Mises, 1949, p. 110).

The difference between both approaches resides in the underlying assumptions. In the first case, we expect to know the event's underlying statistical distribution. In the second case, we expect to have information about the conditional outcome of an event. Going back to the pool table example, the approach by class probability expects an expert to be better than a novice. Mises critiques this approach by explaining that such an assertion tells nothing about the distance to the target point of one specific shot. To the opposite, the approach by case probability bases predictions about a future event on characteristics of human actions. In the pool table example, an observer can induce from the a priori knowledge that a player is an expert that his shot has a strong probability to end up close to the target point.

Case probability is thus to be understood as the possibility for human beings to rightly appraise future events based on a priori knowledge. It is the understanding of a particular situation that helps people to succeed in their actions. In Mises (1949) words, "[…] understanding is the only appropriate method of dealing with uncertainty of future conditions" (p. 118). The tool used by human beings to grasp the future is the formulation of ideal types. The knowledge that an event belongs to such a category allows increasing the quality of decision-making without making any assumption about its underlying distribution. Finally, to get the terminology right, we can say that an individual who makes a prognosis about the pool table example would merely bet or gamble if he only looks at the general distribution underlying such a repeated game. He would speculate if he takes existing information about the characteristics of the game into account in order to increase the chances of success of his prediction. The praxeologist speculator has thus to be seen as an individual who bases his choices on his understanding of given situations.

Furthermore, human action is intrinsically based on calculation. "One calculates with a reasonable degree of precision the outcome of planned actions, and one calculates in order to arrange an action in such a way that a definite result emerges" (Mises, 1949, p. 207). This does not mean that economic calculation in solely base on cardinal numbers related by unique causality links. Ordinal appraisal is made possible by individual valuation of needs. Individual choice is simply the expression of preferences at a given point in time. One can choose an option and let aside others without referring to a unique scale of value (utility or elasticities) that links all options together.[66] The important consequence in the present context is that "[e]conomics is essentially a theory of that scope of action in which calculation is applied or can be applied if certain conditions are realised" (Mises, 1949, p. 200). Economic actors ought to gain information about their environment in order to increase their chance of success in their quest for removing felt uneasiness.

[66] See Mises (1949, p. 201ss) on valuation without calculation for more details.

The present study incorporates this praxeological view in measuring the conditional probability of a firm to be effective. The model only states that firms are formal vehicles used by human beings to interact in the market. It makes no assumption about the underlying production functions. It does not assert any causality link between the process elements and the classical human goals of making profit. It only assumes that efficient firms have a greater probability to reach their goal given a set of control variables (input, infrastructure, and conduct). It uses case probabilities to test if firms' efficiency effectively increases their probability to reach their goal. Following the same principle, the measurement of firms' entrepreneurial and organisational functions in Chapter 9 and Chapter 10 uses historic data to deduce firm functional patterns. These measures are used to control for their effect on firm and sectorial efficiency in a later step.

The object of interest of this empirical analysis is thus the theoretical assumption that firms expressing strong entrepreneurial and organisational functions do better in the market than their peers after having accounted for other measurable aspects of the economic process. The calculated latent constructs presented below entail a disturbance that accounts for the pieces of information that market participants do not have at hand while making choices. Consequently, the content of individual economic calculation is not addressed in the model. The rules used by people and firms to choose and act are discussed in the theoretical part of this thesis but are not measured in the empirical part.

By using the chosen class of econometric models (MLSEM), I believe that I use a statistical method in line with the praxeological premises. The introduction of random parameters at each level of the analysis is expected to account for humans' subjective appraisal of their environment and frees the econometric model from any assumption about the content of choices. In addition, this approach is in line with Wright's (2012) suggestion that research should focus on a multilevel approach accounting for individual, firm and contextual factors (p. 12).

2. The dataset

The database has been put together by the French national office for statistics (Insee). According to them, it is the only database that follows newly created firms over time. The current analysis is based on a cohort of firms created in 2006 and interviewed in 2006 and 2009 (sine2006, sine2009).[67] Their descriptive characteristics are fully presented in Insee's publications following both surveys and are briefly summarised below.

2.1. Descriptive statistics

The number of firms created in France has been stable in the 1990s and reaches about 200,000 per year. A policy change in 2002 increased this number to 286,000 in 2006. This is particularly due to the

[67] http://www.insee.fr/fr/themes/document.asp?ref_id=sine2006 and http://www.insee.fr/fr/themes/document.asp?ref_id=sine2009

"August 2003 law for economic initiatives"[68] which simplified the administrative work related to creation, favoured the financing of young firms, and eased the transition to the legal status of entrepreneur. In 2006, about 80% of the newly created firms started with one position for the creator and hired more people in the first few months. The cohort average initiated with 1.6 employees and increased to 1.7 at the time of the first survey. They generated a total of 477,000 jobs in 2006, from which two-thirds were salaried. 5% of firm creators consider being active in innovative sectors and 30% of them see technology (such as electronics, chemistry, informatics, etc.) as a fundamental component of their products and services or important support to their activity. 80% of all firms were created in three sectors: trade (25%), construction (23.1%), and B2B or B2C services (20.8% and 11.7%). The remaining 20% is in education, health and social action (6.3%), the manufacturing industry (without the food industry) (4.9%), real estate (4.5%), transportation (2.3%) and the food industry (1.2%). Almost 50% of all firms have been developed with the help of specialists such as lawyers, accountants, or fiscal advisors. 36% of the total firms have been created with less than 4,000 euro. This figure can go up to 160,000 euro or more. The investment at the time of creation is the lowest in sectors such as education, health, and social action and the highest in the food industry. One-fourth of all investments have been financed by the banking sector. 75% of firms benefited from public help such as social contribution exonerations or grants. 40% of the creators were unemployed prior to launching their firm. The others were employees, independent workers, or business managers, and the majority did not benefit from specific governmental programs. 29% of total firm creators are women (this percentage amounts to 47% in the population in 2006). On average, firm creators are 38.5 years old and 84% of them are under 50. This group mainly focuses on sectors such as commerce, construction, and B2B services. 37% of the creators have a diploma of higher education. More than 60% of them are motivated by a desire of independence and taste for undertaking. One-third has followed a formation related to firm creation.

Three years later, in 2009, two-thirds of the firms are surviving. This rate is stable in comparison to the past decade despite the economic slowdown of 2008 and the recession of 2009. The survival rate is positively correlated to the invested capital and the creator's age and education level. The highest survival rate is observed in the sectors of transportation, B2B and B2C services, the ICT, and majorly located in the Paris region (Île de France). The trade sector, which recorded the highest number of creations, has the lowest survival rate (59%). Young creators with education levels lower than the average mainly chose this sector, or that of construction, and eventually had lower chances of success. The same has been observed for former unemployed creators. Government programs therefore targeted creators with low survival probability at creation. The supported firms seem to do almost as good as those that did not benefit from governmental initiatives. The decrease in employment due to failure was almost compensated by job creation in surviving firms. The total employment level in 2009 reached 98% of that of 2006. The number of salaried employees has doubled (2/3 against 1/3). 38% of firm creators declare having had problems over that period, 31% of them affirm having had

[68] Author's translation of « *loi pour l'initiative économique* ».

difficulties to find opportunities and 18% to finance operations. Overall, 80% of creators of successful firms are satisfied by their projects, 36% want to further develop the firms, and 16% admit being in a difficult situation to be overcome in the future.

2.2. The sample

The global database entails 48,251 entries and 150 indicators. The below empirical study uses a constrained sub-sample to reduce computational requirements. A coherent subset of firms is chosen as follows. 16,617 firms are dropped because they stopped operation before 2009 and do not provide the necessary information to pursue the analysis. Firms which are not pure creations (5,519 in total), have pure handicraft activities (16,778 in total), or are located in the non-continental French regions of Guadeloupe, Martinique, Guyana, and La Réunion (4,225 firms in total) are also omitted. Another 5,670 firms are finally dropped due to missing values of some important financial indicators such as income or investments. The missing values are mostly due to firm creators checking “Not concerned” for some questions rather than choosing an option from the proposed answers. The final sample entails 10,077 firms. The descriptive statistics are presented in Appendix D.

3. A step-by-step model building

As described in the previous chapters, the Mengerian definition of an economy changes the usual understanding of a means-end relation by adding a reference to a goal. The outcome of a process becomes effectiveness and not the level of output alone. Section 3.1 presents the observed effectiveness indicators to be used as dependent variables in the model of firm performance and discusses the presence of unobserved efficiency at firm level in the sample. Section 3.2 measures this unobserved efficiency in an item response framework and analyses the model specification needed in the full model in section 4.

3.1. Effectiveness and efficiency

The economic model described in Chapter 5 presents effectiveness as the degree of achievement of the firm’s objectives. Unfortunately, the database at hand provides information on goals achievement and not on objectives achievement. The below calculations consequently use goal attainment as a proxy for objective attainment and implicitly assume that a firm which has reached its goal has been able to reach its objectives. To avoid any arbitrary choice of goal, the econometric model allows for multiple dependent variables and, thus, allows studying the firms’ behaviour in following various goals.

Indicators for observed effectiveness

The explained variables in the model are binary measures of effectiveness in reaching goals set in 2006. They represent four items which take the value of one if goals are reached in 2009 and 0

otherwise. They are computed by comparison of the four expressed goals and their effective realisation three years later. The binary indicators for expected outcomes (G_i) take the value of one if firm creators explicitly aimed at increasing income, employment, investment, or the firm's customer base.[69] Four variables measuring the effective outcomes (Y_i) in 2009 take the value of 1 if the income increased, the rate of job creation and the investment are higher than the median, and firms experienced an increase in their number of customers. The multiplication of the indicators for expected and effective outcomes for each goal results in four effectiveness items which take the value of one when goals are expressed and reached and 0 otherwise. They are presented in Table 4.

Table 4 : Descriptive statistics on firms expressed and realised goals

	G_i = Goal realised?	No		Yes		Total
G_i = Expressed as a goal?	G_1 Income increase					
	No	4'381	(55%)	3'510	(45%)	7'891
	Yes	465	(21%)	1'721	(79%)	2'181
	Total	4'846		5'231		10'077
	G_2 Employment increase					
	No	5'852	(76%)	1'856	(24%)	7'708
	Yes	1'097	(46%)	1'272	(54%)	2'369
	Total	6'949		3'128		10'077
	G_3 Investment increase					
	No	5'678	(68%)	2'742	(32%)	8'420
	Yes	931	(56%)	726	(44%)	1'657
	Total	6'609		3'468		10'077
	G_4 Customer base increase					
	No	5'188	(79%)	1'373	(21%)	6'561
	Yes	2'467	(70%)	1'049	(30%)	3'516
	Total	7'655		2'422		10'077

Source: Authors' own calculation based on sine 2006 and sine 2009

This table shows that the percentages of firms which successfully increased income, employment, investment, and their customer base are respectively 79%, 54%, 44%, and 30%. The first interesting element that can be read form these figures is that the number of firms explicitly aiming at one of the four goals is systematically lower than the number of firms that do not (total column). However, those which consciously choose to follow a goal systematically reach it at a higher rate than those which do not. Even if effectiveness in one goal or another can happen without explicitly aiming for it, the rate of success—also called effectiveness or plan conformity—is higher for firms which consciously set a goal and intentionally aim at reaching it.

Unobserved efficiency

The relationship between effectiveness and goal setting can be explained by a direct or indirect link. According to the Austrian literature, a direct link can be interpreted as increased efficiency in executing

[69] See Appendix D for descriptive statistics.

the business process due to the conscious pursuit of a goal. In other words, if a goal is relevant for firms' operations, the firm devolves more energy to reach it. Nevertheless, it is possible that goals are correlated and, consequently, the effectiveness indicators too. It is legitimate to wonder if an increase in any dimension could automatically imply an increase in another one. The comparison of goal formulation and change in these dimensions over time is nevertheless rather independent as shown in Table 5. The effectiveness indicators are significantly correlated but their magnitude is low. Reaching one of these goals thus only slightly increases the probability of reaching the others. Firms' efficiency in process execution seems to be a better explanation for this effect and will be further discussed below.

Table 5: Correlation between effectiveness indicators

	Income (E_1)	Employment (E_2)	Investment (E_3)	Customer base (E_4)
Income (E_1)	1.00			
Employment (E_2)	0.15*	1.00		
Investment (E_3)	0.08*	0.11*	1.00	
Customer base (E_4)	0.22*	0.9*	0.04*	1.00

Source: Authors' own calculation based on sine 2006 and sine 2009

A second interesting element shown in Table 4 above is that, on average, people have succeeded in reaching the first two goals and failed in their attempt to reach the last two. The theoretical explanation for such an effect is the dual impact of unforeseen events on goals definition and realisation. Uncertainty leads to ignorance about a part of the environment, and possibly incorrect goal setting, and imperfect knowledge of the future outcome of a process. Firms might be mistakenly pursuing, or not pursuing, a goal and executing, or not executing, an action. Both elements are directly linked to the role of information in the business process. Good information about the firm and its environment helps increase effectiveness. As discussed in Chapter 6, adequate specialisation, division of labour, coordination mechanisms, and motivation schemes have a direct impact on the efficiency of process execution. We can thus read in the above figures that this impact is heterogeneous among goals. Subjectivity in meanings, interpretation, and decision-making results in heterogeneous actions across time and situations. [70]

The interpretation of Table 4 links increased effectiveness to the conscious pursuit of goals and decreased effectiveness to the difficulty to plan and execute the business process (see next section for a mathematical expression of these effects). According to the process theory of organisation, both elements are related to firm efficiency. The difference in effectiveness across firms is further investigated in a simple econometric framework by considering its dependence on firm efficiency, itself measured as a latent variable explained by firms' properties and goal characteristics.

[70] The available indicators unfortunately do not inform about a change in goal setting during the studied year.

3.2. An IRT approach to firm efficiency

The item response theory (IRT) belongs to the general class of statistical tools called general linear or non-linear mixed models (GMM and NLMM).[71] Such econometric models are mostly used in psychological and psychometrics studies to measure student ability to give correct answers to a test. They are used to provide "a measurement of variables such as abilities, achievement levels, skills, cognitive processes, cognitive strategies, developmental stages, motivations, attitudes, personality traits, emotional states or inclinations" (Wilson, 2008, pp. 31–32). It is an econometric tool used to extract behavioural patterns from the data and entails a transformation using a link function prior to relating the dependent variables to predictors (see below for examples). The freedom of choice of link functions renders such models "generalised". The integration of a random effect for each observation (firms in our case) makes them "mixed".[72] The final model of firm performance (a multilevel structural equation model) presented later in section 4 is developed stepwise from the IRT approach, starting with its simplest form, a Rash model.

In the present case, the items represent goals and the responses are the effectiveness indicators presented above. A measurement model determines the latent index for efficiency as the ability of firms to be effective in reaching their goals. It represents a characteristic of firms that is present in the structure of the data but unobservable as such. This latent variable is, however, more than an underlying covariation between effectiveness indicators. It represents the unobserved heterogeneity in firm effectiveness in reaching their goal after controlling for goal and firm characteristics. Indeed, firms' efficiency level determines their effectiveness only in connection to the subjective meaning they give to the process execution and their individual ability to execute the processes themselves. The measurement model is hence completed by an explanatory part, allowing the modelling of how goal and firm properties influence effectiveness through efficiency.

Table 6: Firm-goal matrix

G_i / Firms	1. Income	2. Employ-ment	3. Invest-ment	4. Customer base	Firm average
Firm 1	1	1	1	1	100%
Firm 2	1	1	1	0	75%
Firm 3	1	1	0	0	50%
Firm 4	1	0	0	0	25%
Firm 5	0	0	0	0	0%
…					…
Firm n	0	0	0	0	0%
Item average	79%	54%	44%	30%	

Source: Authors' own calculation based on sine 2006 and sine 2009

[71] Wilson (2008, p. 21) citing McCulloch and Searle (2001).

[72] Wilson (2008, p. 30) citing Breslow and Clayton (1993); Fahrmeir and Tutz (2001); McCulloch and Searle (2001).

The above Table 6 presents the relation between the responses (E_i), item properties (G_i), and firm characteristics. It describes a hypothetical example of 5 firms reporting on four goal items. A "1" in a cell means success in reaching the goal, a "0" means failure. Firm 1 reports having reached all four goals; firm 2 declares having reached three of them; and so on.

The last column of the table shows the mean effectiveness in reaching goals for each firm. This simple measure is a weighted average of the four items with weights fixed to one. Each goal has the same importance in supporting the overall effectiveness of the firm. Reaching the income goal contributes to the same extent to global effectiveness as reaching the customer goal.

Unforeseen events, however, affect goals in different ways due to the subjective meaning of the process. This is independent of any firm characteristics; it is purely external to the firm but impacts internal process execution. If all components of goal attainment lie within the firm's zone of influence, firms have a higher control of realisation than in a case where they are out of reach of firm's actions. In addition, firms might place more importance in reaching one goal over another. They do not need to follow the four goals in parallel and might select among them with respect to their strategy. The selection of goals thus results from firms' perception of their capacity to reach them and their importance with respect to the firms' overall target. Consequently, we might want to differentiate the goals with respect to their *relevance* for the firm and weight the items regarding their contribution to firm's effectiveness. The "relevance" parameter is called the "difficulty" parameter in traditional IRT analysis. Because students cannot choose among questions in a test, it makes sense to infer that questions with low response rates are rather difficult to answer. However, because firms can choose which goal to pursue, the difficulty parameter is regarded in this study as goal relevance.

The above table also shows the average number of firms having reached each goal in the item average (real average measure in the dataset). Once again, this simple measure does not take into consideration eventual firm differences in their ability to reach their goals. It could, however, reasonably be assumed that a wealthy firm is better able to reach its goal of investment simply by using existing liquidities. Similarly, a firm with a healthy network has a greater chance of increasing its customer base than one that stays out of the radar. Consequently, we might want to add a *discrimination* parameter that accounts for how well a goal discriminates among different efficiency levels. This parameter is also called a loading factor. It expresses the fact that firms with a high ability trait might be better off in reaching their goals compared with the low ability firms.

The ideal case reported in the firm goal matrix makes two assumptions. First, item 1 is easier to reach than item 4, and second, firm 1 has a higher ability to be effective than firm 4. This ability represents the firms' level of efficiency which can be influenced by many elements in a direct and indirect way, especially when time and subjectivity are acknowledged. Efficiency indexes such as DEA analysis and the Malmquist index propose solutions to measure efficiency levels and even take time into consideration in sequential input/output measurement. Comparing firm efficiency in a given period or

determining whether or not efficiency changes occur is possible.[73] Some extensions to DEA approaches even introduce constraints on different units of analysis but the distinction between input and infrastructure is rarely formally described, goals are not taken into consideration, the hierarchical structure of the data can only be assessed through decomposition, and the determinants of efficiency and its changes over time are hardly defined.

The following models take an MLSEM approach in order to introduce a fixed effect for goal relevance, a random effect for goal discrimination, covariates at the firm levels (accounting for input and infrastructure), and a fixed sectorial effect. It aims at providing a more detailed analysis of firms' performance in general and its relation to managerial capacities in particular.

Basic formulation of the model

Assuming binary goals and outputs, the effectiveness of a firm *f* in sector *s* can be expressed in form of "goal *i* reached" or "goal *i* not reached":

Eq. 48: $$E_{ifs} = \begin{cases} 1, \ if\ G_{ifs} = Y_{ifs}, & goal\ i\ has\ been\ reached, \\ 0, \ if\ G_{ifs} \neq Y_{ifs}, & goal\ i\ has\ not\ been\ reached. \end{cases}$$

Reaching the goal, or being effective, means to attain a goal given a set of constraints. In the short run, the infrastructure is fixed and conditions the possible input and output levels in the process. Firms first define their goals, outputs, and production means and then execute the process given exogenous rules. After a repeated sequence of time, firms adapt to take advantage of the newly generated information. The infrastructure can thus evolve in the long run to ensure the objective is reached. The notion of time constrains the degree to which a goal is reached by imposing a lag between the moment the need to adapt is recognised and that when the real adaptation takes place. Effectiveness is thus the conditional outcome of the process given the input and infrastructure at disposal named $\mathrm{Z_j}$, where $\mathrm{Z_j}$ entails $\mathrm{X_{fs}}$, $\mathrm{K_{fs}}$, $\mathrm{L_{fs}}$, and $\mathrm{R_{lfs}}$ for *l* = 2 rule indicators (see below for more on this point). Firms are, however, not executing deterministic processes with a known output for a given input. The probability to be effective given $\mathrm{Z_j}$ can be increased through efficient execution of the process. A vector of random variables θ is added to the model to capture efficiency in Eq. 49 and the equation for effectiveness at the firm level can be written as follows:

Eq. 49: $$g\left(E\left[E_{ifs}\middle|Z_j, \theta\right]\right) = \eta_{ifs},$$

where the left-hand side of the equation represents the conditional expectation of effectiveness in reaching the goals *i* in firm *f* in sector *s*. The general formulation of a multi-level logit model including the link function takes the following form:

Eq. 50: $$E\left(E_{ifs} = 1\middle|Z_j, \theta\right) = \pi_{ifs};$$

Eq. 51: $$Log\left[\frac{\pi_{ifs}}{1-\pi_{ifs}}\right] = \eta_{if}s,;$$

[73] See the Malmquist index in Charnes (1994) for example.

Eq. 52: $\eta_{ifs} = D\beta_i + \theta I\lambda_i + \vartheta_{ij}Z_j,$

where Eq. 50 represents the probability π_{ifs} of a firm to be effective. It is linked to a linear component η_{ifs} via a logit link function $g(.)$ with a binomial or Bernouilli distribution in Eq. 51. This transformation allows the log of the odds of the probability to reach the goal (η_{ifs}) to take any value and to represent the equations' linear component also called the measurement model (Eq. 52).[74] It translates Eq. 47 presented in Chapter 7 into an IRT approach.

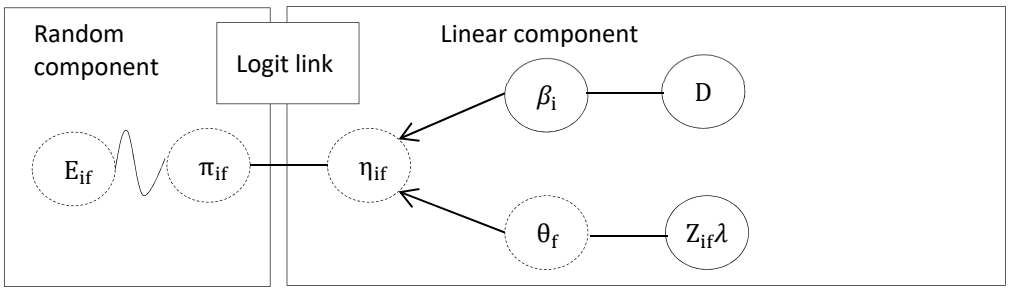
Eq. 50 to Eq. 52 represent the general form of the proposed firm equation for $i = 1, g$ goals, $f = 1, n$ firms, $s = 1, N$ sectors, and *M* latent variables. η_{ifs} is an *i*-dimensional vector with elements corresponding to the log odd of *i* effectiveness indicators (also called items) in firm *f* and sector *s*, D is a *i* x *k* matrix of dummy variable with *i* = *k* items taking the value of -1 if *i* = *k*, β_i is a vector of item intercepts called relevance parameters, λ_i is a vector of discrimination parameters also called loadings, I is an identity matrix, and θ is a vector of latent variables measuring efficiency at each level. β_i differentiates goals with respect to their relevance to the focal firms and λ_i discriminates firms with regard to their probability to reach each item according to their level of efficiency.

The construction of this model is presented in detail in the following subsections. It starts with a one-level one-parameter logistic model and increases the complexity of the model step-by-step to define the adequate specification for the full model in section 4.

A one-parameter logistic model

The "most well-known IRT model for dichotomous responses" is the Rasch model.[75] It is treated here as a one parameter logistic model (1PL) that measures the probability of correct or positive response as a function of firm efficiency and item relevance (see Figure 14).

Figure 14: Representation of a Rasch model



Source: Wilson (2006, p.31)

The random component (denoted with a wavy line in Figure 14) designates the distribution function of E_{if} as presented in Eq. 50. It describes the probability π_{if} of firm *f* to be effective in reaching goal *i*

[74] See Srholec (2010, p. 9) and Rabe-Hesketh S. S. (2007, p. 10).

[75] See Zheng (2007, p. 314). However, Rasch models are often treated as IRT models and some dissention exists on this question. More on this topic comes below.

($\mathrm{Prob}(\mathrm{E_{if}} = 1)$ and has an independent Bernouilli distribution for each firm-item pair with η_{if} as the mean of the distribution. The link function (denoted with a straight line between π_{if} and η_{if}) connects the expected value of the observed variable $\mathrm{E_{if}}$ to the expected value of the linear component η_{if} as presented in Eq. 51. If the log odd of effectiveness η_{if} increases, the probability of a firm to be effective increases as well. A measure for the goal relevance (β_i or item parameters) connects the set of linear predictors D to firm effectiveness. This is a diagonal matrix with *i* = *k* = 4 goals which takes the value of -1 if *i* =*k* and 0 otherwise. It generally takes a negative value to account for item difficulty. Its interpretation thus has to be reversed to account for relevance in this analysis and a high β_i represents low goal relevance. A random coefficient for firm efficiency (θ_f or firm parameter) connects a constant predictor $\mathrm{Z_{if}}$ to firm effectiveness. It has a subscript for the firm because the model does not entail a sectoral component yet. This parameter is assumed to have a bivariate normal distribution such as $\theta_f \sim \mathrm{N}(0, \psi)$.[76] Furthermore, this predictor changes if the model accounts for one or two parameters as described below. The one-parameter model is a doubly descriptive approach that discriminates both firms and goals by applying fixed weights to goals (not varying across firms) and random weights to firms (not varying across goals). The dotted circles in Figure 14 represent random effects and the plain circles are fixed effects.

The general form of the equation for the linear component for a firm *f* is the following:

Eq. 53 : $\eta_{if} = D\beta_i + \theta_f Z_{if}\lambda,$

where $\mathrm{Z_{if}}$ is a vector of 1s and λ = 1 for a 1PL specification. It can be written in matrix format for each firm as follows:

$$\underbrace{\begin{bmatrix}\eta_1\\ \eta_2\\ \eta_3\\ \eta_4\end{bmatrix}}_{\eta_{if}} = \underbrace{\begin{bmatrix}-1 & 0 & 0 & 0\\ 0 & -1 & 0 & 0\\ 0 & 0 & -1 & 0\\ 0 & 0 & 0 & -1\end{bmatrix}}_{D}\underbrace{\begin{bmatrix}\beta_1\\ \beta_2\\ \beta_3\\ \beta_4\end{bmatrix}}_{\beta_i} + \theta_f \underbrace{\begin{bmatrix}1\\ 1\\ 1\\ 1\end{bmatrix}}_{Z_{if}} \underbrace{1}_{\lambda},$$

This equation corresponds to the conclusions derived from Table 4 which states that efficiency increases effectiveness and perceived non-relevance of a specific goal reduces it.[77]

A Rash model with four binary responses presents 2^4 = 64 possible effectiveness patterns (responses). The 10,077 firms from the database can be collapsed into 64 observations by adding a weight variable (wt2) recording the number of firms corresponding to each pattern. The subscript *f* in equations now represents the firm's response pattern and can vary from 64 in the simplest model to 10,073 in the final model specifications. The database is reshaped into a long format to create one unique response vector (e). This multiplies by 4 the number of observations and requires a complementary variable (*g*)

[76] See Rabe-Hesketh (2007) for the formulation of the covariance structure ψ of single-factor models such as the 1PL and 2PL.

[77] Note that the mean of the distribution from which θ_f is drawn has to be zero for the model to be identified (Wilson, 2008, p. 32).

to link each observation (line) to one of the four effectiveness measure as presented in Figure 15. The matrix D with *i = k = 4* dummy variables is to be added for each pattern.

Figure 15: Preparing the database for an IRT analysis

f patt.	Goal1	Goal2	Goal3	Goal4
1	1	1	0	1
2	1	0	1	
…				
64	0	0	0	1

➡

f patt.	e	g	d1	d2	d3	d4	wt2
1	1	1	-1	0	0	0	996
1	1	2	0	-1	0	0	996
1	0	3	0	0	-1	0	996
1	1	4	0	0	0	-1	996
2	1	1	-1	0	0	0	517
2	0	2	0	-1	0	0	517
…	…	…	…	…	…	…	
64	1	4	0	0	0	1	3

Source: Author's own representation

The estimation of all following models is realised with Stata 13 using gllamm[78], a class of programs to estimate generalized linear latent and mixed models. The results for the model calibration (model 1 to 5) are reported in Table 7 on next page. The 1PL (Model 1) acknowledges the presence of an underlying latent factor θ_f with a variance estimated at 1.138 and a standard error of 0.03. The corresponding random variable describing the variation in the items through individual item parameters is interpreted as firms' average efficiency after controlling for goal relevance. A value for this latent variable can be obtained by calculating the empirical Bayesian predictions (posterior mean) for each firm (see below). The β_i parameter indicates that realising investment targets is less relevant than increasing the customer base, employment, or the income.

The non-linear characteristic of logit models, however, implies that the probability of E depends on the value of the predictors (Buis, 2010, p. 305). The magnitude of the coefficient does not express the size of the effect on the dependent variable. The size of an effect can be measured by exponentiating the coefficients (the ratio by which the dependent variable changes for a unit change of the predictor—the multiplicative effect) or by calculating the marginal effect (the change in dependent variable for a unit change in the predictor—the additive effect).

[78] Rabe-Hesketh et al. (2011); Rabe-Hesketh et al. (2004).

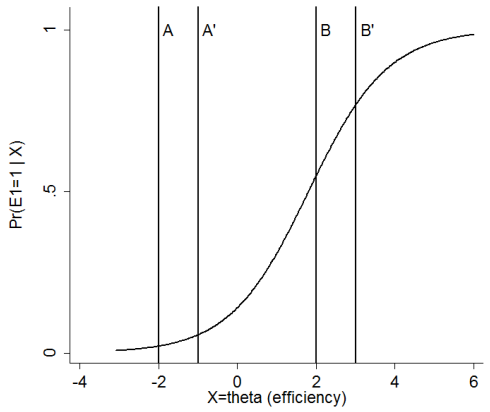
Table 7: Fitting the model of firm performance

	Model 1	Model 2	Model 3	Model 4	Model 5
β_1	1.948*** (0.036)	2.545*** (0.171)	3.298*** (0.357)	3.306*** (0.349)	4.088*** (0.867)
β_2	2.362*** (0.040)	2.192*** (0.048)	2.992*** (0.068)	3.030*** (0.069)	3.012*** (0.067)
β_3	3.063*** (0.049)	2.718*** (0.052)	3.693*** (0.079)	3.724*** (0.080)	3.745*** (0.081)
β_4	2.611*** (0.043)	2.685*** (0.076)	2.965*** (0.107)	2.990*** (0.109)	2.939*** (0.107)
Effect of Input on effectiveness (x)					
Income (ϑ_{11})			0.514*** (0.104)	0.430*** (0.099)	0.545*** (0.155)
Employment (ϑ_{12})			0.654*** (0.069)	0.608*** (0.070)	0.624*** (0.070)
Investment (ϑ_{13})			0.943*** (0.085)	0.916*** (0.086)	0.938*** (0.087)
Customer base (ϑ_{14})			0.055 (0.080)	0.011 (0.082)	0.029 (0.081)
Effect of capital on effectiveness (k)					
Income (ϑ_{21})			1.165*** (0.151)	1.151*** (0.147)	1.425*** (0.321)
Employment (ϑ_{22})			0.792*** (0.068)	0.810*** (0.069)	0.809*** (0.068)
Investment (ϑ_{23})			1.095*** (0.081)	1.116*** (0.081)	1.125*** (0.081)
Customer base (ϑ_{24})			0.858*** (0.081)	0.855*** (0.081)	0.845*** (0.079)
Effect of the labour force on effectiveness (l)					
Income (ϑ_{31})			0.374** (0.117)	0.279* (0.114)	0.330* (0.154)
Employment (ϑ_{32})			1.308*** (0.075)	1.234*** (0.076)	1.207*** (0.075)
Investment (ϑ_{33})			0.796*** (0.088)	0.735*** (0.090)	0.722*** (0.090)
Customer base (ϑ_{34})			0.160 (0.099)	0.117 (0.101)	0.099 (0.099)
Effect of franchise on effectiveness (r1)					
Income (ϑ_{41})				0.815*** (0.156)	1.009*** (0.271)
Employment (ϑ_{42})				0.253* (0.100)	0.260** (0.100)
Investment (ϑ_{43})				0.078 (0.120)	0.089 (0.121)
Customer base (ϑ_{44})				0.496*** (0.118)	0.494*** (0.117)
Effect of group belonging on effectiveness (r2)					
Income (ϑ_{51})				0.142 (0.184)	0.121 (0.227)
Employment (ϑ_{52})				0.613*** (0.121)	0.550*** (0.120)
Investment (ϑ_{53})				0.578*** (0.139)	0.520*** (0.140)
Customer base (ϑ_{54})				-0.058 (0.173)	-0.113 (0.171)
Random effect at firm level					
θ_f	1.138*** (0.033)	2.030*** (0.223)	2.167*** (0.374)	2.122*** (0.363)	2.888*** (0.825)
Loadings for random effect at firm level					
λ_2		0.425*** (0.067)	0.306*** (0.072)	0.312*** (0.073)	0.200** (0.071)
λ_3		0.307*** (0.054)	0.149*** (0.045)	0.151*** (0.045)	0.099* (0.041)
λ_4		0.609*** (0.096)	0.534*** (0.136)	0.545*** (0.138)	0.368** (0.142)
Random effect at sectorial level					
θ_s					0.265*** (0.075)
Statistics					
N	10077	10077	10077	10077	10077
Aic	28151.0	28082.5	26720.3	26648.9	26602.0
Bic	28194.1	28151.3	26892.4	26889.8	26851.5

Note: θ_f is a fixed effect in model1, p<0.05,**p<0.01,***p<0.001, standard errors in brackets.

Consider the logit model for E_1 depending on firm efficiency called X in Figure 16. We can observe the general relation between the dichotomous outcome E_1 and the level of X of the firms. The below graph shows the distribution of the probability of $E_1 = 1$ for a given level of X (centred on its mean, min = -3.2, max = 6.2).

Figure 16: Interpretation of the logit distribution



Source: Author's own representation

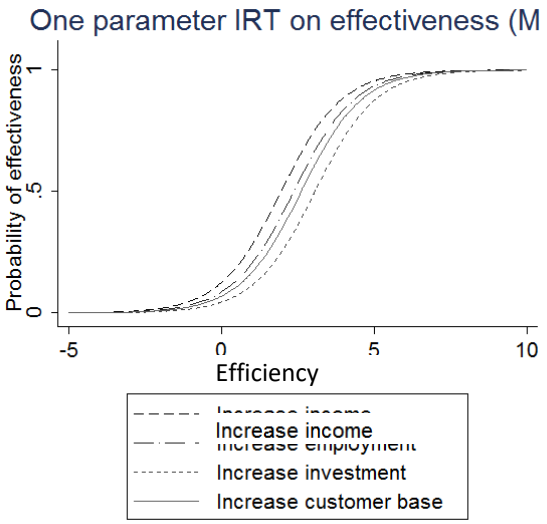
We see that both variables are positively related but the increase in probability varies with efficiency. An increase of X from A to A' shows an average increase of 5 percentage points in the probability of E_1 to be reached (0.05 to 0.10) and an increase of X of the same amount but from B to B' implies a change in probability of about 25 percentage points (0.50 to 0.75). In more complex models, the probability of each firm to be effective depends on the level of all predictors used in the model's specification as well as the initial probability of each firm when interpreting an increase in covariates.

The interpretation of Table 7 thus requires visual tools to be complete. Figure 17 presents in the right graph the relation between the four effectiveness indicators and the efficiency measure in the 1PL model. It is called the item characteristic curve (ICC) and plots the relevance parameter β_i with respect to the efficiency parameter θ_f. The probability of being effective is measured by the following equation:

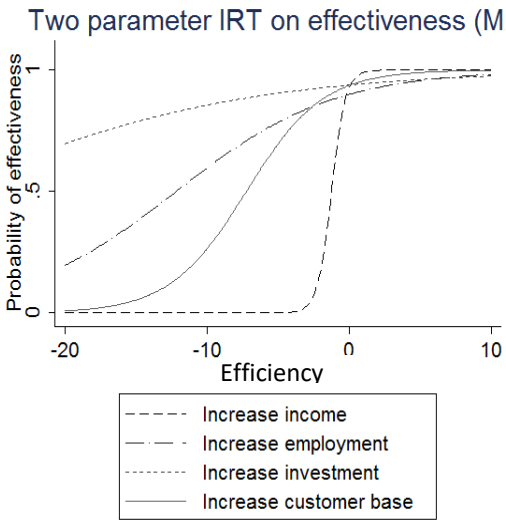
Eq.54: $$Pr(E_{if} = 1|\theta_f) = \frac{exp(\theta_f - \beta_i)}{1+exp(\theta_f - \beta_i)}.$$

The reading of the first graph in Figure 17 leads to the same conclusion than the estimates in Table 7: the less relevant item (which is placed on the right side of the graph) is goal 3, called increase investment. The probability of firms to be effective in each goal knowing that efficiency equals relevance reaches 50%, such as $\Pr(E_{if} = 1|\theta_f = -\beta_i) = 0.5$. The objective of this study is, however, not to explain the reasons why some goals are more relevant than others because it results from a firm's subjective appreciation.

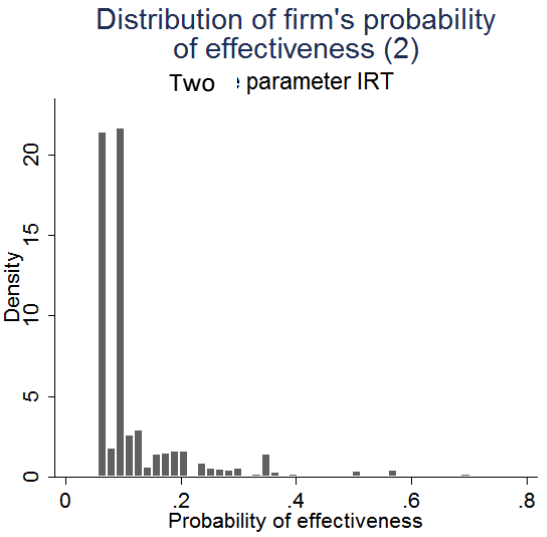
Figure 17: Item characteristic curves of 1PL and 2PL models



Source: Own calculation based on sine2006



Source: Own calculation based on sine2006



Source: Own calculation based on sine2006

Introducing a relevance parameter in the analysis aims at considering the fact that firms face different challenges in pursuing their goals, and this effect is captured in the measurement of efficiency. In a 1PL, however, each item has the same slope. This indicates that an increase in efficiency has the same effect on the probability to be effective in each individual goal. As previously discussed, a discrimination parameter can be introduced in the model to account for the fact that some items might be harder to reach for some firms. This is considered in a two-parameter IRT model as presented below.

A two-parameter logistic model

We can write a 2Pl model by replacing the Z_{if}'s in Eq. 53 by an identity matrix $I_{i\,x\,i}$ and let the discrimination parameter λ_i vary across goals. The βs are still fixed effects representing goal intercepts. The λs are now random parameters, called slope coefficients or loadings, which discriminate goal

relevance with respect to the level of efficiency. In the 2PL model, firms might choose different goals with respect to their level of efficiency. The new equation can be written as follows:

Eq. 55 : $\eta_{if} = D_{if}\beta + \theta_f I\lambda_i$

$$\underbrace{\begin{bmatrix}\eta_{1f}\\ \eta_{2f}\\ \eta_{3f}\\ \eta_{4f}\end{bmatrix}}_{\eta_{if}} = \underbrace{\begin{bmatrix}-1 & 0 & 0 & 0\\ 0 & -1 & 0 & 0\\ 0 & 0 & -1 & 0\\ 0 & 0 & 0 & -1\end{bmatrix}}_{D_{ikf}}\underbrace{\begin{bmatrix}\beta_1\\ \beta_2\\ \beta_3\\ \beta_4\end{bmatrix}}_{\beta_i} + \theta_f I_{i\,x\,i}\underbrace{\begin{bmatrix}\lambda_1\\ \lambda_2\\ \lambda_3\\ \lambda_4\end{bmatrix}}_{\lambda_i},$$

where $\lambda_1 = 1$ for identification. The λ's indicate to what extent the underlying factor θ_f affects the observed variable E_i. In the present case, they express the influence of efficiency on each effectiveness indicator. In the second model presented in Table 7, the λs 2 to 4 range between 0.3 and 0.6, showing a low discrimination level. The overall lecture of the λs tells that increasing income is strongly associated with the level of efficiency of each firm while the other goals are not. In other words, all firms that reach goals 2 to 4 have a rather equal chance of doing so, while firms are not equal with respect to goal 1. They need a high θ_f to be able to increase their income. Goal 1 thus discriminates firms with respect to their efficiency level. This relationship is graphically shown by the ICC in the right graph in Figure 17. The probability of being effective is now calculated as follows:

Eq.56: $Pr(E_{if} = 1|\theta_f) = \frac{exp\{\lambda_i(\theta_f - \beta_i)\}}{1+exp\{\lambda_i(\theta_f - \beta_i)\}}$

In this new context, the probability of firms to be effective equals 50% when efficiency reaches the value of the ratio of relevance to the discrimination parameter, such as $\Pr\left(E_{if} = 1\middle|\theta_f = -\frac{\beta_i}{\lambda_i}\right) = 0.5$. The absolute value of the loadings is nevertheless of little interest as any λ could have been fixed to 1 for identification. Their relative value has to be considered for interpretation. In addition, the presence of a slope parameter now implies that the item characteristic curve can cross. Supplementary pieces of information are generated at the points of intersection. It means, for example, that increasing employment is more relevant than increasing the customer base under a level of efficiency around -4 and less relevant above this level. While such thresholds are of interest in various psychometric analyses, they are rather difficult to interpret in a one-period model in the present context. Clear-cut points could be of interest to analyse a firm's strategy mix but their concentration at a high level of efficiency rather calls for caution. This effect constitutes the main reason why pure Rash theorists do not call a Rash model an IRT model. Indeed, this phenomenon is impossible in a Rash framework and the interpretation of each item is consistent along all ability levels. The 2PL is nevertheless chosen as the base for the remaining analysis because this issue arises first at 85% probability of effectiveness where only few firms are located (see the below graph in Figure 7) and because both AIC and BIC criteria in Table 7 show that model 2 is superior. The issue of crossing lines is further remembered as Lord's paradox and won't be additionally theorised.[79]

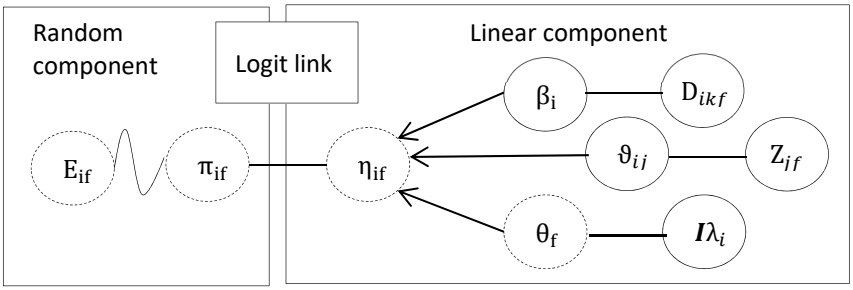
[79] See de Ayala (2009).

So far, the information shown in Table 7 underlines the subjectivity of process execution. It can be noted that, if firms were equal with respect to their goal setting and ways to reach them, all ICCs would collapse into a unique line, goals would not present different levels of relevance, and there would be no reason for firms to be discriminated with respect to the goal they follow and their ability to reach them. To dig further into the understanding of the firms' efficiency level, we need to control for the input and infrastructure used in the production process as presented in the next model.

A latent regression two-parameter model

The rationale for controlling for the effect of input and infrastructure on effectiveness is to isolate the residual efficiency parameter. The idea is to control for the firms' level of input and infrastructure in order to infer that, everything else being equal, a firm with a higher θ is more efficient. The resulting coefficient cannot be due to the differences in level of capital or human resources, for example. The model is hence transformed to measure effectiveness conditional to efficiency, input, and infrastructure.

Figure 18: Representation of a latent regression 2PL



Source: Own adaptation of the latent regression Rash model in Wilson (2006, p.40)

The following latent regression 2PL introduces Z_j predictors for the log odds η_{if}, with *j* = 5. It aims at controlling for firm differences with respect to their input, capital, labour force, and rules. The indicator for the input (x_{fs}) is a dummy that takes a value of 1 if the firm's "necessary means at start-up phase" are higher than the median, and zero otherwise. The original variable is a categorical variable that ranges from 1 (less than 2,000 euro) to 8 (more than 160,000 euro). It has been chosen as a proxy for the input because it expresses operational expenses and thus reflects the definition of input proposed in the process theory of organisation, which states that inputs are directly consumed. Four variables have been chosen to represent the infrastructure. The proxy for capital ((k_{fs}) is based on the sum of 9 dummy variables taking a value of 1 if the firm has bought material and machineries for production and administration, pieces of furniture, real estate, vehicles, licences, other firms, or consultancy services for training and communication. The proxy takes a value of 1 if the firm's capital is higher than the median and 0 otherwise. The proxy for labour force ((l_{fs}) is based on the total number of employees in 2006 (l_{2006}) and takes a value of 1 if the firm's level is higher than the median and 0 otherwise. These indicators are complemented by two proxies for internal rules. They take the

value of 1 if the firm is a franchise ($(r1_{fs}$) or a subsidiary ($(r2_{fs}$) and 0 otherwise. Their impact on the latent construct η_{fi} is measured through a parameter ϑ_j as presented in Figure 18 and equation Eq. 57.

The new equation can be written as follows:

Eq. 57 : $\eta_i = D_{ik}\beta_i + \theta_f I\lambda_i + \vartheta_{ij}Z_j$

$$\begin{bmatrix}\eta_1\\ \eta_2\\ \eta_3\\ \eta_4\end{bmatrix} = \begin{bmatrix}-1 & 0 & 0 & 0\\ 0 & -1 & 0 & 0\\ 0 & 0 & -1 & 0\\ 0 & 0 & 0 & -1\end{bmatrix}\begin{bmatrix}\beta_1\\ \beta_2\\ \beta_3\\ \beta_4\end{bmatrix} + \theta_f I_{4\,x\,4}\begin{bmatrix}\lambda_1\\ \lambda_2\\ \lambda_3\\ \lambda_4\end{bmatrix} + \begin{bmatrix}\vartheta_{x1} & \vartheta_{k1} & \vartheta_{l1} & \vartheta_{r11} & \vartheta_{r21}\\ \vartheta_{x2} & \vartheta_{k2} & \vartheta_{l2} & \vartheta_{r12} & \vartheta_{r22}\\ \vartheta_{x3} & \vartheta_{k3} & \vartheta_{l3} & \vartheta_{r13} & \vartheta_{r23}\\ \vartheta_{x4} & \vartheta_{k4} & \vartheta_{l4} & \vartheta_{r14} & \vartheta_{r24}\end{bmatrix}\begin{bmatrix}x\\ k\\ l\\ r1\\ r2\end{bmatrix},$$

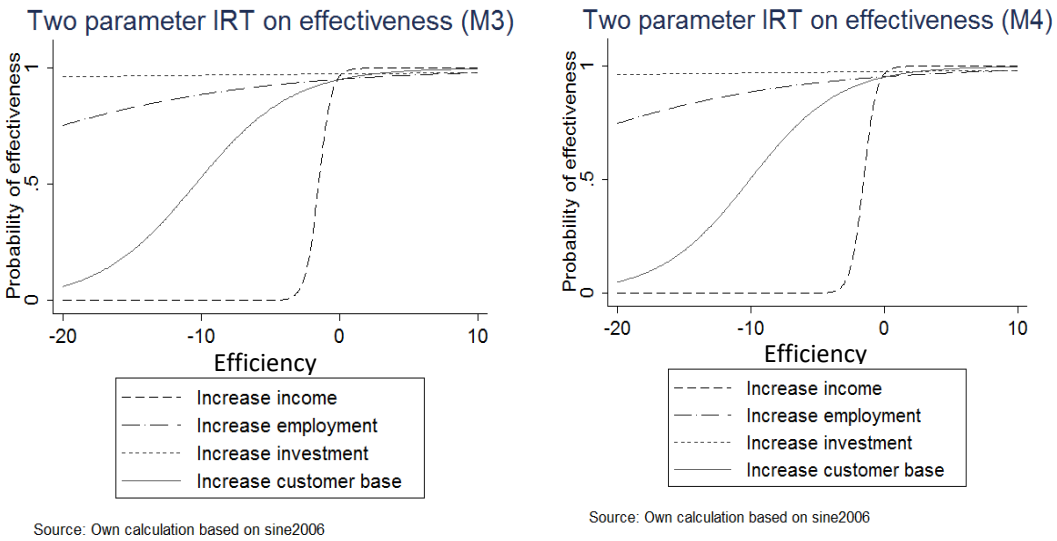
The results of model 3 in Table 7 show that the effect of the input on the log odds of effectiveness is positive for all goals but the number 4. A high rate of input consumption in the economic process is linked to an increase in income, employment, and investment but the source for a reinforcement of the customer base lies somewhere else. This makes senses in a business perspective. It can be imagined that an increase of the number of customers is linked to other variable such as marketing, price strategy, or distribution method, but not directly to the level of productive activity within the firm. The level of capital has a positive and significant effect on all effectiveness items, implying that the equipment is a global determinant to reaching firm goals. The labour force has a strong impact on the effectiveness in increasing employment and investment. It is relevant to wonder if problems of endogeneity appear with regard to the indicators of labour force and increased employment which are apparently closely related. They are significantly correlated but at a very low level, rejecting the issues of endogeneity. If it were to be a problem, it would be further mitigated by the model design which regresses l_{2006} on the log odds of goal effectiveness in 2009. It is thus rather secure to keep the variable in the model and to interpret this effect as a reinforcement pattern. Consequently, a high labour force in 2006 induces a strong probability to increase the number of employees within three years. The same effect is to be observed with investment. However, an increase in labour force can induce a need for more pieces of equipment and *vice versa*. Measuring the correlation between the labour force and income increase shows that the link weak but still significant. The higher the employment level in a firm, the higher is its probability to increase its income. Hence, a productivity effect seems to be linked to firm size in terms of labour. Finally, the number of employees does not influence the probability to increase the customer base. Once again, it could be reasonably argued that the major part of employees in most of the studied firms is dedicated to production and not sales (especially in small firms). The database unfortunately does not provide information to follow on this point.

The introduction of rule indicators in model 4 has a very small impact on the previous estimates' magnitude and does not change their interpretation. The idea behind the choice of indicator is to test for a possible effect of non-material infrastructure such as culture. The indicator $r1_{fs}$ tells if a firm is a part of a franchise and $r2_{fs}$ if it is part of a group. It is assumed that such firms benefit from a centralised infrastructure with respect to marketing, legal advice, or corporate governance. The effect

of a common culture within the firm should increase coherence in goal attainment. These indicators test if common sets of rules increase the probability of being effective. They show a mitigated response with $r1_{fs}$ being strongly linked to the income and customer goals and $r2_{fs}$ to the employment and investment goals. An interpretation for such differences can be imagined in relation to firms' structure of capital or differences in sub-economies' autonomy but the database does not entail information to back this up.[80] We hence note that non-material infrastructure influences goal realisation and we control for this effect in the next models.

Finally, the introduction of the five covariates has changed the relative order of item relevance. Reaching investment targets stays the less relevant goal but it is now joined by the income target at the second place. However, this effect does not indicate that "the level of input and infrastructure influences the relevance of reaching goals". The relevance parameter is indeed supposed to account for the item characteristic independent of firms' properties. The change is due to the measurement of an ability trait in a finite sample. It measures a fixed effect that captures goal relevance by iteratively comparing the impact of the βs on the log odds of effectiveness. It is a closed system that re-evaluates the level of relevance each time the model is changed. The βs' magnitude therefore cannot be interpreted until the last model has been specified. The same holds true for the λs.

Figure 19: Item characteristic curves of latent regression 2PL models



Source: Own calculation based on sine2006

Source: Own calculation based on sine2006

The information of interest at this point is linked to the random slopes θ in both models. They show strong evidence of the influence of the common factor "efficiency" on effectiveness. It is measured at 2.17 and 2.12 in model 3 and 4 and is strongly significant. The ICCs in Figure 19 show a quasi-absence of discrimination with respect to investment and, as before, strong inequalities between firms in pursuing their income goals. Controlling for firm input and infrastructure seems to increase the impact

[80] See, for example, Ciabuschi (2012) on the relation from headquarters to the subsidiary levels of their group in relation to sheer ignorance.

of subjectivity on firm effectiveness. The more complex the models are, the further the ICCs are located from one another.

The probability of being effective is now conditional to firms' θ and to their level of input and infrastructure denoted by $\mathrm{Z_j}$. According to the process theory of organisation, however, two supplementary elements can influence the process: firm participation in a broader system (its nesting in the higher-level economy called a "sector") and its conduct. The effect of the sector is first accounted for in a multi-level structural equation model.

4. A model of firm performance

A simple one-period multi-level structural equation model of the business process with binary goals and output is proposed to illustrate the views on firms' performance in the context of the process theory of organisation. This model corresponds to the full model presented in Eq. 47 in Chapter 7. The main rationale for choosing such an approach is the fact that it takes into consideration the hierarchical structure of the data and the existence of unobservable heterogeneity in the business process measured as an efficiency score after controlling for the firm's input and infrastructure.

The below model is inspired from Rabe-Hesketh, Skrondal, and Zheng's (2012) paper, "Generalised Multilevel Structural Equation Modelling". They suggest a formulation that lets the usual model for the structural part of a structural equation model include latent and observed variables varying at different levels. It is regarded as an alternative to conventional structural equation models composed of separated within-cluster and between-cluster models. It has the advantage of both SEM and latent variables models by considering the nested structure of the data and the presence of fallible instruments such as items (unobserved heterogeneity).

4.1. A multi-level structural equation model

Multilevel structural equation models allow controlling for the hierarchical structure of the data at different levels without violating the assumption of independence of error, leading to unbiased estimates.[81] The goals represent the first level of the model. For ease of understanding and comparison to other studies, it is called level 0, allowing firms and sectors to be the first and second levels. A model for $\mathrm{L} = 2$ and $\mathrm{M} = 2$ (three levels for goals, firms, and sectors and two latent variables at firm and sector levels) can be written into a measurement and structural models as presented in Eq. 58 to Eq. 61:

Level 1 model: the firm

Eq. 58: $\eta_{ifs} = D\beta_i + \theta_{fs}^{(1)} I\lambda_i + \vartheta_{ij} Z_j$, measurement model *and*

Eq. 59 $\theta_{fs}^{(1)} = \xi_{fs}^{(1)} + \eta_{is}$, structural model*;*

[81] See Kaplan (1997 p. 2).

Level 2 model: the sector

Eq. 60: $\eta_{is} = \theta_s^{(2)}$ *, measurement model and*

Eq. 61: $\theta_s^{(2)} = \xi_s^{(2)}$, structural model.

In Eq. 58, effectiveness depends on the goal intercepts, the discrimination parameter, a latent variable measuring efficiency of the process at the firm level $\theta_{fs}^{(1)}$, and a set of covariates Z_{fs} which represent the input and infrastructure. The structural model in Eq. 59 indicates that the latent efficiency score is expected to be the first-level residual, or unobserved heterogeneity $\xi_{fs}^{(1)}$, completed by a sectorial element not varying at the firm level. Eq. 60 shows that a second latent variable $\theta_s^{(2)}$ is computed at the sectorial level. It is expected to equal the sectorial disturbance $\xi_s^{(2)}$ in Eq. 61. A combined model for the structural part can be written as follows:

Eq. 62: $\theta_{fs}^{(1)} = \xi_{fs}^{(1)} + \theta_s^{(2)}$ (structural model).

Eq. 62 shows that firm efficiency has to be interpreted as a combined effect of firm level and sectorial level heterogeneity. While $\xi_{fs}^{(1)}$ captures the true firm level efficiency, a sectorial margin $\theta_s^{(2)}$, independent from firm actions, influences firms' efforts to reach their goals. The two-level model with two latent efficiency variables represents the econometric framework used below to assess the role of management in the performance model. Prior to including variables for such functions, we must test the empirical validity of the model according to the following hypothesis.

4.2. Hypothesis testing

Hypothesis A1: firm efficiency positively and significantly influences firm effectiveness

The firm level of efficiency $\theta_{fs}^{(1)}$ in Eq. 58 represents the residual unobserved heterogeneity at the firm level after controlling for input and infrastructure. A value for this latent variable can be obtained by calculating the empirical Bayesian predictions (posterior mean) for each firm. The effect of this variable on the log odds of effectiveness is expected to be positive and significant. Such a result would imply that a high efficiency in executing the business processes results in a high chance to reach firm's goals.

Hypothesis A2: firms evolve in a subjective world

The parameters for relevance β_i and discrimination λ_i in Eq. 58 measure the in-sample firm difference in goal effectiveness and its relation to a firm's efficiency level. If both parameters are significantly related to the log odds of firm effectiveness after controlling for input and infrastructure, the goal choice must influence the firm's probability to be effective. Everything being equal, firms would not be identical with respect to process execution. Not only would their chance of success vary with respect to the chosen goals, but they would also vary with respect to the firms' level of efficiency. Significant relevance and discrimination parameters are to be interpreted as the subjectivity of goal

definition and process execution that discriminate firms with respect to their chances of success in a given economic situation.

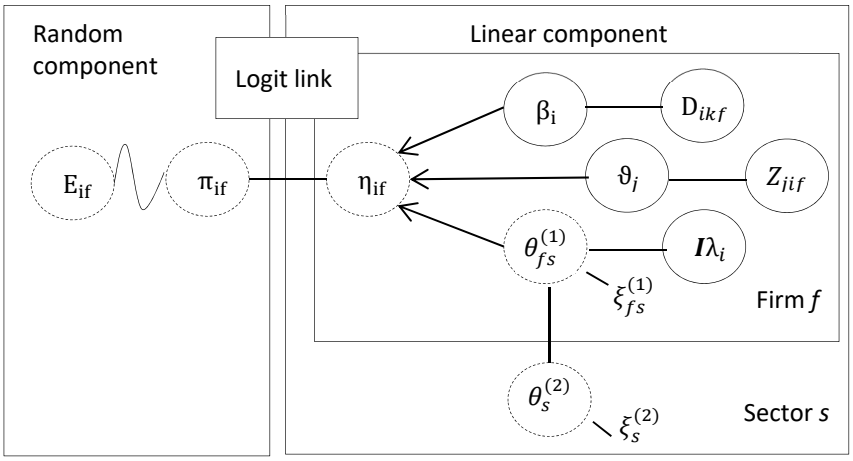
Hypothesis A3: sectorial efficiency positively and significantly influences firm effectiveness

The third hypothesis relates to the systemic aspect of the process theory of organisation. Firms are treated as elements of a broader economic system (a sector). Their action is simultaneously constrained and supported by the system. They reciprocally impact the whole and undergo its influence. This hierarchical structure of the economy (the fact that a national economy entails sectors, which entail firms, which entail teams, etc.) should imply the presence of unobserved heterogeneity at the firm and sectorial level. The model is likely to entail a significant sectorial effect summarising all exogenous influences on which the firm has no direct control. The sectorial efficiency $\theta_s^{(2)}$ is expected to have a significant effect on firm effectiveness. It can be interpreted as a sectorial margin influencing the activities of the whole sector. A significant coefficient would bring clear support to the nested aspect of the theory. It would confirm that data are organised into a hierarchical structure with within-group units (the firms) observed in higher-order units (the sectors). The significance of the coefficient is to be interpreted as existing dependence among lower-level and higher-level units and would affirm the beliefs of Simon (1979): "[i]f, in the face of identical environmental conditions, different decision mechanisms can produce different firm behaviors, this sensitivity of outcomes to process can have important consequences for analysis at the level of markets and the economy" (Simon, 1979, p. 509).

4.3. The findings

The path diagram for the new equation is completed with the sectorial level represented by a second frame in Figure 20.

Figure 20: Representation of a multi-level structural equation model



Source: Own adaptation of the latent regression Rash Model in Wilson (2006) p.40

The common formulation of the IRT now represents the measurement model. The latent variable θ becomes a system of structural equations measured at each nested level. Two error terms $\xi_{fs}^{(1)}$ and $\xi_{s}^{(2)}$ are introduced to account for the independent disturbance between levels. Exponents 1 and 2 are used to highlight the firm and sectorial levels. $\xi_{fs}^{(1)}$ and $\xi_{s}^{(2)}$ are assumed to have a normal distribution with $\xi_{fs}^{(1)} \sim N(0, \psi^{(1)})$ and $\xi_{s}^{(2)} \sim N(0, \psi^{(2)})$.[82]

The equation for the model can now be rewritten as follows:

Eq. 63 : $\eta_i = D_{ik}\beta_i + \theta I\lambda_i + \vartheta_{ij}Z_j,$

where θ is vector written as the following :

$$\begin{bmatrix}\theta_{fs}^{(1)}\\ \theta_{s}^{(2)}\end{bmatrix} = \begin{bmatrix}0 & 1\\ 0 & 0\end{bmatrix}\begin{bmatrix}\theta_{fs}^{(1)}\\ \theta_{s}^{(2)}\end{bmatrix} + \begin{bmatrix}\xi_{fs}^{(1)}\\ \xi_{s}^{(2)}\end{bmatrix},$$

$$\theta_{fs}^{(1)} = \theta_{s}^{(2)} + \xi_{fs}^{(1)}$$

$$\theta_{s}^{(2)} = \xi_{s}^{(2)}.$$

The latent variable $\theta_{fs}^{(1)}$ is assumed to vary across firms and entails an error term. $\theta_{s}^{(2)}$ is assumed to be equal to the sectorial level disturbance. The introduction of the structural part in model 5 of Table 7 has a small incidence on the covariates, item relevance, and the discrimination parameters. It does not change the sign of the coefficients, nor their significance level. All estimates are robust across specifications, which validates hypothesis A2. Firm efficiency still has a positive effect on effectiveness and so does the sectorial efficiency, which validates hypothesis A1 and A3. It indicates that the data structure is hierarchical with elementary units at level 1 nested in clusters at level 2 (Rabe-Hesketh et al., 2012, p.512). Furthermore, "[t]he latent variables, or *random effects*, are interpreted as unobserved heterogeneity at the different levels, which induce dependence among all lower-level units belonging to a higher-level unit" (p.513, emphasis in the original). This represents strong support for the process theory of organisation which describes the economic activity as systems of nested processes.

4.4. Summary and next steps

This chapter has empirically tested the model of firm performance derived from the process theory of organisation and finds strong support for the three hypotheses presented above: (i) decision-making is subjective, (ii) firm efficiency influences firm effectiveness, (iii) and firms' activity is nested into sectorial activity. These positive results are signs of validity for the proposed theoretical framework. The element of conduct, however, still lacks in the current model of the firm.

[82] See Rabe-Hesketh (2012) for the formulation of the covariance structure ψ.

According to the proposed theory, the conduct—or managerial abilities in firms—is linked to the definition and execution of the process. The next chapters build upon the functional approach presented in Chapter 7 to analyse this issue. They use the principle stating that people locate the alternative for choice within an information silo as theoretical basis for model building. Simon theorises on the “informational silo” in a business context in his 1979 empirical analysis on decision-making. He states that “[t]he businessmen's perceptions of the principal problems facing the company […] were mostly determined by their own business experiences—sales and accounting executives identified a sales problem, manufacturing executives, a problem of internal organisation” (p. 501). The goal of Chapter 9 and Chapter 10 is to measure the expression of firm’s entrepreneurial and organisational functions with respect to their “informational silos”. It leads to measuring indicators for the organisational and entrepreneurial functions in firms used to control for their effect in the econometric model of firm performance in Chapter 11.

Chapter 9 : Entrepreneurial ability and its characteristics

The goal of this chapter is to measure the expression of a firm's entrepreneurial function presented in Chapter 7. It has been defined as a class of decisions that generate market power by creating new (additional or novel) economic activity. This chapter investigates the novelty and initiative patterns of the 10,077 firms in order to measure their entrepreneurial profile. Section 1 presents the model specification and the hypothesis to be tested. Section 2 measures both novelty and initiative patterns in an IRT model. Section 3 computes an overall entrepreneurship indicator at the firm level by comparing the presence of the initiative and novelty traits in each firm and provides a conclusion.

1. Model specification and hypothesis testing

The effective expression of entrepreneurial activity in firms is the consequence of individual behaviours. It is described in the literature as the emergence of new economic activity (Wiklund, 2001), but its empirical assessment is fairly scarce. Wiklund (2001) studies this phenomenon in young Swedish firms by capturing "the prevalence of new business initiative pursued by firms or individuals associated with the management of the firm" (p.4). He proposes an index that takes the value of 1 for individuals that have either "started an internal venture" since launching the focal firm, "committed time or any other resources to any other business initiatives that has not yet been carried through to fruition", or "started any new ventures in a separated firm" in the last three years. As he points out, the literature on the topic suggests that the main determinants of economic activity are similar to those on decision-making: knowledge and motivation.

Knowledge consists of human and social capital. The level of human capital depends on the individual's experience and education. The cognitive science literature draws a link between these factors and the ability to make sound decisions. For example, Takii (2009) cites Welch (1970) who "identifies that higher education influences the production process through the ability to increase the amount of output for a given amount of input (the worker effect) and the ability to interpret information that enables the worker to make a better use of the inputs (allocative effect)" (p.4). Social capital refers to the ability of extracting benefits from a social network such as access to information or resources. Motivation, on its side, impacts venture development by the degree of involvement of individuals (Storey, 1994; Johannisson, 2001). Individuals that are fulfilling personal goals, aiming at independence, or developing ideas are likely to seek extension and growth.

The determinants for knowledge and motivation are described in Appendix E. They are studied in a thorough econometric analysis in order to select the best model specification to be used in measuring the both entrepreneurial and organisational functions in firms. Hence, in the current econometric analysis, the expression of both initiative and novelty patterns is expected to result from decision-making in firms. Furthermore, according to the presentation on entrepreneurship in Chapter 8, the

distribution of both patterns is expected to be normally distributed around the trait means. The hypotheses to be testes in this section are the following:

Hypothesis B1: Firms' knowledge and motivation are positively related to the initiative and novelty patterns.

Hypothesis B2: The ability to initiate ideas is normally distributed in the population

Hypothesis B3: The ability to have novel ideas is normally distributed in the population

The following sections measure both behavioural patterns in firms in an item response framework.

2. Measuring firms' creative and active profiles

"The role of the entrepreneur is to turn the potential of new knowledge, networks, and markets into concrete actions to generate–and take advantage of–new business opportunities" (Hekkert, 2007, p. 421). To investigate this view on entrepreneurship, we introduce independent variables referring to both novelty and initiative patterns in the model. This subsection proposes an extension of Wiklund's (2001) setup including new information related to the independent variables. In particular, the French database allows extracting the following additional information about initiatives taken during the period of 2007–2009:

A. Investing in the launch of a parallel firm (the Y1 of Appendix E)
B. Totally or significantly improved products/services;
C. Totally or partly improved fabrication/ production /distribution processes;
D. Implemented commercial methods;
E. Implemented organisational or resource management methods;

Firms were also questioned about their novelty patterns. The novelty items are represented by the answer to the five following questions:

F. The motivation for starting the business was the novelty of the idea;
G. The principal investment in the period 2007–2009 was buying licences;
H. The firm sells a product or service that is new to a particular market;
I. The firm is based on a new production method or process;
J. The firm uses an innovative sales concept.

The 10 initiative and novelty items are dummy variables taking a value of 1 for "yes" and 0 otherwise.

2.1. Young firms' initiative patterns

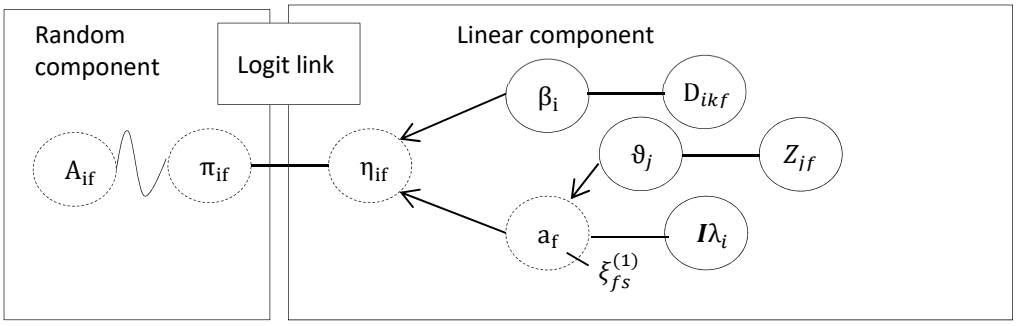
As described in Chapter 7, the variation that firms induce in the economic environment is a function of firm's ability to take initiatives and carry them until completion. As Johannisson (2011) mentions, entrepreneurship is about "actionable knowledge" or "knowledge that is appropriate for getting things

done".[83] In an empirical study, he asks Swedish successful family businesses how they allocate their time between action, planning, and vision. "One intriguing experience is that (successful) entrepreneurs use their available time in a way that is in total contrast to what we associate with proper management". They find that successful entrepreneurs spend more time doing concrete actions with rapid feedback than on planning and strategy, which have a prolonged feedback period.

In a similar vein than that presented in the above IRT framework, it could be argued that different actions contribute to various extents to a firm's propensity to act. Implementing innovative sale techniques could be less demanding than introducing a new production process due to access to resources or financial means, for example. Weighting change items would allow accounting for this issue by giving more importance to certain component of change. In addition to the different contribution of each change item to the propensity to act of the firm, the problem remains that firms do not share the same attribute when implementing changes. The below empirical analysis is based on the IRT to account for these elements. It chooses this approach to differentiate young firms with respect to item difficulty and a discrimination parameter. It uses an adapted version of the model presented in Chapter 8 to control for the direct effect of the specification presented in Appendix E on the latent variable (initiative trait).

The below 2Pl structural model is similar to that in Eq. 53 with an identity matrix $I_{i\,x\,i}$ and a parameter λ_i that discriminates firms with respect to their latent initiative trait. The random component now measures the probability of a firm to have implemented an initiative item (A_{if}) for *i* = 5. Since the studied items do not have to be realised to improve the odds of success, the difficulty parameter β is once again interpreted as the degree of relevance attributed by firms to each item. The higher this parameter is, the lower the item's relevance in the firms' action pattern. The λs are still random parameters which discriminate firms with respect to their level of ability. The latent initiative construct a_f represents a firm's propensity to act (or initiative pattern) and is measured conditionally to the Z_{jf} as presented in Figure 21. There are *j* = 27 covariates for knowledge and motivation following the specification labelled "c" in Appendix E.

Figure 21: Representation of a latent regression 2PL for initiative



Source: Own adaptation of the latent regression Rash model in Wilson (2006, p.40)

[83] Johannisson B. (2011), citing Jarzabkowski and Wilson (2006).

The new equation can be written as follows:

Eq. 64 : $\eta_{if} = D_{if}\beta + a_f I\lambda_i,$

$$a_f = \vartheta_j Z_{jf} + \xi_f^{(1)},$$

where $\lambda_1 = 1$ for identification and $\xi_f^{(1)}$ is the disturbance at level 1 (the firm) or the remaining initiative trait.[84] The results of the calculation are presented in Table 8. The models A1 to A3 presents the results of a 1PL, 2PL, and a full model including the above specification of the Z_{jf}.

The estimates for all covariates are very close to those presented in Appendix E. A complete interpretation of their coefficients is proposed in Section 3 below in order to compare the results in both traits analysis. For the time being, we can note that the interpretation of the model remains the same after controlling for the effects of item relevance and discrimination and regressing the social capital, human capital, and motivation covariates on the latent trait. This calls for strong robustness of the specification. Moreover, the propensity to act a_f is highly significant in all models.

The latent trait can be measured by computing the empirical Bayesian predictions (posterior mean) for each firm and plotted against the probability of expressing initiative in firms. The ICC in Figure 22 informs that the most difficult item to be pursued is creating a firm in parallel to the focal business. While the introduction of slope parameters in the 2PL leads the item "change products" to cross all other ICC, controlling for the Z_{jf} in model A3 strongly decreases the Lord's paradox. This is also acknowledged for by the AIC and BIC criteria which strongly advocates for A3 as the best specification. The second line of graphs in Figure 22 shows the distribution of the firms' probability to express the initiative trait. We see that increasing the model complexity leads to smoothing the distribution of the initiative trait in firms. The probability to express the trait is, however, rather low with a mean around 10%. One firm out of ten is thus expected to actively bring changes to the market. The innovative content of these changes is not considered yet. This is the object of analysis of the next subsection.

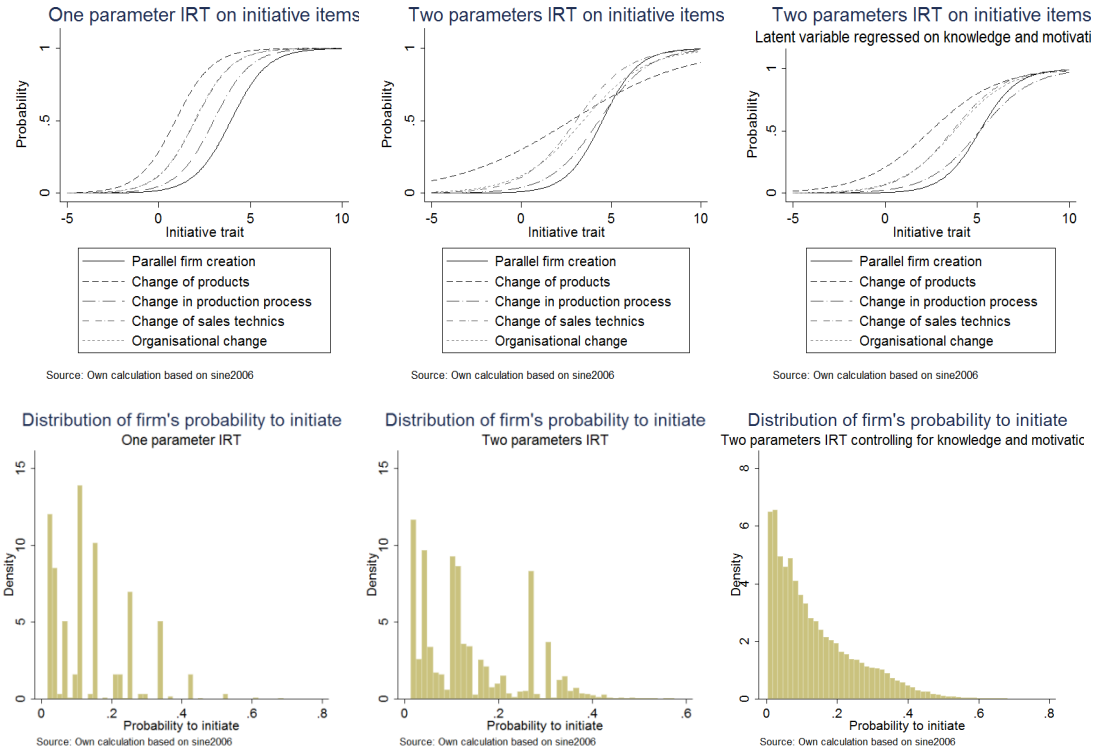
[84] Level 0 is still the item level.

Table 8: Result table: the IRT models for initiative

Model		A1	A2	A3
Ind. variable		(A_i)	(A_i)	(A_i)
Regression type		1PL	2PL	2PL + cov
β_1		3.932*** (0.068)	4.512*** (0.193)	5.134*** (0.251)
β_2		0.911*** (0.025)	0.843*** (0.024)	1.334*** (0.096)
β_3		2.995*** (0.047)	3.172*** (0.096)	3.637*** (0.149)
β_4		1.995*** (0.033)	2.090*** (0.060)	2.647*** (0.127)
β_5		1.963*** (0.033)	1.977*** (0.049)	2.550*** (0.127)
a_f		0.764*** (0.029)	1.381*** (0.159)	0.960*** (0.097)
λ_2			0.306*** (0.054)	0.543*** (0.062)
λ_3			0.733*** (0.124)	0.710*** (0.088)
λ_4			0.685*** (0.109)	0.726*** (0.080)
λ_5			0.575*** (0.089)	0.681*** (0.076)
Human capital				
Education	Med			0.267*** (0.067)
	High			0.040 (0. 066)
Specific training to launch firm				0.146* (0.057)
Entrepreneurial experience	1cre			-0.004 (0.062)
	2cre			0.104 (0.093)
	3cre			0.074 (0.106)
Prior experience in sector	<3y			-0.034 (0.107)
	3-10y			-0.131* (0.066)
	10y+			-0.334*** (0.067)
Former hierarchical level	B			-0.142 (0.132)
	C			0.097 (0.089)
	D			0.176 (0.117)
	E			0.394*** (0.116)
	F			0.309*** (0.087)
Social capital				
Professional network				0.222*** (0.058)
Entrepreneurial entourage				0.354*** (0.067)
Supplier network				0.091 (0.055)
Customer network				0.787*** (0.124)
Entrepreneurial network				0.817*** (0.112)
Gender				0.250*** (0.058)
Nationality				0.070 (0.095)
Motivation				
Want to stay small				-0.507*** (0.090)
Growth of employment				0.030 (0.088)
Income growth - loan				0.211* (0.103)
Income growth - dilution				-0.264 (0.142)
Projected evolution	S			-0.086 (0.087)
	G			0.634*** (0.090)
Observations		10077	10077	10077
Ll		-1.8e+04	-1.8e+04	-1.7e+04
Aic		35720.6	35665.0	34855.09
Bic		35773.6	35753.33	35181.71

Note: B=worker, C=Employee, D=Technician, E=Manager, F=Top manager, S=Will probably stay same size in the future, G=Will probably grow in the future, *p<0.05, **p<0.01, ***p<0.001. Standard errors in brackets.

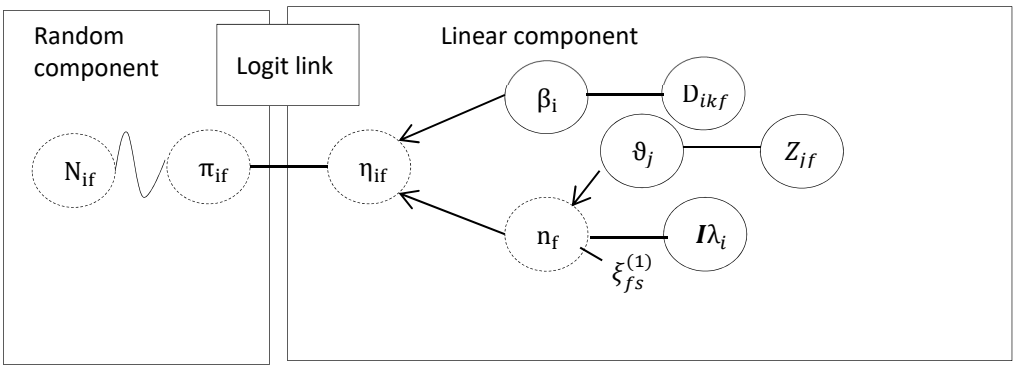
Figure 22: Item characteristic curve on initiative and firms' probability to initiate



2.2. Young firms' novelty pattern

Moroz (2012) states that, "[a]s there is a common agreement that entrepreneurship and innovation are highly interrelated (Drucker, 1985; Schumpeter, 1912/1934), the concept of emergence would be better served by accounting for innovation within the scope of "what is novel about a new venture". Thus, the process of new venture emergence in Gartner's model may be associated with non-innovative outcomes that may generate profits but would not be considered by many scholars as creating new "innovative" value, that is generic to all entrepreneurial processes (Parker, 2004; van Prasg, 1999)" (p.801). The following analysis hence repeats the methodology presented in the section 2.1 using novelty items as the dependent variable.

Figure 23: Representation of a latent regression 2PL for novelty



Source: own adaptation of the latent regression Rash model in Wilson (2006, p.40)

Based on an IRT model, a study of the 5 novelty indicators allows extracting response patterns that provide information on an individual's ability to innovate. The model in Figure 23 is an adaptation of the previous model where the A_{if} has been replaced by the five novelty indicators, N_{if}. This allows for measuring the latent trait n_f for each firm following the same procedure.

The new equation can be written as follows:

Eq. 65 : $\eta_{if} = D_{if}\beta + n_f I\lambda_i$,

$$n_f = \vartheta_j Z_{jf} + \xi_f^{(1)},$$

where $\lambda_1 = 1$ for identification and $\xi_f^{(1)}$ is the disturbance at level 1 accounting for the remaining novelty trait.[85] The results of the calculation are presented in Table 9. The models N1 to N3 present the results of a 1PL, 2PL, and a full model including the same specification for the Z_{jf}.

The estimates for all covariates are, once again, very close to those from Appendix E. Even after controlling for the effects of item relevance and discrimination and regressing the knowledge and motivation on the latent trait accounting for firm novelty pattern, the interpretation of the model remains the same. This calls for strong robustness of the specification. Moreover, the propensity to innovate n_f is highly significant in all models. The value of the latent trait is plotted against the probability to express novelty in firms in Figure 24. The ICC informs that the most difficult item to be pursued is buying a licence. However, the introduction of the slope parameters in the 2PLs leads this item to be the less discriminative with respect to firms' level of novelty. This means that the implementation of the other novelty items is highly dependent on the firm innovation level. Firms with a low novelty trait have less of a chance to succeed in implementing their novel ideas in general, sell a product or service that is new to a particular market, base the firms' activity on a new production method or process, or introduce innovative sales concepts. An intuitive interpretation for this fact can be that acquiring a licence consists of buying novelty rather than generating it, which is contingent to a firm's financial power rather than internal innovation capacities.

Controlling for the Z_{jf} in model N3 does not change the interpretation. The AIC and BIC criteria, however, advocate for N3 as the best specification. The second line of graphs in Figure 24 shows the distribution of the firms' probability to express the novelty trait. Increasing the model complexity once again leads to a smoother distribution of the novelty trait. The probability to express the trait is still rather low, with a mean around 10%. One firm out of ten is thus expected to bring novelty to the market.

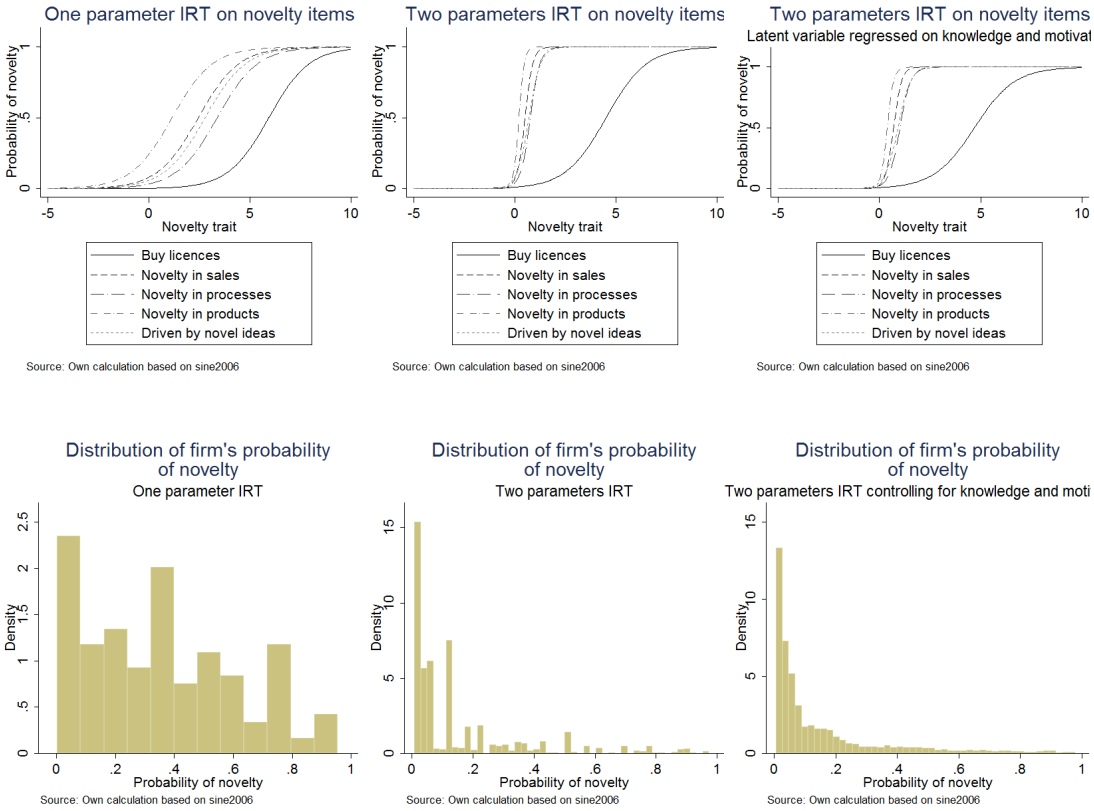
[85] Level 0 is still the item level

Table 9: Result table: the IRT models for novelty

Model		N1		N2		N3	
Ind. variable		(N_i)		(N_i)		(N_i)	
Regression type		1PL		2PL		2PL + cov	
β_1		5.931***	(0.108)	4.513***	(0.103)	4.692***	(0.136)
β_2		2.448***	(0.045)	2.589***	(0.080)	3.545***	(0.217)
β_3		3.378***	(0.054)	3.199***	(0.083)	3.779***	(0.167)
β_4		1.149***	(0.035)	1.619***	(0.093)	2.538***	(0.261)
β_5		2.784***	(0.048)	2.405***	(0.053)	2.961***	(0.136)
n_f		1.853***	(0.036)	0.398***	(0.119)	0.402***	(0.107)
λ_2				5.154***	(1.551)	5.042***	(1.351)
λ_3				4.185***	(1.261)	3.721***	(0.998)
λ_4				7.802**	(2.408)	6.352***	(1.729)
λ_5				3.445***	(1.036)	3.215***	(0.859)
Human capital							
Education	Med					0.037*	(0.018)
	High					0.002	(0.015)
Specific training to launch firm							
Entrepreneurial experience	1cre					0.015	(0.015)
	2cre					0.033	(0.024)
	3cre					0.029	(0.027)
Prior experience in sector	<3y					-0.125**	(0.042)
	3-10y					-0.108***	(0.032)
	10y+					-0.107***	(0.032)
Former hierar. level	B					0.048	(0.033)
	C					0.077**	(0.029)
	D					0.070*	(0.033)
	E					0.091*	(0.036)
	F					0.085**	(0.030)
Social capital							
Professional network						0.038*	(0.016)
Entrepreneurial entourage						0.135***	(0.038)
Supplier network						0.022	(0.014)
Customer network						0.135**	(0.045)
Entrepreneurial network						0.088**	(0.033)
Gender						-0.005	(0.013)
Nationality						0.003	(0.022)
Motivation							
Want to stay small						-0.104**	(0.034)
Growth of employment						0.046	(0.025)
Income growth – loan						0.016	(0.025)
Income growth – dilution						-0.001	(0.034)
Projected evolution	S					-0.046*	(0.023)
	G					0.204***	(0.057)
Observations		10077		10077		10077	
Ll		-1.71e+0		-1.70e+0		-1.65e+04	
Aic		34290.41		34006.88		33048.05	
Bic		34343.37		34095.15		33374.66	

Note: B=worker, C=Employee, D=Technician, E=Manager, F=Top manager, S=Will probably stay same size in the future, G=Will probably grow in the future, $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$. Standard errors in brackets.

Figure 24: Item characteristic curve on novelty and firms' probability to innovate



3. Measuring the entrepreneurial trait

The last subsections have used the best model specification defined in Appendix E to control for knowledge and motivation in measuring the initiative and novelty traits. This section presents the final interpretation of the estimates in relation to hypothesis B1 and analyses the distribution of the propensity to act and innovate with respect to hypothesis B2 and B3. It then shows a model to combine both traits into one unique indicator for the entrepreneurial trait.

3.1. Interpreting the knowledge and motivation estimates

The best models from the above specification clearly show that a firm's propensity to act and innovate is influenced by each item's level of relevance. Firms are also discriminated in their implementation of the various items with respect to their level of latent ability. Both relevance and discrimination parameters account for subjectivity in decision-making and show signs of heterogeneous behaviours in given economic situations. As stated by Shane, the source of opportunity resides in the entrepreneur himself. It depends solely on their personal attributes and does not reflect the situation in which they find themselves (Shane, 2000, p. 218). He adds that "[t]echnological, political, social, regulatory, and other types of changes offer a continuous supply of new information about different ways to use resources to enhance wealth" (Shane, 2000, p. 221).

The above models show that both latent traits are significant. This indicates that the structure of the data hides latent ability indicators. Some regressors for knowledge and motivation significantly influence both traits. The first coefficient for knowledge shows that creators with a medium level education outperform firm creators with a lower education level by 0.267 logits in the initiative trait and 0.037 logits in the novelty trait.[86] The supplementary margin for higher education is, however, very low and non-significant. The length of experience in the sector has a negative impact on the traits. It indicates that novices have a greater tendency to act and innovate than experts. The former hierarchical level also favours both propensity levels. A positive margin on novelty is to be observed at the employee level and above. Such a margin is detected in the initiative traits only above the manager level. Having a professional, customer, or entrepreneurial network and living in an entrepreneurial entourage also positively influence both abilities. In addition, being a man increases the propensity to act but does not influence the propensity to innovate. Finally, the motivation to stay small reduces the probability to express both traits while the will to grow strongly supports them. All these elements support hypothesis B1, which states that firms' knowledge and motivation are positively related to the initiative and novelty patterns.

3.2. Investigating the traits' underlying distribution

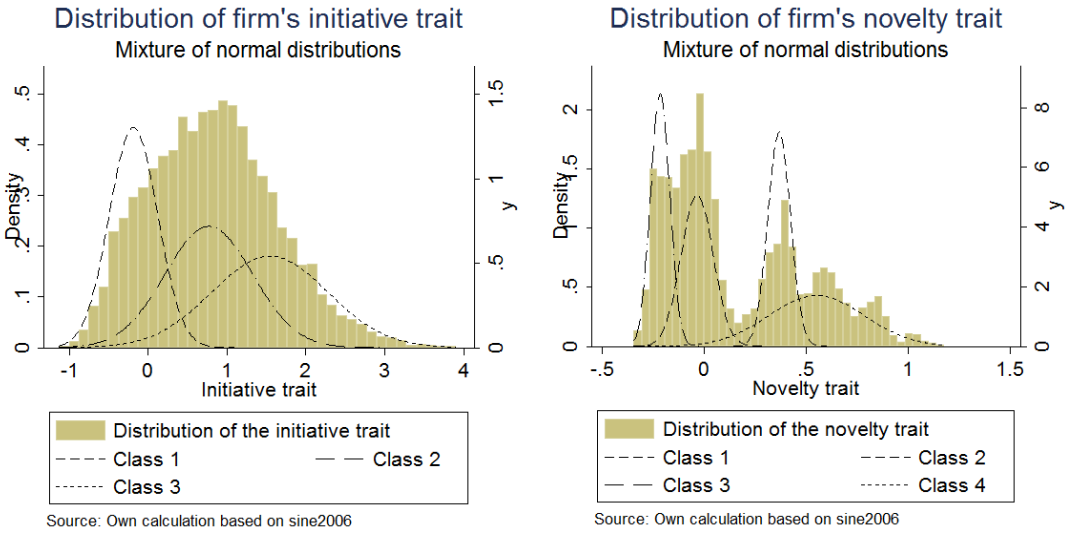
Hypothesis B2 and B3 assume that both traits are normally distributed in the population. Figure 25 shows their distribution. The left graph seems to be close to a normal distribution at first sight, but the right graph is far from being homogenously distributed. This poses a problem for combining the traits into one indicator for entrepreneurship because the population is obviously segregated into different sub-classes regarding its propensity to innovate. A deeper investigation of the underlying structure of both latent traits is proposed in the next subsection based on a finite mixture model (FMM). This approach also belongs to the class of latent variable methods. In such a model, "a discrete unobservable variable with *K* categories is assumed to exist" and influence the populations' distribution (Vermunt, 2008, p. 33). The goal of the FMM is to measure this variable by approximating the statistical distribution of both latent traits by a mixture (or weighted sum) of sub-distributions. This is visually represented in Figure 25, where the corresponding normal sub-distributions are drawn over the histograms, which clearly rejects both hypothesis B2 and B3.

The distribution of the latent traits is far more complex than expected. The FMM method allows the extraction of a natural representation of the population heterogeneity in a finite number of latent classes. This method can be used to build complex models and directly regress covariates on the underlying component.[87] In the present case, I only build FMM models with a constant to create categories of firms with respect to their ability traits. The probability of each firm belonging to a subpopulation is then computed, offering an objective tool to attribute the firm to statistically defined categories.

[86] See Zheng (2007, p. 331) for model interpretation.

[87] See *Ibid*. for a formal presentation of latent class and finite mixture models.

Figure 25: Distribution of a firm's propensity to act and innovate



The calculation is realised with the Stata package FMM and the results are presented in Table 10. The value of the constant represents the mean ability for each class for the explained variables a_i and n_i resulting from models A3 and N3 in sections 2.1 and 2.2. I artificially constructed four models going from two to five classes for each trait. The BIC criterion is used to select among models with respect to their measure of fit. The initiative trait shows an inflexion point at three classes and the novelty trait at four classes.

Table 10: Result table: the finite mixture models on initiative and novelty traits

Ind. variable	a_i	a_i	a_i	a_i	n_i	n_i	n_i	n_i
Regression type	FMM	FMM	FMM	FMM	FMM	FMM	FMM	FMM
class 1								
Constant	-0.069	-0.186***	-0.346***	-0.323***	-0.096***	-0.035***	-0.036***	-0.035***
	(0.035)	(0.027)	(0.072)	(0.071)	(0.002)	(0.003)	(0.003)	(0.003)
Class 2								
Constant	1.001***	0.770***	0.132	0.265	0.491***	0.487***	0.366***	0.373***
	(0.020)	(0.040)	(0.132)	(0.221)	(0.005)	(0.005)	(0.005)	(0.006)
class 3								
Constant		1.543***	1.617***	2.459**		-0.212***	-0.218***	-0.216***
		(0.135)	(0.197)	(0.876)		(0.003)	(0.003)	(0.003)
class 4								
Constant			0.880***	0.922***			0.549***	0.471***
			(0.067)	(0.226)			(0.013)	(0.058)
class 5								
Constant				1.367**				0.798***
				(0.460)				(0.084)
Ll	-1.20e+04	-1.19e+04	-1.19e+04	-1.19e+04	-1255.655	-948.419	-804.074	-794.869
Aic	23995.54	23836.55	23825.78	23828.17	2521.310	1912.837	1630.147	1617.737
Bic	24031.63	23894.29	23905.18	23929.22	2557.400	1970.581	1709.546	1718.789

Note: $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$. Standard errors in brackets.

The FMMCL command calculates the *a posteriori* probability of each firm to belong to the three initiatives classes (class 1 = low, class 2 = medium, class 3 = high) and the four novelty classes (class 1 = mean, class 2 = medium, class 3 = low, class 4 = high). It creates "a categorical variable based on the

most likely latent class membership" (Luedicke, 2011). These categories are used below to compute an indicator for the firms' entrepreneurial level.

3.3. Combining the initiative and novelty traits

This final step in measuring the entrepreneurial trait uses a variation of the above latent variable methods to combine both initiative and novelty traits into one indicator. This approach is called the one-parameter partial-credit model (1P PCM). It extends the Rash model to polytomous items with ordered response categories 0, 1, …, $\mathrm{m_i}$ for each item *i*. We can see the current problem of combining both traits (*i*= 2) as one of measuring each firm's probability to be simultaneously attributed to one of the three initiative classes and one of the four novelty classes. The initiative category is interpreted as an item with polytomous responses taking the value 1 to 3 and called "trait 1" (T1). The novelty trait is a second item with polytomous responses 1 to 4 called "trait 2" (T2). T1 and T2 are the new explained variables. The PCM specifies the probability of responding in the *j*th category of item *i* for firm *f* as a function of the firm ability θ_f and a step parameter δ_{ij} $(\mathrm{J} > 0)$ such as the following:

Eq. 66 : $$Pr\left(x_{if} = j \middle| \theta_f\right) = \frac{exp \sum_{l=0}^{j} (\theta_f - \delta_{il})}{\sum_{k=0}^{m_i} exp \sum_{l=0}^{k} (\theta_f - \delta_{il})} \qquad j = 0, 1, \dots, m_i \,,$$

where $\sum_{\mathrm{l=0}}^{0}(\theta_\mathrm{f} - \delta_{\mathrm{il}}) = 0$.[88] The parameter δ_{ij} is known as the step difficulty associated with category *j* of item *i*. Since firms' membership to a category of each item is not optional, the δ_{ij} represent a status and not a choice. The meaning given to this parameter is hence "difficulty". It is therefore expected to be difficult for firms to reach higher initiative and novelty levels. The parameter θ_f symbolises the ability of a firm to simultaneously express the initiative and novelty trait and represents a firm's entrepreneurial level. The linear part of the model now entails a variation across categories in item *i* and is called η_{ijf}. A firm's probability to belong to one category of each item is computed as follows:

Eq. 67 : $$Pr\left(x_{if} = j \middle| \theta_f\right) = \frac{exp(\eta_{ijf})}{\sum_{k=0}^{m_i} exp(\eta_{ikf})} \qquad j = 0, 1, \dots, m_i \,.$$

For an item with 4 categories, the value of η_{ijf} is measured as follows:

$when\ j = 0,\ \eta_{ijf} = 0,$

$when\ j = 1,\ \eta_{ijf} = 0 + \left(\theta_f - \delta_{i1}\right),$

$when\ j = 2,\ \eta_{ijf} = 0 + \left(\theta_f - \delta_{i1}\right) + \left(\theta_f - \delta_{i2}\right) = -\delta_{i1} - \delta_{i2} + 2\theta_f,$

$when\ j = 3,\ \eta_{ijf} = 0 + \left(\theta_f - \delta_{i1}\right) + \left(\theta_f - \delta_{i2}\right) + \left(\theta_f - \delta_{i3}\right) = -\delta_{i1} - \delta_{i2} - \delta_{i3} + 3\theta_f.$

[88] See Zheng (2007, p. 315).

The database must be modified to correspond to the following matrix:

$$\underbrace{\begin{bmatrix}\eta_{10f}\\ \eta_{11f}\\ \eta_{12f}\\ \eta_{20f}\\ \eta_{21f}\\ \eta_{22f}\\ \eta_{23f}\end{bmatrix}}_{\eta_{ijf}} = \underbrace{\begin{bmatrix}0 & 0 & 0\\ -1 & 0 & 0\\ -1 & -1 & 0\\ 0 & 0 & 0\\ -1 & 0 & 0\\ -1 & -1 & 0\\ -1 & -1 & -1\end{bmatrix}}_{D_{ijf}} \underbrace{\begin{bmatrix}\delta_{11}\\ \delta_{12}\\ \delta_{13}\\ \delta_{21}\\ \delta_{22}\\ \delta_{23}\\ \delta_{24}\end{bmatrix}}_{\delta_{ij}} + \theta_f \underbrace{\begin{bmatrix}0\\ 1\\ 2\\ 0\\ 1\\ 2\\ 3\end{bmatrix}}_{\lambda_i j}.$$

The results are presented in Table 11 and visualised with a category probability curve (CPC) for each item in Figure 26. The parameter θ_f is significant and has a variance of 0.514. It can be plotted against the probability of belonging to each category of T1 and T2 by computing the entrepreneurial trait as a scaled variable that increases in equal steps from -4 to +4.The graph on the left shows that the category of firms with a low initiative trait is likely to be observed in relation to a low entrepreneurial level and those with a high propensity to act express high entrepreneurship.

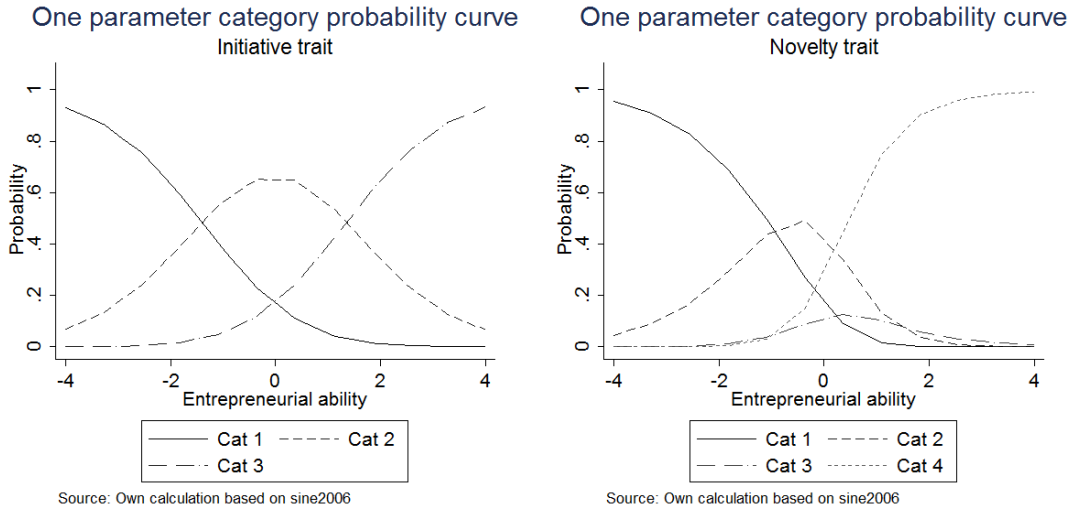
Table 11: Result table: the 1P PCM on the entrepreneurial traits

Model	M43	
Ind. variable	(T_i)	
Regression type	1P-PCM	
δ_{12}	-1.402***	(0.030)
δ_{13}	1.350***	(0.029)
δ_{22}	-0.962***	(0.034)
δ_{23}	1.349***	(0.036)
δ_{24}	-0.897***	(0.040)
θ_f	0.514***	(0.026)
Observations		10077
Ll		-2.19e+04
Aic		43878.943
Bic		43933.927

Note: *p<0.05, **p<0.01, ***p<0.001. Standard errors in brackets.

The category order in the novelty trait induced by the FMM renders the right graph more difficult to read. Indeed, class 1 represents firms that are distributed around the mean novelty trait; class 2 entails those with a level of novelty a bit higher than the mean, called medium; class 3 groups firms which have a low propensity to innovate; and class 4 is composed of firms with a high novelty trait. The right graph clearly expresses a dichotomy between firms in classes 1 and 4. Hence, these firms tend to be highly represented in the population but class 1and class 2 have low and high entrepreneurial trait. The two other categories are related to the mean entrepreneurship.

Figure 26: Category probability curves for the initiative and novelty items



The firm's entrepreneurial score is represented by θ_f, which has a very significant variance measured at 0.514 in Table 11. The trait's distribution is plotted in Figure 27. θ_f naturally ranges between -0.5 and +0.5 and shows three distinct groups (the summary statistics per group are given in Table 12). The first group entails 2,419 firms with a low probability of showing both initiative and novelty traits together. The second group gathers 4,754 firms with average scores in entrepreneurship, and the last group entails 2,904 firms with high entrepreneurial profiles. We now have the desired indicator for the firm's entrepreneurial level to be used in the further empirical analysis of the process theory of organisation.

Figure 27: Distribution of the entrepreneurial trait

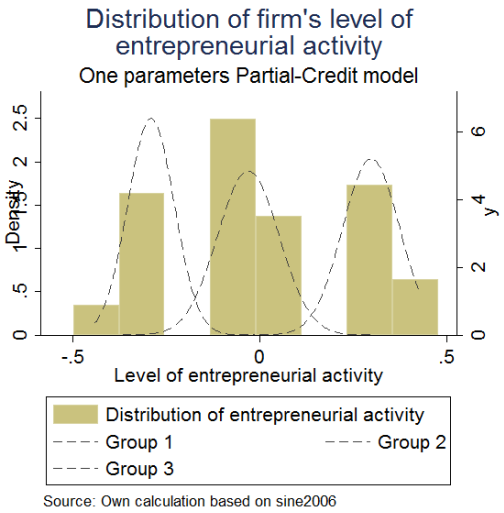


Table 12: Descriptive statistics of the entrepreneurial trait

Categories	N	Mean	Sd	min	max
Low entrepreneurship	2419	-0.33	0.07	-0.49	-0.30
Medium entrepreneurship	4754	-0.03	0.09	-0.10	0.08
High entrepreneurship	2904	0.33	0.09	0.28	0.47

In conclusion, Chapter 7 has proposed a definition of entrepreneurship based on characteristics common to all entrepreneurs and yet specific to them. The review of the literature has indicated that entrepreneurial decisions are distinct from other decision classes because they initiate chains of events which eventually bring innovative changes to the market. This can be observed in firms by measuring their propensity to enact novel economic activity. This complex entrepreneurial characteristic results from firms' dual capacity to have creative ideas and take the necessary initiatives to implement them. This chapter has proposed a methodology to measure a firm's entrepreneurship level based on its observed patterns of initiative and novelty. It assumes that both traits are the expression of a firm's decisions to act and innovate.

3.4. Summary

Both trait analyses show strong support for the hypothesis B1 (i.e. the idea that firms' knowledge and motivation are positively related to the initiative and novelty patterns), which leads to computing two indicators for a firm's initiative and novelty traits. Their distribution in the population is, however, far less homogenous than expected and clearly rejects hypothesis B2 and B3 (i.e. the idea that both traits are normally distributed in the population). A complementary investigation of the underlying structure of the data allows constructing classes of initiative and novelty patterns and categorising firms with respect to their membership probability. The statistical definition of classes is used to combine both indicators into one unique measure for a firm's level of entrepreneurship based on the probability of each firm to simultaneously express both latent traits. This last step of the analysis presents an index for the firm entrepreneurial level describing three mutually exclusive groups with low, medium, and high entrepreneurship. A class of entrepreneurial firms therefore seems to exist in the data. If one accepts the idea that entrepreneurship is expressed by firms' joint propensity to act and innovate, there is little doubt that firms differ from one another with respect to their underlying traits. This is strong support for the Austrian view that each economic actor can be an entrepreneur while this trait is heterogeneously distributed among the population. Further investigations about a firm's entrepreneurial level are proposed in Chapter 10. This trait will be analysed together with the organisational trait in the broader framework of firm performance. For the time being, the expression of the organisational function needs to be measured as proposed in the chapters that follow.

Chapter 10: Organisational ability and its characteristics

The process theory of organisation presents the organisational function as the sum of all decisions in firms which lead to efficiently structure and drive the economic process. The structuring force represents all decisions which aim to define the process with respect to an effective implementation of the entrepreneurial vision. It has to be complemented by a driving force ensuring that decisions are effectively implemented, and goals are reached. Organising thus aims to reduce the deviation from the goal through a gain in efficiency. This chapter measures indicators for both structuring and driving activities in IRT models in section 1 and 2 to be used in the later analysis of the formal model of the firm.

1. Measuring a firm's structuring ability

1.1. Model specification and hypothesis testing

The structuring part of the organisational function entails all decisions regarding the structuring activities in the firm. The French database allows extracting information corresponding to the definition of the process elements with respect to the discussion on the structuring activities in Chapter 7. The chosen indicators are expected to measure firms' propensity to generate information in order to make structuring decisions. The young French firms were asked if they had taken the following decisions during the period 2007–2009:

A. Have an active prospection policy;
B. Have implemented strong marketing actions;
C. Have introduced an aggressive price strategy;
D. Have based their procurement strategy on competition;
E. Have increased their network by signing agreements with other companies.

Items A and B are linked to firms' active pursuit of their goal. Aggressive prospection and marketing campaigns are expected to represent the conscious will to validate the business model. It is seen as a proxy for a firm's purposive search for information in order to reach their goal. It is clear that a firm's sales speech is not limited to objective information about the technical characteristics of the products. It entails a subjective component aiming at creating an emotional response and influencing a customer's need for the products and services. Firms hence gain information about the validity of their process by observing the customer's decision to buy. Both items A and B are expected to inform firms on their adequate approach of the market, or in other terms, on the correctness of the orientation given to their business model (e.g. their goal). Item C introduces a price component independent of the correctness of firms' goals. The chosen business orientation might correspond to an existing need, but firms might not be able to tap this profit source with the current organisation. An aggressive price strategy is expected to test if the process structure is adequate to satisfy a customer's needs. In a case

where customers only buy the output for a reduced price, firms have failed to understand the customer's use value for their products. Sources of inefficiencies can be linked to a firm's own use value for the means of production or inadequate organisational structure. Item C is thus regarded as a general element that validates a firm's strategy concerning the organisation that supports the execution of the business model. Item D tests for firms' procurement policy. It is seen as a proxy for using the market rules in buying the necessary inputs for production. Choosing their procurement partners in a competitive game is expected to provide information on a firm's conscious aim at reducing production costs, hence increasing efficiency. Finally, item E accounts for a firm's embeddedness in its economic environment. It is regarded as a proxy for firms' active cooperation with other economic actors that provide information about the market evolution. It is especially expected from firms that positively answer this item to be aware of the best practice regarding production means, labour skills, and general laws and rules constraining or supporting the production process. Item D thus stands for a firm's capacity to implement sound infrastructure with regard to the market. In addition, the fact that all items focus on "active" or aggressive" implementation of process elements indicates that firms create a conscious feedback loop with their environment in order to adequately evolve though time.

Consequently, firms which positively answer these items are expected to increase their probability to tap the market potential defined by the entrepreneurial vision. In other words, firms which have actively prospected the market, implemented marketing campaigns, tested their price structure, obeyed the competitive rules, and activated their network are expected to have gained information about an adequate design for their structural elements in order to best implement their plan. The proposed lecture of the chosen proxies is only valid under the assumption that informed actors use their information in order to improve their situation. As described in Chapter 7, the link between information and action is expected to be decision-making. Consequently, the next subsection tests if the determinants for sound decision (knowledge and motivation) positively influence the underlying structuring pattern. The first hypothesis to be tested is the following:

Hypothesis C1: Firms' knowledge and motivation are positively related to their structuring ability.

The firms' ability to make sound decisions is, however, also expected to be contingent upon the agent's understanding of their situation. Both discrimination and relevance parameters of the IRT are expected to be significant and positive and the second hypothesis to be tested is the following:

Hypothesis C2: Firms' structuring ability is subjective.

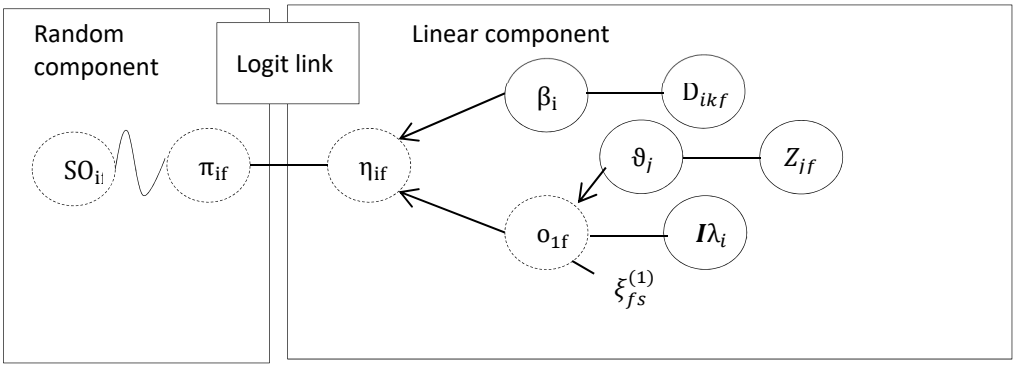
Prior to examining the empirical analysis, it is worth mentioning that the French database does not provide information on firms' internal coordination and motivation mechanisms. This empirical study thus focuses on indicators which are expected to represent the structuring dimensions of the organisational function (SO) by focusing on the definition of the process elements at the firm level. The five SO items are dummy variables taking a value of 1 if firms have implemented an item and 0

otherwise ($SO = \{0,1\}$). They are studied using the same framework as above with model specification "c" (see Appendix E).

1.2. Young firms' structuring ability

Based on the IRT approach, a study of the 5 SO indicators allows extracting response patterns that indicate a firm's ability to take structuring decisions. The model in Figure 28 is the same as presented in Figure 23, but the N_{if} is replaced by the five SO indicators SO_{if} (*i* = 5). This allows measuring the latent trait o_{1f} for each firm following the same procedure. o_{1f} now represents the firms' propensity to take structuring decisions.

Figure 28: Representation of a latent regression 2PL for structuring activities



Source: Own adaptation of the latent regression Rash model in Wilson (2006, p.40)

The new equation can be written as the following:

Eq. 68 : $\eta_{if} = D_{if}\beta + o_{1f}I\lambda_i,$

$o_{1f} = \vartheta_j Z_{jf} + \xi_f^{(1)},$

where $\lambda_1 = 1$ for identification and $\xi_f^{(1)}$ is the disturbance at level 1 (the firm) accounting for the remaining structuring trait after controlling for the Z_{jf}. The results of the calculation are presented in Table 13. The models SO1 to SO3 presents the results of a 1PL, 2PL, and a full model with covariates. The estimates show a slight inversed U-shape relation between education and the structuring ability. Firms, with creators that have a medium education level have a greater propensity to take structuring decisions, but this strongly declines for higher education levels. Following a specific training prior to launching the firm seems to help firms in taking structuring decisions while extensive experience in the field impedes it. These human capital indicators bring a rather mitigated interpretation of their effect on structuring decision-making as discussed in appendix E.

Table 13: Result table: the IRT models on structuring items

Model		SO1	SO2	SO3
Ind. variable		SO_{if}	SO_{if}	SO_{if}
Regression type		1PL	2PL	2PL + cov
β_1		0.614*** (0.023)	0.594*** (0.024)	1.388*** (0.125)
β_2		1.549*** (0.028)	1.590*** (0.046)	2.213*** (0.111)
β_3		1.967*** (0.032)	2.027*** (0.056)	2.137*** (0.065)
β_4		2.281*** (0.035)	2.419*** (0.079)	2.671*** (0.093)
β_5		2.389*** (0.037)	2.268*** (0.039)	2.970*** (0.125)
o_{1f}		0.656*** (0.025)	0.512*** (0.070)	0.648*** (0.050)
λ_2			1.493*** (0.222)	0.857*** (0.072)
λ_3			1.535*** (0.336)	0.379*** (0.056)
λ_4			1.772*** (0.406)	0.606*** (0.072)
λ_5			0.663*** (0.160)	0.778*** (0.076)
Human capital				
Education	Med			0.097* (0.045)
	High			-0.222*** (0.048)
Specific training to launch firm				0.206*** (0.041)
Entrepreneurial experience	1cre			-0.017 (0.045)
	2cre			-0.001 (0.067)
	3cre			-0.049 (0.077)
Prior experience in sector	<3y			-0.040 (0.077)
	3-10y			-0.125** (0.047)
	10y+			-0.212*** (0.044)
Former hierar. level	B			-0.105 (0.092)
	C			0.113 (0.063)
	D			-0.026 (0.084)
	E			0.505*** (0.082)
	F			0.349*** (0.062)
Social capital				
Professional network				0.062 (0.038)
Entrepreneurial entourage				0.279*** (0.044)
Supplier network				0.163*** (0.044)
Customer network				0.701*** (0.085)
Entrepreneurial network				0.474*** (0.072)
Gender				0.122** (0.040)
Nationality				0.254*** (0.071)
Motivation				
Want to stay small				-0.271*** (0.058)
Growth of employment				0.240*** (0.066)
Income growth - loan				0.117 (0.076)
Income growth – dilution				0.036 (0.103)
Projected evolution	S			-0.086 (0.060)
	G			0.439*** (0.054)
Observations		10077	10077	10077
Ll		-2.22e+0	-2.21e+0	-2.16e+0
Aic		44333.72	44319.61	43368.89
Bic		44386.68	44407.89	43695.51

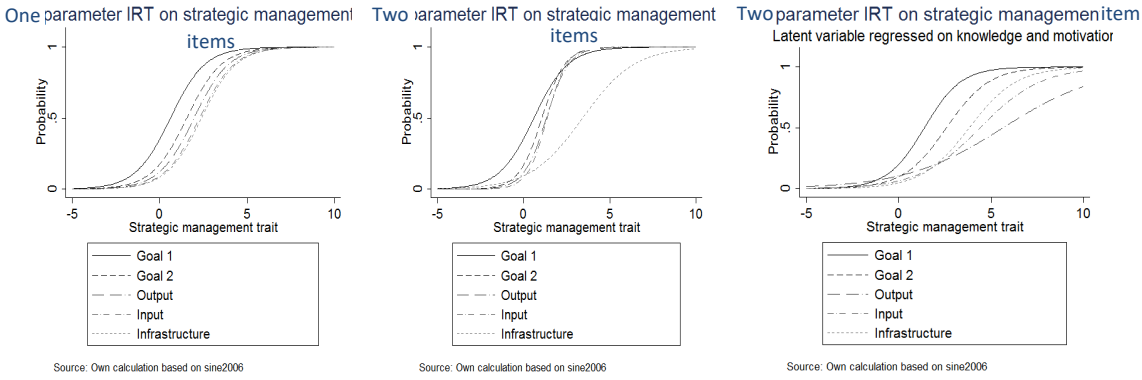
Note: B=worker, C=Employee, D=Technician, E=Manager, F=Top manager, S=Will probably stay same size in the future, G=Will probably grow in the future, *p<0.05, **p<0.01, ***p<0.001. Standard errors in brackets.

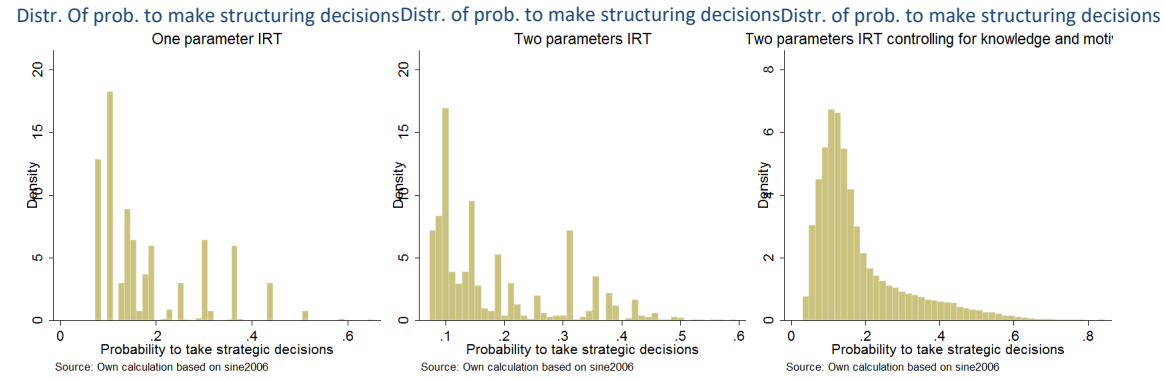
Conversely, all networking measures (except the general professional network) are significantly and positively related to this ability. In addition, being a man or a European also positively influences structuring thoughts. Finally, the motivation to stay small is strongly linked to a lack of structuring decisions in the firms, while the desire to grow shows strong signs of structuring ability. In a way consistent with the interpretation of the βs in the initiative and novelty models, their meaning here is

"relevance" due to the fact that engaging in a structuring item is optional. Both parameters of relevance and discrimination show a positive effect on the probability of taking structuring decisions. Moreover, the propensity to take such decisions o_{1f} is highly significant in all models, and model SO3 is stronger with respect to the AIC and BIC criteria.

The value of the latent trait is plotted against the probability of taking strategic decisions in firms in Figure 29. It seems that firms place a great amount of importance in ensuring they choose the right orientation for their process, with both goal items being the most relevant in the 1PL. The meaning attributed to the λs is the same as in the previous models, and they discriminate firms with respect to the level of ability. Both elements validate hypothesis C2, which states that making structuring decisions is a subjective process.

Figure 29: Item characteristic curve on structuring items





Furthermore, we can see in Table 13 that the relative relevance of structuring item does not strongly variate with respect to firms' structuring propensity. The most notable difference is that the infrastructure item, which accounts for the firms' quest in finding the best existing production means, loses its discrimination power. Its degree of relevance is thus far less dependent on a firm's degree of structuring ability, indicating that a majority of firms recognise the importance of being embedded in their environment. Finally, introducing covariates in the model shows that an increased level of structuring ability is related to a decrease in relevance of the input, output, and infrastructure items. The higher the structuring level, the more importance is given to both goal items. It seems that active prospection and aggressive marketing campaigns are actions taken by firms that have a high

structuring propensity. The interpretation given to both items implies that firms active in structuring activities feel a strong need to have a feedback about the orientation they chose for their business. They constantly need to control that they are on the right path in order to validate their approach of the market. Most of the covariates for knowledge and motivation thus influence the ability to make structuring decisions, which validates hypothesis C1. The second line of graphs in Figure 29 furthermore shows the distribution of firms' probability to take structuring decisions. Increasing the model complexity still leans the distribution of the latent trait. Furthermore, the probability to take structuring decisions observed in the population is higher than that of the novelty and initiative traits and reaches about 20%. One firm out of five is thus expected to express a structuring profile.

2. Measuring a firm's driving ability

2.1. Model specification and hypothesis testing

The driving dimension of the organisational function entails all decisions regarding day-to-day managerial activities. Despite the fact that Insee's survey has not been designed to study the various aspects of the organisational function, three indicators can be related to the current research on the driving activities. Young firms were asked if they had a need for the following elements during the studied period:

A. have been helped by husband/wife for administrative tasks or ICT, or subcontracted the relative services to external firms;
B. have subcontracted sales and marketing operations;
C. have actively managed liquidity issues by bank overdraft, bank loan, 0% loan, discounts, temporally rescheduled payments, the firms' liquidity reserves, or refinancing by shareholders.

Each item is expected to imply a daily monitoring of managerial tasks. Recalling that the mean number of employees in firms reached 1,7 at time of the 2006 survey, item A is regarded as a proxy for the importance firm creators place on administrative tasks that they might not be able to manage alone. A firm which answers positively to this item is expected to consciously try to improve its administration. Unfortunately, this indicator does not allow controlling for firms which internally and efficiently realise these tasks. Item B is regarded as an indicator for the coordination of subcontractors. The informational content of this proxy is expected to be a need to drive and monitor (at least) one external actor to realise the firm's goal. Item B is expected to account for that supplementary operative task. The third item refers to the firms' difficulty to manage their liquidities. It is based on seven dummies taking the value of 1 if firms had recourse to one of the above financial vehicles and 0 otherwise. A variable recording the sum of all seven items is created to represent the intensity of liquidity management in the firm. A proxy for operative liquidity management is created and takes the value of 1 if the firm lies over the median sum score and 0 otherwise. Item C is expected to account for a firm's financial operations intensity. This indicator is built in such a way to express constant

monitoring of financial activities rather than the difficulty to pay monthly expenses. A firm that scores a 1 is regarded as carefully monitoring its liquidity during the 2008 slow-down and the 2009 recession. Firms which give importance to the administrative tasks, the coordination of external contractors, and the management of their liquidities are expected to express operative managerial skills. Once again, the meaning of the proxies is valid under the assumption that actors use information in order to improve their situation and the link between information and action implied by the theoretical approach is expected to occur through decision-making. Consequently, the next subsection tests if the determinants for sound decision (knowledge and motivation) positively influence the underlying driving pattern (DO). The first hypothesis to be tested below is that a firm's driving activities are decisional tasks:

Hypothesis D1: Firms' knowledge and motivation are positively related to their driving ability.

This pattern is also expected to be contingent upon the firm's understanding of their environment. The second hypothesis to be tested is the following:

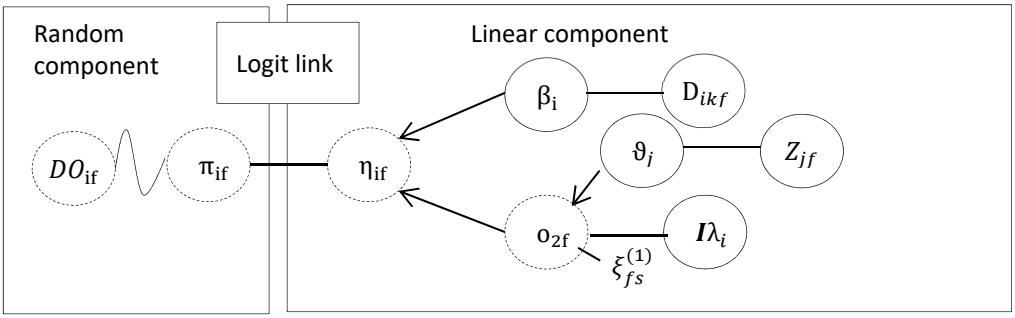
Hypothesis D2: A firm's driving ability is subjective.

This empirical study focuses on indicators expected to provide information on the process's driving force. The three DO items are dummy variables taking a value of 1 if firms have implemented them and 0 otherwise ($\mathrm{DO} = \{0,1\}$). They are studied using the same framework as above with the specification "c".

2.2. Young firms' driving ability

The IRT model studies the three driving indicators in order to extract a response pattern informing on firms' ability to manage their operations. The model in Figure 30 is the same as that in Figure 28, but the $\mathrm{SO}_{\mathrm{if}}$ has been replaced by the three indicators for $\mathrm{DO}_{\mathrm{if}}$ (i = 3). This allows measuring the latent trait $\mathrm{o}_{2\mathrm{f}}$ for each firm following the same procedure. $\mathrm{o}_{2\mathrm{f}}$ now represents the firms' propensity to take driving decisions.

Figure 30: Representation of a latent regression 2PL for driving activities



Source: Own adaptation of the latent regression Rash model in Wilson (2006, p.40)

The new equation can be written as:

Eq. 69 : $\eta_{if} = D_{if}\beta + o_{2f} I\lambda_i,$

$o_{2f} = \vartheta_j Z_{jf} + \xi_f^{(1)},$

where $\lambda_1 = 1$ for identification and $\xi_f^{(1)}$ is the disturbance at level 1 accounting for the remaining driving trait after having controlled for the Z_{jf}. The results of the calculation are presented in Table 14. The models DO1 to DO3 present the results of a 1PL, 2PL, and a full model with covariates. The estimates show a slight decrease in operational ability with a high education level and once again a positive link to specific training. Interestingly, the entrepreneurial experience had no effects on structuring decision-making but the higher this experience is, the higher and the stronger is the increase in probability to take driving decisions. This element corroborates Johannisson's (2011) emphasis on acting over planning. In a way consistent with the entire study, high experience in the focal sector has a negative effect on the ability to drive operations. However, a strong link to the former hierarchical level exists. The higher the previous position was, the greater is the probability of firms to express the driving trait. All network indicators are also significant, which imply a strong effect of social capital. Being engaged in supplier networks, however, decreases the driving ability. This effect implies that firms which tend to engage in such networks also tend to have a low organisational capability for driving tasks. Finally, the motivation to stay small and grow have the expected coefficients and either hamper or amplify the driving ability. Most of the covariates thus tend to significantly influence driving decisions, which supports hypothesis D1. Finally, the relevance and discrimination parameters also have an effect on the probability of taking operational decisions, the propensity to take such decisions (o_{2f}) is highly significant in all models, and model DO3 is stronger with respect to the AIC and BIC criteria.

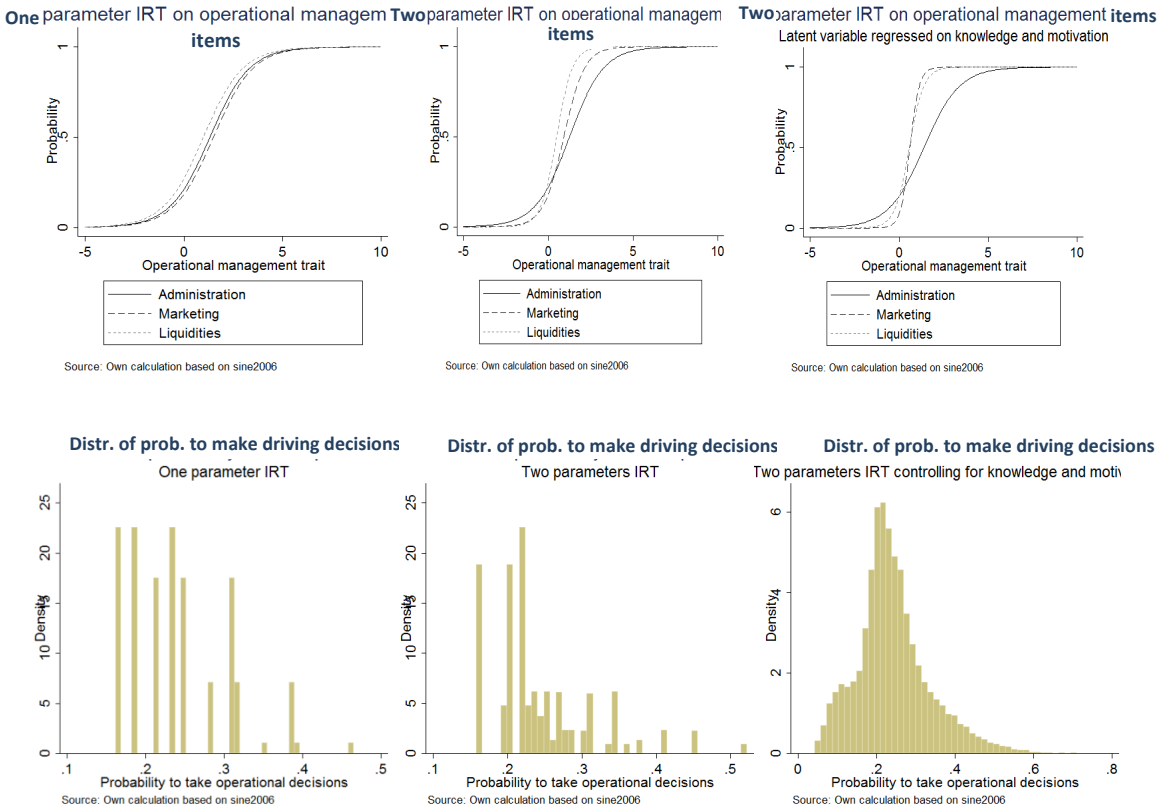
The value of the latent trait is plotted against the probability of taking driving decisions in firms in Figure 31. The difference in relevance for the three items is very small but the increase in model complexity slightly reduces the discrimination level of the administrative item. The second line of graphs shows the distribution of a firm's probability to take driving decisions. The mean probability to be observed in the population is a bit higher than in the structuring models (around 25%) but the firms' distribution around the mean is closer to a normal distribution. The distribution of the structuring trait is characterised by a long tail to the right of the distribution indicating that the mean structuring ability is driven by an ever-increasing trait in an ever-decreasing number of firms. On its side, the number of firms expressing a low driving trait is compensated by the firms with high driving ability. The significance of the discrimination and relevance parameters as well as these distributions of the trait tend to support hypothesis D2 that driving decisions are subjective. Both structuring and driving traits can now be used in the model of firm performance to control for the effect of the organisational function in the next chapter.

Table 14: Result table: the IRT models on driving items

Model		DO1	DO2	DO3
Ind. variable		DO_{if}	DO_{if}	DO_{if}
Regression type		1PL	2PL	2PL + cov
β_1		1.319*** (0.028)	1.253*** (0.028)	1.388*** (0.054)
β_2		1.496*** (0.029)	1.512*** (0.049)	2.305*** (0.161)
β_3		0.989*** (0.025)	1.066*** (0.056)	1.399*** (0.105)
o_{2f}		0.685*** (0.033)	0.443*** (0.063)	0.234*** (0.033)
λ_2			1.647*** (0.311)	3.811*** (0.559)
λ_3			2.163*** (0.558)	2.454*** (0.347)
Human capital				
Education	Med			0.020 (0.016)
	High			-0.114*** (0.022)
Specific training to launch firm				0.089*** (0.018)
Entrepreneurial experience	1cre			0.019 (0.016)
	2cre			0.048* (0.024)
	3cre			0.080** (0.029)
Prior experience in sector	<3y			0.028 (0.027)
	3-10y			-0.005 (0.016)
	10y+			-0.068*** (0.017)
Former hierar. level	B			0.069* (0.033)
	C			0.102*** (0.025)
	D			0.060* (0.031)
	E			0.109*** (0.031)
	F			0.063** (0.023)
Social capital				
Professional network				0.045** (0.015)
Entrepreneurial entourage				0.099*** (0.020)
Supplier network				-0.056*** (0.016)
Customer network				0.137*** (0.034)
Entrepreneurial network				0.125*** (0.029)
Gender				-0.003 (0.014)
Nationality				-0.008 (0.024)
Motivation				
Want to stay small				-0.066** (0.023)
Growth of employment				0.089*** (0.026)
Income growth - loan				0.167*** (0.035)
Income growth - dilution				-0.010 (0.036)
Projected evolution	S			0.004 (0.021)
	G			0.147*** (0.027)
Observations		10077	10077	10077
Ll		-1.65e+0	-1.65e+0	-1.61e+04
Aic		33045.50	33034.98	32272.42
Bic		33078.77	33084.88	32546.87

Note: B=worker, C=Employee, D=Technician, E=Manager, F=Top manager, S=Will probably stay same size in the future, G=Will probably grow in the future, *p<0.05, **p<0.01, ***p<0.001. Standard errors in brackets.

Figure 31: Item characteristic curve on driving items



Chapter 11: The impact of management on firm performance

According to the process theory of organisation, the conduct of the firm is composed of the combined entrepreneurial and organisational functions which consist of two complementary sets of abilities used to cope with the positive and negative effects of uncertainty in the business environment. This chapter extends the model presented in Chapter 8 to integrate the conduct. Section 1 presents the final model of firm performance including the managerial ability. Section 2 presents the hypothesis to be tested in the model, and section 3 presents the findings.

1. The final model of firm performance

The model of firm performance presented in Chapter 8 is extended to entail indicators for the managerial function in firms. The new notation complements Eq. 52 to Eq. 62 and Figure 20 as follows:

Level-1 model: the firm

Eq. 70: $\eta_{ifs} = D\beta_i + \theta_{fs}^{(1)} I\lambda_i + \vartheta_{ij} Z_j$ *measurement model;*

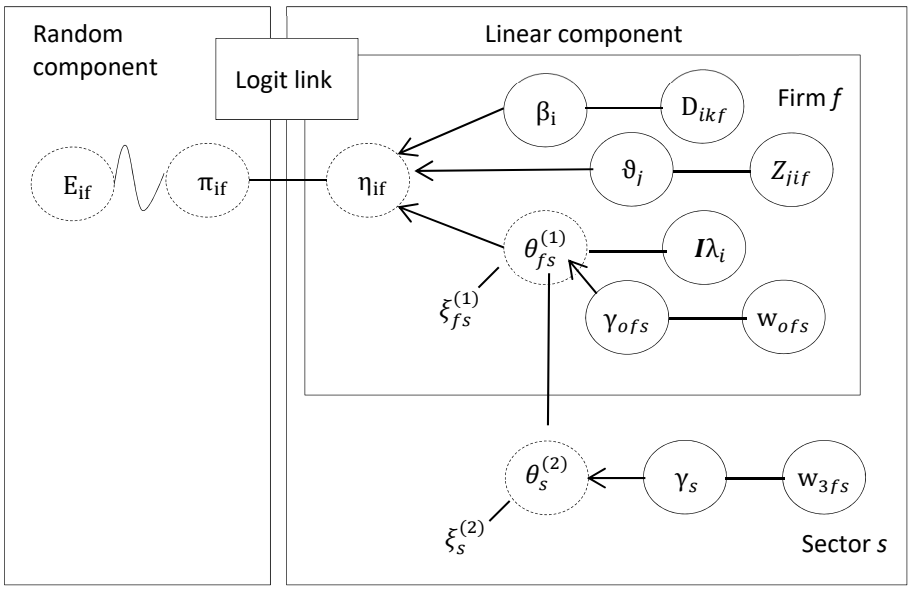
Eq. 71: $\theta_{fs}^{(1)} = \xi_{fs}^{(1)} + w_{ofs} + \eta_{is}$ *structural model;*

Level-2 model: the sector

Eq. 72: $\eta_{is} = \theta_s^{(2)}$ *measurement model;*

Eq. 73: $\theta_s^{(2)} = w_{3fs} + \xi_s^{(2)}$ *structural model.*

Figure 32: Representation of the full model



Source: Own adaptation of the latent regression Rash model in Wilson (2006, p.40)

In Eq. 70, effectiveness still depends on the goals' intercepts, the discrimination parameter, a latent variable measuring efficiency of the process at the firm level $\theta_{fs}^{(1)}$, and a set of covariates Z_{fs} representing the input and infrastructure. Organisational covariates w_{ofs} (o = 2) are introduced in Eq. 71 at the firm level. They represent firms' structuring (SO_{fs}) and driving (DO_{fs}) decision patterns measured in Chapter 10. They are regressed on $\theta_{fs}^{(1)}$ and their impact is described by the estimates γ_{ofs}. An entrepreneurial index for firms $w_{3fs} = ent_{fs}$ is introduced at the sector level. It represents the entrepreneurial pattern measured in Chapter 9. It is regressed on $\theta_{s}^{(2)}$ and its impact on sectorial efficiency is measured by the estimate γ_s. The resulting model is presented in Figure 32 above.

The equation in matrix form can now be rewritten as follows:

Eq. 74 :
$$\begin{bmatrix}\theta_{fs}^{(1)}\\ \theta_{s}^{(2)}\end{bmatrix} = \begin{bmatrix}0 & 1\\ 0 & 0\end{bmatrix}\begin{bmatrix}\theta_{fs}^{(1)}\\ \theta_{s}^{(2)}\end{bmatrix} + \begin{bmatrix}\gamma_1 & \gamma_2 & 0\\ 0 & 0 & \gamma_3\end{bmatrix}\begin{bmatrix}so_{fs}\\ do_{fs}\\ ent_{s}\end{bmatrix} + \begin{bmatrix}\xi_{fs}^{(1)}\\ \xi_{s}^{(2)}\end{bmatrix},$$

$$\theta_{fs}^{(1)} = \gamma_1 so_{fs} + \gamma_2 do_{fs} + \xi_{fs}^{(1)} + \theta_{s}^{(2)},$$

$$\theta_{s}^{(2)} = \gamma_3 ent_{fs} + \xi_{s}^{(2)}.$$

Substituting $\theta_{s}^{(2)}$ into $\theta_{fs}^{(1)}$ leads to the overall structural equation for firm efficiency:

Eq. 75 : $$\theta_{fs}^{(1)} = \underbrace{\gamma_1 so_{fs} + \gamma_2 do_{fs} + \xi_{fs}^{(1)}}_{\text{Firm level}} + \underbrace{\gamma_3 ent_{fs} + \xi_{s}^{(2)}}_{\text{sectorial level}}$$

2. Hypothesis testing

It is assumed that the entrepreneurial function generates competitive advantages in order to gain market power and position the firm in an advantageous situation with respect to its environment. The two structuring and driving dimensions of the organisational function are expected to improve effectiveness through efficient organisation and implementation of the entrepreneurial vision. Both assumptions lead to three hypotheses to be tested in the final model.

Hypothesis E1: entrepreneurship has a positive and significant effect on sector-level efficiency

The expression of entrepreneurship at firm level is expected to increase efficiency at the sectorial levels because it influences a firm's outcome conformity and places the firm in an advantageous position in the market. Entrepreneurs' activities of enacting novelty allow them to benefit from an advantage with respect to their competitors. Their "right" appraisal of the future customer needs coupled with their ability to bring changes to the market influence their relative position in the sector. A concentration of entrepreneurial firms in a sector is thus expected to drive up the sectorial margin. The entrepreneurial function is expected to have a significant and positive effect on the sectorial heterogeneity $\theta_{s}^{(2)}$. Importantly, entrepreneurship is not expected to have any impact on firm efficiency $\theta_{fs}^{(1)}$. This is expected to be the role of the organisational function alone.

Hypothesis E2: The organisational function has a positive and significant effect on firm efficiency

Plan conformity at the firm level is expected to depend on both structuring and driving activities in firms. According to the theory, the adequate definition of a firm's internal structure and the energy deployed to implement the process are ways to influence a firm's effectiveness in reaching its goals. The expression of both organisational dimensions is expected to increase the internal efficiency of the firm. In other words, the organisational function aims to ensure the efficient implementation of the entrepreneurial vision. Both indicators for the structuring and driving dimensions of the organisational function are expected to have a significant and positive impact of firm efficiency $\theta_{fs}^{(1)}$.

Hypothesis E3: The organisational function has a positive and significant effect on sectorial efficiency

While the definition of the entrepreneurial function clearly separates it from firm internal efficiency, the argument that a concentration of entrepreneurial firms in specific sectors must influence sectorial efficiency can be extended to the organisational function. There is no reason to expect sectorial heterogeneity to be independent from the organisational function. In other words, it can be expected from both entrepreneurial and organisational functions to influence the sector as a whole. In "Strategic Entrepreneurship: Creating Value for Individuals, Organisation, and Society", Hitt et al. (2011) define the notion of strategic entrepreneurship (SE) as a conjunction of both fields of strategic management and entrepreneurship. While they recognize the similarities and distinctiveness described above, the authors argue that SE entails a central difference. "SE expands the scope to which a firm's wealth-creating outcomes can apply to multiple stakeholders, including society at large" (Hitt et al., 2011, p. 59). In this text, the influence of the entrepreneurial activity on the system is recognised as a creative effect of process execution. However, the focus on efficient process execution must have an impact on internal organisation and on the external environment by increasing price and quality competition. While Hitt et al. attribute this trait to entrepreneurs, the above analysis clearly shows that this results from a different use of terminology. The third hypothesis thus tests if firm organisational activities also impact efficiency at the sectorial level.

3. The findings

Prior to introducing the new variables in the model, this section studies the underlying structure of the entrepreneurial and organisational indicators to see if they can have unexpected impacts on the overall results. While their measurement is based on independent indicators, their measured value can be related, as expressed by the hypothesis. The theory can hence not distinguish which variable is supposed to have a sectorial impact and possible interdependence among indicators can lead to biased estimated. This section also presents the result of different model specifications to test for the three hypotheses and proposes a plausibility analysis for the given results.

3.1. A study of a firm's entrepreneurial and organisational traits

Table 15 shows the correlation index between the entrepreneurial, structuring, and driving indicators. We see that the level of entrepreneurship in firms is not correlated to the others. A link exists between

the structuring and driving indicators, but it is too low to expect collinearity. It is secure to consider them independent and discard the existence of possible bias due to measurement.

Table 15: Correlation between the managerial indexes

	$\mathrm{ent}_{\mathrm{fs}}$	so_{fs}	$\mathrm{do}_{\mathrm{fs}}$
$\mathrm{ent}_{\mathrm{fs}}$	1.000		
so_{fs}	0.013	1.000	
$\mathrm{do}_{\mathrm{fs}}$	0.005	0.136*	1.000

Note: * significant at the 10% level

Furthermore, Table 16 and Table 17 show the summary statics for the standardised value of each indicator and their sectorial mean sorted by the value of $\mathrm{ent}_{\mathrm{fs}}$.

Table 16: Summary statistics for managerial indexes

Variables*	Obs	Mean	Sd	Min	Max
$\mathrm{ent}_{\mathrm{fs}}$	10'077	0	1	-1.728	2.085
$\mathrm{so}_{\mathrm{fs}}$	10'077	0	1	-2.495	4.055
do_{fs}	10'077	0	1	-2.357	3.600

Note: * standardized value with mean=0 and sd=1

Table 17 is divided into three segments with sectorial mean score of entrepreneurship ranging from over 0.1, between 0 and 0.1, and under 0. We can see that the extractive industry simultaneously displays the highest entrepreneurial and structuring means and the lowest driving mean (note that this sector entails only 4 firms). More generally, the first segment seems to display rather positive structuring scores and negative driving scores. The sector of financial activities and insurance has the next highest structuring score and is to be found in the lowest entrepreneurial group. It is followed by the sectors of real estate and commerce and vehicle repair with a structuring (and driving) mean score above 0.1. The sectors with only a high driving score (above 0.1) are those of hotel and restaurant, entertainment, other services, and construction.

The independence of the latent variables has been confirmed. The table shows that each firm evolves in a seemingly subjective environment and lends importance to either the entrepreneurial or organisational function.

There is no clear relation between entrepreneurship and organisational capacities which indicates that both functions are different aspects of managing a firm. This is confirmed by the sectorial analysis of the three indicators which does not give a clear-cut image of firm's sectorial behaviour. We can hence assert that firms engaging in entrepreneurial activities do not necessarily possess strong organisational skills and vice versa. The entrepreneurship literature's tendency to couple both opportunity enactment and organisational skills as pillars of the entrepreneurial activity seems not to hold. The next subsection adds the three indicators to the formal model of the firm to confirm these findings and to test for the above-mentioned hypotheses.

Table 17: Mean values of managerial indexes per sector

Industry	Number	$\mathrm{ent}_{\mathrm{fs}}$	so_{fs}	do_{fs}
Extractive industry	4	.383	.659	-.379
Production and distribution of water	29	.149	.169	-.313
Information and communication	677	.145	.069	-.078
Teaching	321	.129	-.117	-.071
Health and social actions	886	.086	-.453	-.273
Production and distribution of electricity and gas	15	.084	-.372	-.170
Hotel and restaurants	847	.075	-.078	.181
Manufacturing industry	187	.074	.080	-.033
Commerce, vehicles repair	2'635	.071	.103	.110
Specialised, scientific, and technical activities	1'843	.020	-.115	-.209
Entertainment	187	.005	.157	.181
Other services	258	.000	.055	.182
Administrative services	526	-.034	.097	-.008
Real-estate	607	-.218	.171	.268
Financial activities and insurances	354	-.334	.400	.075
Construction	269	-.343	.040	.147
Transport and stock	432	-.388	.067	-.059
Total	10'077	-	-	-

Note: * standardized value with mean=0 and sd=1

3.2. Introducing managerial indicators in the model of firm performance

The results of the new calculation are presented in Table 18. Model 5 has already been presented in Table 7 and is repeated here for comparison. Models 6 to 9 present different model specifications with respect to the entrepreneurship and organisational indicators. All multi-level structural equation models entail relevance parameters β_i for *i* = 4 goals (increase income, employment, investment, and the customer bases) and discrimination parameters λ_i.

Each model controls for the level of input, capital, labour, and rules in the measurement of effectiveness (based on model 5). They also entail a random effect at firm and sector level accounting for heterogeneity. In addition, Model 6 controls for the three covariates for entrepreneurial, structuring, and driving activities on firm efficiency. Model 7 presents the final model described in the above section 1 with the entrepreneurial function regressed on sectorial efficiency and both organisational indicators regressed on firm efficiency. Finally, model 8 regresses the three indicators on sectorial efficiency and model 9 controls for sectorial conjuncture by introducing the sectorial mean income increase in the specification.

Table 18: Result table: Firm model with managerial covariates

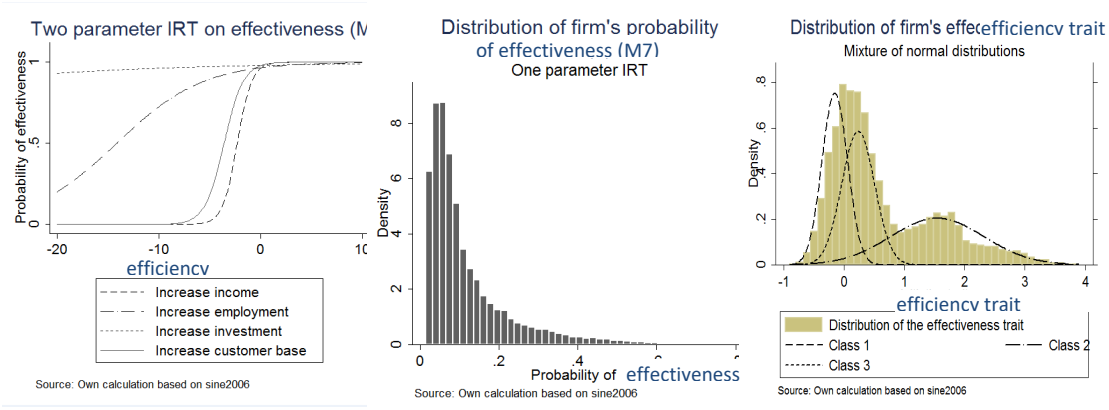
	Model 5		Model 6		Model 7		Model 8		Model 9	
β_1	4.088***	(0.867)	3.220***	(0.151)	3.219***	(0.149)	3.421***	(0.219)	4.511***	(0.754)
β_2	3.012***	(0.067)	3.303***	(0.099)	3.309***	(0.099)	3.410***	(0.090)	4.626***	(0.760)
β_3	3.745***	(0.081)	3.877***	(0.106)	3.881***	(0.106)	4.140***	(0.101)	5.196***	(0.761)
β_4	2.939***	(0.107)	3.797***	(0.181)	3.814***	(0.182)	3.423***	(0.124)	5.136***	(0.781)
Effect of Input on effectiveness (x)										
Income (ϑ_{11})	0.545***	(0.155)	0.317***	(0.075)	0.316***	(0.075)	0.367***	(0.087)	0.317***	(0.075)
Employment (ϑ_{12})	0.624***	(0.070)	0.612***	(0.071)	0.612***	(0.071)	0.581***	(0.071)	0.614***	(0.071)
Investment (ϑ_{13})	0.938***	(0.087)	0.935***	(0.087)	0.935***	(0.087)	0.898***	(0.087)	0.937***	(0.087)
Customer (ϑ_{14})	0.029	(0.081)	-0.035	(0.089)	-0.036	(0.089)	-0.024	(0.084)	-0.034	(0.089)
Effect of capital on effectiveness (k)										
Income (ϑ_{21})	1.425***	(0.321)	0.844***	(0.078)	0.846***	(0.078)	0.981***	(0.107)	0.838***	(0.077)
Employment (ϑ_{22})	0.809***	(0.068)	0.765***	(0.069)	0.767***	(0.069)	0.729***	(0.069)	0.765***	(0.069)
Investment (ϑ_{23})	1.125***	(0.081)	1.094***	(0.081)	1.096***	(0.081)	1.043***	(0.082)	1.094***	(0.082)
Customer (ϑ_{24})	0.845***	(0.079)	0.818***	(0.087)	0.823***	(0.088)	0.786***	(0.083)	0.820***	(0.088)
Effect of the labour force on effectiveness (l)										
Income (ϑ_{31})	0.330*	(0.154)	0.178	(0.092)	0.177	(0.091)	0.211*	(0.104)	0.175	(0.091)
Employment (ϑ_{32})	1.207***	(0.075)	1.214***	(0.077)	1.214***	(0.077)	1.193***	(0.076)	1.215***	(0.077)
Investment (ϑ_{33})	0.722***	(0.090)	0.717***	(0.091)	0.717***	(0.091)	0.695***	(0.091)	0.717***	(0.091)
Customer (ϑ_{34})	0.099	(0.099)	0.079	(0.109)	0.079	(0.109)	0.076	(0.102)	0.079	(0.109)
Effect of franchise on effectiveness (r1)										
Income (ϑ_{41})	1.009***	(0.271)	0.523***	(0.111)	0.521***	(0.111)	0.650***	(0.133)	0.518***	(0.110)
Employment (ϑ_{42})	0.260**	(0.100)	0.194	(0.102)	0.194	(0.102)	0.151	(0.101)	0.192	(0.102)
Investment (ϑ_{43})	0.089	(0.121)	0.057	(0.122)	0.057	(0.122)	-0.024	(0.122)	0.055	(0.122)
Customer (ϑ_{44})	0.494***	(0.117)	0.385**	(0.129)	0.383**	(0.130)	0.401***	(0.122)	0.382**	(0.130)
Effect of group belonging on effectiveness (r2)										
Income (ϑ_{51})	0.121	(0.227)	0.051	(0.151)	0.048	(0.151)	0.074	(0.170)	0.054	(0.150)
Employment (ϑ_{52})	0.550***	(0.120)	0.570***	(0.123)	0.569***	(0.123)	0.552***	(0.121)	0.574***	(0.123)
Investment (ϑ_{53})	0.520***	(0.140)	0.542***	(0.141)	0.541***	(0.141)	0.523***	(0.141)	0.546***	(0.141)
Customer (ϑ_{54})	-0.113	(0.171)	-0.133	(0.187)	-0.136	(0.188)	-0.120	(0.176)	-0.131	(0.188)
Random effect at firm level										
θ_f	2.888***	(0.825)	1.410***	(0.120)	1.404***	(0.119)	1.821***	(0.232)	1.383***	(0.115)
Loadings for random effect at firm level										
λ_2	0.200**	(0.071)	0.481***	(0.059)	0.484***	(0.059)	0.328***	(0.060)	0.494***	(0.060)
λ_3	0.099*	(0.041)	0.250***	(0.052)	0.252***	(0.052)	0.161***	(0.046)	0.258***	(0.053)
λ_4	0.368**	(0.142)	1.020***	(0.145)	1.031***	(0.145)	0.654***	(0.132)	1.049***	(0.145)
Effect of covariates on random effect at firm level										
Entrepreneurial trait			0.097	(0.429)						
Structuring trait			0.605***	(0.061)	0.605***	(0.060)			0.601***	(0.059)
Driving trait			0.743***	(0.144)	0.745***	(0.144)			0.747***	(0.142)
Random effect at sectorial level										
θ_s	0.265***	(0.075)	0.185***	(0.044)	0.183***	(0.044)	0.187***	(0.044)	0.161***	(0.041)
Effect of covariates on random effect at sectorial level										
Entrepreneurial trait					-0.540	(0.321)	-0.520	(0.323)	-0.562	(0.321)
Structuring trait							0.420***	(0.035)		
Driving trait							0.713***	(0.107)		
Msec									0.524	(0.300)
Statistics										
N	10077		10077		10077		10077		10077	
Aic	26602.0		26398.63		26395.86		26402.67		26395.11	
Bic	26851.5		26673.97		26671.19		26678.01		26679.05	

Note: “customer” stands for “customer base”, $^{*}p<0.05$,$^{**}p<0.01$,$^{***}p<0.001$. Standard errors in brackets.

The introduction of covariates for both efficiency latent scores induces very little changes in the measurement part of the model. The magnitude of firm level explanatory variables which control for the level of input and infrastructure on firm effectiveness slightly varies but their sign and significance stay very robust across specifications. It can be stated that the level of plan conformity over time is strongly determined by a firm's level of input and capital. In other words, firms with input and capital higher than the median have a stronger chance to be effective in all four goals, which unveils a scale effect. The effect of the labour force on goal attainment shows a reinforcement pattern similar to the prior findings. Firms with a size (in term of labour force) higher than the median have a stronger chance to hit their targets of increasing employment and investment. Hence, an increase in the number of employees seems to generate an increase in plan conformity for goals directly linked to the labour force and the equipment needed to execute the process which is over-proportional. This shows a productivity effect resulting from firm's size in terms of number of employees. The indicators for the immaterial infrastructure that is conditioning the process (the rules) also show the patterns found in model 5. Indeed, firms that are part of a franchise have a higher chance of success for the income and customer goals and those which are part of a group tend to better reach the goals related to employment and investment. Hence, the set of rules, cultures, or institution framing the internal process execution seems to impact plan conformity over time. As previously said, the database at hand unfortunately does not allow further investigation of these aspects.

All random effects for efficiency at firm and sectorial levels are positive and significant. This supports the existence of an underlying efficiency trait at both levels and the idea that the data are hierarchically structured, confirming that all firms belonging to a sector present a clear dependence to their upper-level system. The value of firms' latent efficiency trait is plotted against the probability to be effective in Figure 33. The results of the preferred model (model 7) are presented in this table because the ICCs of all new models are very similar. In all cases, the values of the relevance parameters β_i are now very close to each other, ranging from 3.2 for the income goal to 3.8 for the investment goal in model 7. It could be said that reaching the income goal is the more relevant goal for all firms but the difference in magnitude between the β_i should call for caution. It is safer to infer from these results that firms, which consciously aim at reaching a goal, actually set the conditions to attain their objectives, independent of the goal itself (confirming the findings of Chapter 8). The values of the slope parameter λ_i change for the first time, implying that effectiveness in reaching the income and customer goals highly discriminates among firms while reaching employment and investment goals do not. In other words, only highly efficient firms are able to reach their income- and customer-related goals. It can be inferred from these results that increasing employment and investment are prerequisites for a firm's survival, independent from their efficiency level. Moreover, firms need to find a way to increase internal efficiency prior to focusing on actions leading to an increase of their income and customer base.

Figure 33: Item characteristic curve of the full model

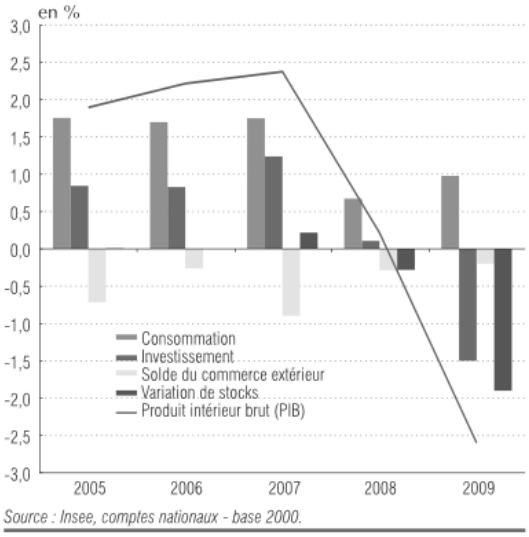


Model 6 entails the three supplementary indicators regressed on firm efficiency. All signs and significance levels correspond to expectations (hypothesis E1 to E3). Both organisational traits have a strong positive influence on a firm's internal efficiency and the entrepreneurial trait has no influence at a firm level. Model 7 thus introduces the entrepreneurship indicator at the sectorial level to test for its influence. While both organisational estimates remain very close, the entrepreneurial trait does not influence sectorial efficiency. Two supplementary models are thus tested to further analyse this situation. Model 8 regresses all three indicators at the sectorial level and confirms that a concentration of efficient firms in a sector influences sectorial efficiency. This change in specification has, however, no impact on the entrepreneurial estimate and standard error. The theoretical interpretation for such a result is that firms are unable to perceive the customer needs during the focal period. According to the process theory of organisation, this implies that entrepreneurial firms introduce inadequate changes to the system and fail to tap into the perceived entrepreneurial profit. Recalling the discussion on the progressing economy, reason—or people's quest to substitute a better situation for a less satisfactory one—sets the economy on a progressing path and creates an ever-changing economy where needs are sequentially better served. Hence, the only theoretical explanation for such findings on the entrepreneurial trait is that entrepreneurial firms formed false expectations about customer needs in France between 2006 and 2009 and were only able to "avoid entrepreneurial losses".

Recalling that the studied period is composed of two years of a normal business climate (2006–2007) followed by a slow-down (2008) and a recession (2009) can explain entrepreneurs' systematically incorrect appraisal of their environment. Figure 34 shows a graph from the French National Institute of Statistics (Insee) describing the economic context during the focus years. All major economic indicators (consumption, investment, external trade, stock variation, and GDP) sharply decreased after 2007 and even turned negative in 2009.[89] This can explain the low rate of plan conformity over the period and the difficulty to form expectations about the future, leading to a temporal absence of entrepreneurial profit in the French economy.

[89] Insee, 2011.

Figure 34: Decomposition GDP in France between 2005 and 2009 (volume)



Model 9 thus introduces the closest possible estimator for sectorial stability available in the database (Msec). It represents the sectorial mean income growth over the period as reported by firm creators. The original indicator takes a value 1 for a strong decrease, 2 for stability, and 3 and 4 for small and strong increase. It is used to compute the sectorial mean and introduced in the specification at sectorial level. This indicator is not significant and does not change the interpretation of the model. The data at disposal thus does not allow inferring that entrepreneurship has a sectorial effect.

In summary, the proposed empirical analysis finds only partial support for Hypothesis E1 which states that entrepreneurship has a sectorial effect only. This study does not confirm the first part of the hypothesis, namely the idea that entrepreneurial firms find advantageous positions compared to their competitors by creating temporary market power. This finding can be mitigated by the poor conjuncture in the studied years which can lead to the absence of entrepreneurial profit in presence of false entrepreneurial expectations. The absence of significance of the entrepreneurial trait at a firm level on the other side supports the second part of the hypothesis, namely the idea that entrepreneurship in not related to internal efficiency. This implies a decoupling of both entrepreneurial and organisational functions in the firm. Furthermore, the empirics strongly support Hypothesis E2 and E3. The presence of both structuring and driving capacities has a strong positive impact on both firm and sectorial efficiency scores. Firm heterogeneity is greatly reduced by the introduction of the organisational indicators in the model which shows that a great part of firm efficiency is explained by organisational skills. Additionally, because all firms belonging to a sector show dependence among each other (significant sectorial heterogeneity), it can be ascertained that a concentration of firms with high organisational traits in a defined sector improves the overall sectorial efficiency. These findings constitute a strong support for the proposed process theory of organisation. Prior to providing a general conclusion on the thesis, the next section proposes a plausibility analysis linking firm efficiency to a firm's effective income increase over the studied period.

3.3. Plausibility analysis

The central graph in Figure 33 above shows the distribution of the firms' probability to be effective after controlling for all elements of the process, including the conduct (organisational and entrepreneurial indicators). The mean probability of being effective to be observed in the population is rather low (13%). Firms' distribution is close to a Poisson distribution with many firms having a low probability of conforming to their plan over time and a long right-hand tail. It indicates that an ever-decreasing number of firms have an ever-increasing probability to be effective. The theory of process organisation assumes that efficient firms have a great odd of success. This has been proven by significant estimates for efficiency in all model specifications. However, for the model to provide a better understanding of the firms' functioning, we should determine if efficient firms have a greater probability of surviving over time. Because the database at hand does not entail an indicator for firm survival after 2009, this section tests the existence of a link between firms' efficiency level and capacity to generate income growth. It follows Wright's argument that firm growth per se is the primary indicator of business success.[90] The following analysis uses the above-mentioned indicator for firm income evolution (1 for decrease, 2 for stability, and 3 and 4 respectively for low and strong increases) assuming that it describes the overall aptitude of the firm to survive.

The income growth indicator is treated as a categorical indicator entailing four mutually exclusive groups of firms distinguished by their ability to generate income growth over the studied period. Table 19 presents the number of firms in each group and the group mean efficiencies (at the firm level). It seems that high efficiency firms have a greater tendency to increase income but the standard deviation in each group casts doubts about mean differences.

Studying the distribution of the efficiency latent trait in the right-hand graph of Figure 33 above shows an explanation for this phenomenon. Indeed, we are once again in the presence of a mixed distribution of firms with respect to their efficiency level. An FMM approach is used to categorise them with respect to their probability to belong to a defined class of efficiency. The results presented in Table 20 show that the trait is better represented by a mixture of three underlying normal distributions with mean efficiencies at -0.153, 0.235, and 1.544.

Table 19: Descriptive statistics of firm efficiency by income growth

Income growth (2006-2009)	N	Mean θ_f	sd
Decrease	1'665	0.38	0.63
Stable	3'181	0.36	0.65
Low increase	3'751	0.70	0.90
Strong increase	1'480	1.32	1.02
Total	10'077	0.63	0.87

Source: Author's own calculations.

[90] Wright (2012), citing Clarysse et al. (2011); Davidsson et al. (2009)

Table 20: Result table: the finite mixture models on the efficiency trait

Ind. variable	θ_f	θ_f	θ_f	θ_f
Regression type	FMM	FMM	FMM	FMM
class 1				
Constant	0.107***	-0.153**	-0.130	-0.133***
	(0.005)	(0.047)	(0.069)	(0.039)
Class 2				
Constant	1.538***	1.544***	1.538***	1.736***
	(0.025)	(0.026)	(0.026)	(0.070)
class 3				
Constant		0.235***	0.265***	0.252***
		(0.056)	(0.072)	(0.047)
class 4				
Constant			0.686***	1.450***
			(0.042)	(0.065)
class 5				
Constant				2.619***
				(0.104)
Ll	-1.06e+04	-1.06e+04	-1.06e+04	-1.05e+04
Aic	21194.323	21144.026	21143.588	21026.514
Bic	21230.413	21201.770	21222.986	21127.566

Note: p<0.05,**p<0.01,***p<0.001. Standard errors in brackets.

Based on the visual representation of Figure 33 and the closeness of mean efficiency in group 1 and 3, I decide to further study the characteristics of two groups of firms by merging these classes into a single low efficiency group. Group 2 hence represents the high efficiency firms. Following Long (2006), I apply a multinomial logit model to study the firm's probability to belong to one of the four income groups conditional to their latent efficiency trait. The conditional category of income is called y_f and takes a value $j = 1, \dots, 4$. The probability of firm *f* belonging to category *j* is the following:

$$\pi_{fj} = Pr(y_f = j) = F_j(\eta_f; \theta), j = 1, \dots, m, f = 1, \dots N,$$

with $F_j(.)$ being the multinomial logit function and θ_f the latent efficiency trait. We are interested in computing the marginal effect of firm efficiency on their probability to generate growth as follows:

$$ME_{fj} = \frac{\partial Pr(y_f = j)}{\partial \eta_f} = \frac{\partial F_j(\eta_f = \theta)}{\partial \eta_f}.$$

Table 21 shows the results of the analysis. The model mlogit 1 shows a positive effect of θ_f on all income categories. A 1 unit increase in efficiency leads to a relative odd of being in the stable category of $e^{0.358} = 1.43$ times higher than being in the base category (decrease income), 2.26 for the low increase category, and finally 1.93 for the high increase category. The marginal effects are plotted in Figure 35 below for ease of interpretation.

Table 21: Result table: a multinomial logit model on firm efficiency

	mlogit 1	mlogit 2
Decreased	Base category	
Stable		
θ_f	0.358***	0.226**
	(0.038)	(0.078)
group==2		0.269
		(0.145)
Low increase		
θ_f	0.819***	0.412***
	(0.035)	(0.072)
group==2		0.834***
		(0.133)
Strong increase		
θ_f	0.658***	0.458***
	(0.036)	(0.074)
group==2		0.402**
		(0.137)
Ll	-1.35e+04	-1.35e+04
Aic	27079.596	27035.536
Bic	27101.250	27078.844

Note: p < 0.05, ** p < 0.01, *** p < 0.001. Standard errors in brackets

Controlling for the group effect in the model mlogit 2 gives similar results and even a slightly better model specification as shown by the AIC and BIC criteria. To understand the results, we must bear in mind that being classified as a high efficiency firm does not necessarily imply an income increase. In comparison to the pool example in Chapter 7, knowing that a player is an expert increases the chances for an observer to rightly assess that the player will place the ball close to the target point but does not reveal any information on a player's effective shot. In the present context, this means that the knowledge that a firm has all characteristics for being highly efficient does not mean that it will effectively increase its income.

To illustrate this fact, Table 22 shows the number of firms belonging to group 1 and group 2 in each income category. We see that about 30% of firms belonging to the high efficiency group have seen their income decrease or stagnate ([306 + 578] / 3'262). Indeed, according to case probabilities, we assume to know some factors which determine the outcome of an even but cannot predict the outcome of a unique event based on this information. We can only infer that a firm belonging to group 2 has a higher chance of increasing its income. In our case, there are 2,853 firms which belong to group 1 and have effectively increased their income over the period (low plus strong increase) and only 2,378 in group 2. In fact, the only case where group 2 can be deemed better at increasing income than group 1 is in the class of strong income increase (982 compared to 498). This descriptive analysis can be improved by plotting the marginal effect from the model mlogit 2 in Figure 35.

Table 22: Number of firms grouped by efficiency and income growth

Income growth	Group 1 (low efficiency)	Group 2 (high efficiency)	Total
Decrease	1’359	306	1’665
Stable	2’603	578	3’181
low increase	2’355	1’396	3’751
Strong increase	498	982	1’480
Total	6’815	3’262	10’077

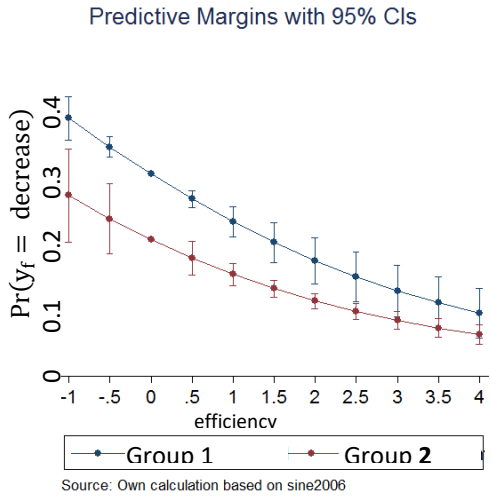
Source: Author’s own calculation

The first line of the graph shows a clear tendency toward a decreasing probability of belonging to income class 1 and 2 (decrease and stagnate) with respect to firms’ efficiency level, while the second line shows a clear tendency to increase the probability to belong to classes 3 and 4 (low and strong increase) for highly efficient firms. Interpreting the group differences shows that efficient firms always have a lower probability of seeing their income decrease and a higher probability to experience a low increase. No group difference exists in the stable and high increase classes.

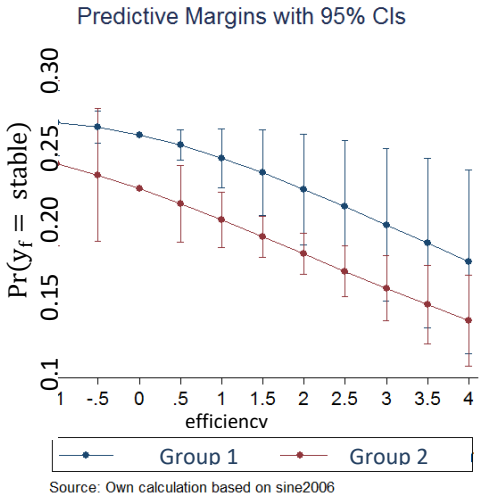
This analysis reveals two very important aspects underlying the current empirical study in line with the case probabilities. First, efficient firms tend to be better able to increase their income than non-efficient firms. Hence, knowing the efficiency level of a firm increases the odds to seeing it succeed. Second, no a priori knowledge about one firm’s efficiency level can lead to an exact prediction of its future success. The above findings tend to support the process theory of organisation as a tool to study firm behaviour and increase our knowledge about the determinant of plan conformity over time, but it cannot predict the outcome of any individual event. It rather aims at describing ideal types and extracting empirical regularities from the observation of historic data in order to understand general economic phenomena.

Concluding the empirical analysis, we can say that it has demonstrated how statistical tools can be used in line with the Austrian understanding of econometrics. Moreover, the specific knowledge gain resulting from the above analysis is (i) a strong support for the hierarchical aspect of organisations implied by the process theory of organisation, (ii) a strong support for the separation of both organisational and entrepreneurial aspects in studying a firm’s performance, (iii) a strong support for the positive impact of organisational skills on internal efficiency, and (iv) an overall validation of the process theory of organisation in line with the case probabilities.

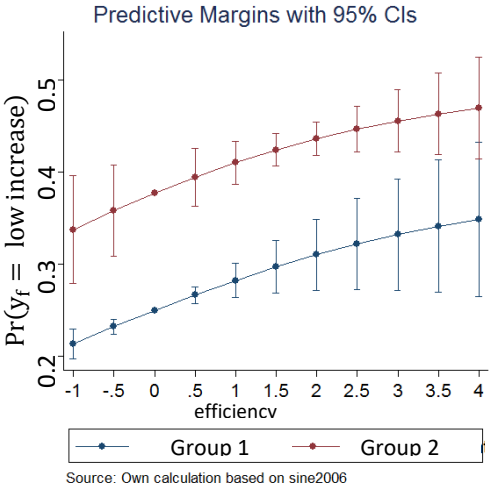
Figure 35: Conditional probability to belong to an income category



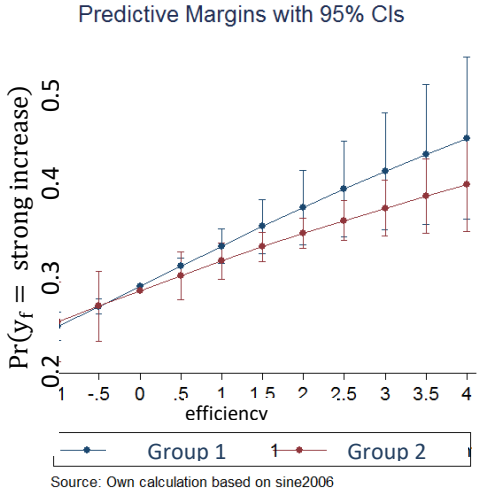
Source: Own calculation based on sine2006



Source: Own calculation based on sine2006



Source: Own calculation based on sine2006



Source: Own calculation based on sine2006

Part IV: Outlook

This thesis develops a theoretical framework to analyse the management of structural changes in business organisations. Its theoretical core is developed over three aspects of the organisational problem at firm-level: a difficulty to design efficient organisations, combine individual information at the highest organisational level, and combine assets with heterogeneous uses to create market power. As explained in the introduction, the common analysis of these problems in economic research is currently hampered by a fragmentation of researchers' views (across and within fields). In reaction, this thesis presents a theoretical framework which (i) allows the simultaneous analysis of the three aspects of the organisational problem and (ii) does not contradict with existing literature on adjacent topics as long as they treat information as limited in some way or another.

The development of the methodological framework consists of describing the organisational dimension of the Miesian praxeology. It leads to presenting the management of structural changes in business organisations as the solution to a managerial problem which occurs in firms. This problem represents a difficulty for subjective organisational participants to continuously ensure outcome and plan conformity over time and, thus, secure a firm's longevity in a progressive economy. Management is regarded as an activity (i.e. a set of tasks that results from decision-making and induces change in the decision-maker's environment) which occurs at every organisational level and aims at ensuring effectiveness in the long run (increasing the degree of goal attainment). Management hence represents human influence on the course of internal actions, i.e. actions occurring within the firm. It entails an entrepreneurial and organisational component which jointly aim at designing the firms' organisational structure and driving operations until process completion. This thesis contributes to the literature by (i) explicitly describing the interdependence between a structural and a behavioural component of organisations, (ii) developing and testing the process theory of organisation which allows dissociating the entrepreneur from its organisational unit, and (iii) clearly distinguishing the organisational and entrepreneurial dimensions of running a firm.

More work is nevertheless required to effectively apply the process theory of organisation to a broader set of economic topics. The development of a praxeological theory of organisation in a Mengerian tradition is believed to provide a generic analytical framework which bridges various contemporary economic perspectives on organisational economics. The embeddedness of processes and the inclusion of institutions as immaterial infrastructure influencing process execution could be analysed in relations to Williamson's (2000) four levels of social analysis, embedded organisational arrangements (Menard, 2014), endogenous institutions and institutional changes (Aoki, 2007), Posner's organisational economics (Posner, 2010; Backhaus, 2010), the economics of identity (Boulu-Reshef, 2013), or Commons' theory of institutions (Chavance, 2012). It could further be studied in light of the dynamics of organisational structures and performance (Hédoin, 2012; Dosi and Marengo, 2015; Landini, 2013) and Hodgsons' (2015) analysis of rules and equilibria. The aggregation of activities

within specialised organisations linked to purposive economic actions can also be studied in relation to experience, routines, and organisational capabilities (Felin et al., 2011; Lazaric, 2011; Witt et al., 2011, Winter, 2011, Pentland, 2011). It could be linked to asset commitment (Gandori, 2010), agency and near-decomposability (Reinstaller, 2007), or internal and external factors of organisational success (Ulen, 2010). Furthermore, the distinction between goals, objectives, and motivations can be related to the research on incentives in complex organisations (Lopes et al., 2009, Aviram, 2010, Roberts, 2010).

The praxeological subjectivity in being and reasoning bears commonalities with the research on conformity and deviation from expectations (Dequesh, 2013), Gronow's (2008) pragmatist critique of institutional theories, and the literature on entrepreneurial judgment (Foss N., and Klein 2015; Godley and Casson, 2015; Hallberg, 2015; McMullen, 2015). This aspect could especially be further studied in relation to dispersed information and similarity/dissimilarity of knowledge (see Foss N. and Klein, 2013). The entrepreneurial function also highlights the link between economic activity and a creative world (Koppl, 2015; Pelikan, 2015). The organisational function bears clear commonalities with the new theory of the firm and could be further developed in line with the Coasian approach to the firm (Loasby, 2015; Pagano and Vatiero, 2015; Shirley et al., 2015), transaction costs economics, the property rights theory, and the principal-agent theory. In addition, further work is needed to compare the process theory of organisation to another literature stream commonly used in organisational studies: the research on management (e.g. the resource and knowledge-based views of the firm, the behavioural theories of the firm, and their evolutionary economic outgrowths).

In conclusion, linking the nature of organisations to human collective actions allows analysing people's interactions within organisations under the light of two kinds of actions: execution (realisation of routines according to a plan) and influence (interference with the course of actions by ways of adaptation and innovation). It implies the existence of complex relationships between individual economies based on the repartition of resources and authority within organisations. In firms, the management of these relationships aims to generate profit based on the heterogeneous use of assets and collective decision-making with dispersed and limited information. For the time being, however, the theoretical development presented above is work in progress. It only sets the foundation for analysing the emergence of new economic activity in general and the nature and dynamics of organisations in particular from a different perspective than those yet proposed in the literature. This is why it does not offer definitive answers to economic questions. It rather exposes a vision of the economy rooted in early Austrian premises that I interpret as suited for the study of modern economic questions. I hope to have shown the potential strength of this analytical framework that I see as a binder between various economic perspectives. In this spirit, I follow Ruester et al. (2009), who "conclude that in order to improve the theory of the firm, competing theories must be integrated" (p.51) and Williamson (2000), who notes about the study of institutions that "pluralism is what holds promise for overcoming our ignorance" (p.595).

Appendix

Appendix A: The Austrian school of thoughts and its evolution

According to Boettke and Leeson (2003), "[c]ontemporary Austrians straddle heterodoxy and orthodoxy within the economic profession. They offer a heterodox critique of formal theory but contribute to the policy consensus that has emerged in the past 20 years that has moved away from state led development to a more laissez-faire position in international and domestic policy" (p.9). They add that "[…] the Austrian school finds [itself] in a strange position with regard to their fellow economists. They believe others have stumbled upon the right answers to many practical policy questions but for the wrong reasons" (p. 9).

This appendix reviews fundamental Austrian tenets to clarify the position held by the author with respect to this body of literature, a position that greatly differs from that of modern scholars of the Austrian School of thought. It is structured as follows. Section 1 presents the evolution of the school's though since its foundation in the 1870s, Section 2 defines some elementary concepts from the praxeological perspective,[91] Section 3 presents selected features of the praxeological progressing economy with relevance in the current context, Section 4 describes the Mengerian empirical-realistic orientation, and Section 5 concludes on praxeological theory building.

1. The evolution of the school's thoughts

Austrian economists have developed their views in reaction to a profound dissatisfaction with the classical focus on optimality. Starting in the late 19th century, they argue that classical economics suffers from a "formal reductionism" in describing homogenous actors evolving in the static framework of perfect competition (Huerta de Soto, 2008, p. 42). With the abolition of economic actors' mechanistic behaviour as main concern, a class of Austrian scholars developed a systemic view of the economy focusing on the market's adjustment process and its path to equilibrium. Joseph Salerno's 1999 article, "The Place of Mises's Human Action in the Development of Modern Economic Thought" reveals that the school's evolution followed multiple non-linear development paths. For ease of understanding this evolution in a condensed (linear) summary, the following subsections focus on the school's views before and after World War II. This cut-off point relates to the importance scholars attributed to the market process as a central tenet of the school's theoretical underpinnings. The below review of the evolution of the school's thoughts describes how the views on this particular Austrian keystone evolved into a wide and heterogonous body of Austrian literature until the present day.

[91] The meaning of the term "perspective" is borrowed from Ciabuschi (2012): "In line with Scott, we define perspective as a conceptual umbrella 'with a number of varying approaches that bear a strong family resemblance (Scott, 1981, p. 55)'".

1.1. Pre-World War II: the rise and fall of the Mengerian causal-realistic approach

Since the 1870s, Menger developed a theory of price in sharp contrast to the contemporary Marshallian and Walrasian general and partial equilibrium. He focused on the causal relationship between economic phenomena and proposed an "all-encompassing, reality-based price theory". The essential difference to contemporaneous authors was his belief in universally valid economic laws with human beings and choices as the appropriate economic unit of analysis. He initiated the marginalist revolution in economic thoughts by explaining that choices are determined by subjective preferences and the margin at which decisions are made (Boettke, 2003, p. 2). His views have been developed in the lines of a causal-realistic method by followers such as Friedrich von Wieser (known for proposing the idea of opportunity costs) and Eugen von Böhm-Bawerk (known for theories of capital and interests).[92]

Between the early 1900s and WWII, Menger's influence in the Austrian school experienced a gradual decay accompanied by a methodological reconsideration of the school's elementary understanding of the market process. A slow fusion of the Austrian and orthodox theories initiated when the latter started absorbing prominent ideas of the former (such as methodological subjectivism, marginalism, and the time structure of consumption and production).[93] As a consequence, the distinction between both perspectives progressively blurred. The doctrine's authenticity faded out until it "could hardly be considered a separate school of thoughts anymore" (Boettke, 2003, p. 1). Authors such as Joseph A. Schumpeter, Friedrich A. Hayek, and their contemporaries were the architects of this fusion.

Both the rising of Marshallian economics and the existence of internal shortcomings regarding the Mengerian paradigm directed the merging efforts. The main reproaches addressed to Menger's work were a "moment-to-moment" description of market price formation and the failure to provide monetary calculation. The focus on instant market price formation rendered any concept of long-run equilibrium unnecessary, thus eliminating the human reality of time horizon. The theory was lacking a description of a "subsidiary and purely imaginary construct of a final equilibrium of price and production" that could "trace out the causal relations that govern the complete and time-consuming adjustment of the structure of resource prices and allocation to given changes in the underlying data of the economy" (Salerno, 1999, p.53). This critique reveals that a Mengerian value imputation mechanism was formulated for higher-order goods (e.g. consumption goods), but "refrained from analysing the pricing and allocation of factors of production in an exchange economy" (Salerno, 1999, p. 53). The failure to provide monetary prices on its side implied that Menger's approach remained essentially a "theory of barter economy". Menger and his followers understood that "economic calculation could only operate with money price and that a realistic theory of price must be a theory of monetary exchanges" but could not bridge the gap between their value theory and a monetary approach (Salerno, 1999, p.56). At the end of the 1930s, the school had lost its attraction and its yet

[92] See Boettke (2003, p.1).

[93] Malchup cited in Boettke (2003, p. 2).

prominent members had gradually transformed the Austrian views into theories in line with the static paradigm of its former opponents.

1.2. Post-World War II: the rebirth of the Mengerian tradition and new school dissensions

The second phase experienced a rebirth of the Mengerian tradition after WWII. It was primarily marked by Hayek's and Ludwig von Mises's participation in the socialist calculation debate and their respective work on "knowledge" and "entrepreneurship" (Boettke, 2003, p. 3) According to Salerno (1999), however, Hayek "was never able to escape the general-equilibrium framework he learned in his youth" (p. 46). It is really Mises's theorising on human action and logic of choice (i.e. praxeology) that brought a whole new credibility to the process of market adjustment and path to equilibrium. Mises's concept of the "evenly rotating economy" and his praxeological approach to economic calculation solved the previous theoretical shortcomings. His work "marked the culmination of the Mengerian approach, and, in a real sense, the rebirth of the Austrian School of economics. The causal-realistic approach now had the great systematic treatise that it required in order to definitively distinguish it from the rival approach to price theory" (Salerno, 1999, p. 58). The school could really depart from mainstream in asserting the importance of studying "sequences of events" of the market process and the related "uncertainty".

New methodological controversies

Theorising on processes and radical uncertainty (or sheer ignorance), however, led to new methodological controversies starting in the 1970s. This time, the dissention focused on three elements: convergence to equilibrium, the question of the theory having a micro or macro emphasis, and the corollary of uncertainty: knowledge. The issue of the equilibrating properties of the market ceased to be a focus of debate at the end of the 20th century and is still currently unsolved (see section 2 below for more on this). It is of great importance from an epistemological point of view but really is a consequence of one's conception of Austrian premises. No right or wrong exists. Equally, while some authors agree on methodological subjectivism, no consensus about the ontology of market phenomena such as prices, profits, and losses—and an individual's knowledge of them—can be found. The consequence is simply that such economic constructs can be seen as purely subjective (e.g. existing in actor's mind) or not. An Austrian study consequently has to be clear with regard to the meaning it gives to market phenomena. Another ontological question which is still opened relates to the existence of macro phenomena independently from their micro corollaries. For some authors, unemployment, inflation, or business cycles are autonomous phenomena. For others, they represent the sheer expression of people's individual actions. Once again, no consensus can be found among scholars on this topic due to differences in understanding of the Austrian theoretical underpinnings (Boettke, 2003, p. 6).

The more serious problem of knowledge can lead to potential elementary theoretical flaws, not only misunderstandings. The different points of view on this topic gave birth to an additional

methodological split among scholars. The disagreement is of less obvious substance than the previous static-dynamic dichotomy and is harder to unveil in modern authors' writings. The foundations for the dissention can be found in Hayek's critiques of the work of Mengerian tradition. He attacks Mises's work, for example, because of a lack of consistent treatment of the problem of "understanding". Seglin writes that, if this is to be true, then the praxeological "[…] theorems must be regarded as, not *necessary* truths about the world, but as empty and arbitrary tautologies referring to a hypothetical society populated not necessary by man 'as such', but by 'understanding man'; not by *homo agens*, but by *homo percipiens* (perceiving man) and, even more crucially, by *homo divinans*–"man who grasps the future" (Selgin, 1990, p. 28).

Serious doubts have been cast on praxeologists' claim to base their theories on universal laws (i.e. assertions that are true independently of time and place) as long as they don't present a consistent treatment of *homo divinans*. If individuals are to be able to form correct expectation about the future, there must be a theory describing how they come to have certain knowledge, or understanding, of what happens further in time. In other words, scholars ask: what are the mechanisms used by individuals to direct their actions "well enough to achieve desired results" (Selgin, 1990, p. 29)? This concern led to the next internal separation between sceptics and praxeologists.

The kaleidic wing

Sceptic authors do not believe that individuals are able to gain any knowledge about the future. They embrace G. L. S. Shackle's radical view that market changes are kaleidic: their signalling property is characterised by the absolute absence of cognizable information patterns.[94] This assertion gave rise to Lachmann's critique on "divergent expectations" which states that, even if market signals express information regarding the past, they lack explanatory power regarding the future. In this view, man has no means of planning or forming expectations (Selgin, 1990, p. 33). With respect to market phenomena, these authors emphasise a lack "[…] of any known 'criterion of success' that can inform entrepreneurs *ex ante* of the future composition of customer demands" (emphasis in the original). People in general—and entrepreneurs in particular—are thus unable to gain any knowledge about other's behaviour. Choices are to be seen as mere haphazard speculations. The inability to increase the probability of decisions to be right makes people simply gamble. An economy, taken in its integrity, regarded over time, and exempt of non-market forces should be a zero-sum game. Markets cannot reflect any tendency toward equilibrium or progress if people cannot influence the results of their decisions. Life is to be understood as "a random, irrational struggle" (Selgin, 1990, p. 46).

As Seglin (1990) notes, the kaleidic critique assumes that praxeology sees a rigid link between today's and tomorrow's patterns of actions or knowledge. It "[…] is based upon a serious confusion of its

[94] According to Selgin (1990, p. 30), Shackle "implicitly equates formal theory with neoclassical theory, the only conceivable basis for pure theory is one that identifies rational action with action that is 'fully informed'". A Kaleidic future is formed of pattern-less information which makes any knowledge gain about future events impossible.

tenets with those of general-equilibrium analysis" (p.45). Praxeology is in fact founded on "activist determinism", not on "fatalist determinism". Actions are determined by ideas formed about ends, knowledge, and understanding.[95] By rejecting the possibility of potentially correct individual mind representations of future events, the kaleidic view denies the existence "of spontaneous orders, coordination, progress, and, fundamentally, social causation […]" (p. 46) For scholars of the kaleidic wing, Austrian thoughts are incompatible with any idea of equilibration mechanisms because individuals can simply not be *homo divinans*.

The "progressing economy"

The other Austrian approach describes a "progressing economy", gives a theoretical justification to *homo divinans,* and provides explanation on two further theoretical shortcomings: it definitely frees praxeology from Walrasian premises and solves the knowledge controversy by redefining market phenomena's subjective meanings with the help of Schultz's definition of ideal-types.

Subjective valuation and understanding

To understand the residual general-equilibrium legacy of Austrian thoughts after WWII, consider the following issue. According to Kirzner, and in line with a praxeological position, it is the role of entrepreneurs to uncover information patterns and exploit them. Kirzner characterises the measure of success of economic activity by entrepreneurial profits and losses. For him, the entrepreneurial action in the market consists of entering mutually beneficial exchange relationships with other market participants. The aim of these exchanges is the reduction of felt uneasiness, which is also consistent with praxeology. The very fact that information patterns exist helps people to orient their action toward success. In return, at least a small portion of them, those who make sound decisions, make profit. Action explicitly results in equilibration by eliminating profit opportunities. The equilibration and knowledge problems are apparently solved.

For Kirzner, however, those who are not alert to "hitherto unnoticed opportunities" do not act entrepreneurially. They are passive price-takers who merely function as general-equilibrium actors under perfect competition, called the Robinsian market participants. From a praxeological point of view, the issue of non-entrepreneurial action is different. Key to understanding this point is to consider profit opportunities from a different epistemological stance. For praxeologists, opportunities have to be viewed as "imagined" or "understood". They have no objective existence "out there" and entrepreneurial profits and losses are subjective phenomena that have "[…] no objective basis outside the mind of market participants" (Selgin, 1990, p. 34). While Kirzner's work is consistent with the notion of progressing economy resulting from "knowledge patterns", it must be distinguished from the pure praxeological standards because of the author's belief in objective opportunities and his

[95] Praxeology holds these ideas as given, separating itself from psychology.

reference to Walrasian concepts.[96] Lachmann's work cited above suffers from the same problem. For him, states of affairs are determined by a set of market conditions objectively defined. He, neither, can depart from Walrasian criteria in his analysis (Selgin, 1990, p. 38).

The important element taught by this historical review is that a subjective valuation and understanding of opportunities makes them "pure mind constructs". This view allows praxeologists to depart from the static reminiscences of the past. Individuals can possibly acknowledge opportunities independently of appreciating them in a "right" or "correct" manner. Imagination is not bound to conform to a certain objective idea of what is right for the economy. Imaginative man is free to make any choice he thinks is in line with his own objectives. From a theoretical praxeological point of view, all market participants can be chronically failing in making Kirznerian discovery while living in a dynamic environment (see subsection 2.5 below on the evenly rotating economy). Praxeology does not need "the static concepts of Pareto optimality and general equilibrium as standards against which entrepreneurial action must be judged" (Selgin, 1990, p. 37). The orthodox and praxeological worlds are different and cannot interlace. The praxeological economy is perpetually moving and this is independent of its actors conforming to any aprioristic behaviour. Praxeology "make[s] sense out of the idea of a tendency toward equilibrium while totally rejecting Walrasian criteria and their implications" (Selgin, 1990, p. 37).

Homo divinans

Understanding the mechanism that brings humans to imagine the future with a certain degree of correctness is related to social causation and Schultz's definition of ideal types. The praxeological argumentation goes as follows: for profit and loss to exist in the head of entrepreneurs, entrepreneurs need to assert them by economic calculation. This is the concept of defining monetary surpluses and losses using market prices. The signals transmitted by prices are thus prerequisites for entrepreneurial decision-making and guidance for entrepreneurial actions.[97] It is the very reason invoked by liberal Austrians in their modern quest against governmental interventions. The "rightness" of decision-making depends on the "correctness" of price signals. For them, prices should be absolutely uninfluenced by governments to correctly inform market participants on market phenomena. Without entering the underlying political debate, it is important to understand that entrepreneurial action transforms ex-ante "imagined profits" into ex-post "monetary profit". A successful entrepreneurial action is only revealed ex-post by monetary remuneration.

The importance of this dynamic statement lies in its consequences on the praxeological definition of "coordination". A coordination mechanism is composed of ex-ante imagined plans, their realisation, and their monitoring. It is based on the belief that regularities exist in sequences of social events,

[96] While Kirzner's views bring interesting insight to the present analysis, they hold an illustrative purpose in the chosen Austrian approach.

[97] This is the reason invoked by the liberal wing in its striving against governmental interventions. The "rightness" of decision-making depends on the "correctness" of price signals. Prices should stay absolutely uninfluenced by governments to correctly provide information on market phenomena.

which allow people to "grasp" the future, imagine profitable actions, design plans aiming at tapping these profits, and successfully realise their strategy. Coordination is a matter of "plan compatibly" over time. To be sure, for people's plans to correspond to reality after some time has passed, imagining man needs to have some capacities of "foreseeing". He bases today's imagined profits opportunities on elements that bring him to think he can be successful tomorrow. He forms expectations. It is his ex-ante imagination, or understanding, of a situation that triggers his actions. His expectations are then revealed to observers through actions. An economic action is only undertaken if its initiator perceives it as potentially beneficial. But the effective outcome of the action can be anything from over-delivery to catastrophe. If human beings tend to succeed rather than fail—which is only possible if they have a degree of control over their actions' outcome —the economy tends to progress. Human reason triggers purposeful actions that set the economy on a progressive path. "Praxeology conceives of a sequence of social events as coordinated in so far as they result mainly in psychic profit rather than psychic loss. The notion of coordination thus becomes a corollary to the praxeological construct of the progressing economy" (Selgin, 1990, p. 43).

From the presentation of the kaleidic future, we know that decisions become guesswork if one cannot form expectations. So, what are the elements that allow praxeologists to conceive the future as non-kaleidoscopic? The answer comes from Schultz and his phenomenological approach to "ideal types". He writes that ideal types are "statements about anyone's action, about action or behavior considered occurring in complete anonymity and without specification of time or place".[98] In a Mengerian tradition, man influences his environment by acting and consequently gives rise to observable things, or phenomena. Phenomena are considered things that manifest themselves, can be observed, and are present in the everyday life. Actions end up revealing individual intentions.[99] For Schultz, the intended meaning given by one individual to his action is a "subjective context of meaning". This meaning is inaccessible to external observers. Observers need to deduct "objective contexts of meaning" from actor's subjective context of meaning by means of interpretation. By mean of experience though, they are able to develop what is called ideal types. "It represents a selection of features or elements considered significant, essential, or exemplary. It is based on or derived from observations of empirical reality and compared with that reality in its formulation but it does not purport to be a fully accurate and complete depiction of that reality in all of its features".[100] The use of ideal types allows man to create order in the surrounding mass of information according to his "understanding" of his environment. [101] Schultz states about ideal types "that members of society are actively engaged in

[98] Schutz, cited in Selgin (1990, p. 25).

[99] See next subsection for a discussion on revealed preferences.

[100] Psathas, cited in Endress (2005, p. 147).

[101] Terms such as "perception", "interpretation", or "grasp" have different epistemological meanings but are used as synonyms in the current context. They are viewed as means to procure "understanding". This term is not used *stricto sensus*. "Understanding" a future phenomenon such as consumer demand is impossible in a world of uncertainty. This is one reason why Seglin talks of *homo divinians* and doesn't use any terminology implying perfect knowledge of the future. When the term "understanding" is used across this study in an ex-ante context, it is to be understood as a justified belief, an expectation that has reasonable chances to be true in the future according to one's subjective context of meaning.

their construction and use, and that sedimented and pre-given types are already present in language, belief, and action systems" (Selgin, 1990, p. 47). Man's reference to ideal types is a mechanism that allows him to "grasp" the future, as well as to imagine the consequences of his actions or those of others even if they are located in the future.

The use of ideal-types in "understanding" is closely related to the mechanism of social causation. This is simply "[…] how a person's actions may bring about a particular set of responses on the part of other people" (Selgin, 1990, p. 47). Successful causation, observable ex-post, requires a certain degree of ex-ante "understanding" from the part of the actor. It acknowledges that this particular understanding has certain value and significance in forming expectations. Man's purposive tentative to influence the outcome of his actions only makes sense in a world where "understanding" is possible. The world is a complex system with conscious parts aiming at improving their state of affairs and having the possibility to understand, to some extent, the consequences of their actions. The actions perpetuated in a world of h*omo divinans* are directed by their reason and give rise to a progressing economy.

2. On methodological individualism and praxeological subjectivism

Any non-evenly rotating economy undergoes constant modifications due to the multitude of individual subjective actions undertaken at each and every point in time (see section 2.5 for a definition of an evenly rotating economy). Each action is carried on by individuals who follow a pre-determined goal. Man is the focus of praxeology in its quality of "acting man". His actions, considered in relation to those of other individuals, form complex collective economies. For Mises, methodological individualism is an epistemological stance presupposing that systems are composed of active parts and that both the parts and the whole are correlative. In his words, "it is uncontested that in the sphere of human action social entities have a real existence. Nobody ventures to deny that nations, states, municipalities, parties, religious communities, are real factors determining the course of human events. Methodological individualism, far from contesting the significance of such collective wholes, considers it as one of its main tasks to describe and analyse their becoming and their disappearing, their changing structures, and their operation" (Mises, 1949, p. 42). In this context, methodological individualism has to be understood in line with Boettke (2003) who says "[u]ltimately, we can trace all economic phenomena back to the actions of individuals; thus, human actions must serve as the basic building block of economic theory" (p. 2).

Methodological individualism, however, has to be considered in relation to praxeological subjectivism. This notion considers subjectivity in the two dimensions of being and reasoning. The emphasis on "being" refers to people's consciousness. Individuals are subjects because they possess the faculty to experience, feel, believe, or want. They can act upon their environment and they distinguish themselves from objects. The emphasis on "reasoning" refers to the fact that things, ideas, or situation are only considered true from the perspective of a subject. This second dimension is of great importance in discussing the progressing economy. It implies that individual can attribute different meanings to the same thing. It has been used to theorise on contexts of meanings above, but it also

allows individual motivations to diverge. The content of motivation, ends, knowledge, or understanding, is nevertheless of no interest to pure theorising. Praxeology is "value-free or nonnormative" (Selgin, 1990, p. 23). Despite being a theory of purposeful action, praxeology does not seek to identify motivations and ends that give rise to particular actions. It acknowledges that motivations and ends are constructs of the mind but does not seek to understand them. Consequently, it cannot define actions as irrational; it cannot judge on the adequateness of an action; it cannot prescribe suitable acts. What it can do, however, is describe economic phenomena according to general laws and ideal-types. It can study social causation and infer that individual's purposeful actions can trigger other individual's reactions. It can also assert that actions have different effects on the system while all effects are not predetermined by human purpose. Furthermore, it acknowledges the presence of heterogeneous action patterns due to subjectivity. Hence, when studying human actions, one must distinguish different levels of implication in execution, degrees of control over the action's consequences, and impact of actions on the system's evolution.

2.1. Mechanical and creative execution of the process

Actions' execution can be schematised by considering them mechanical or creative. Mechanical execution refers to participation to the economic process without alteration. It consists of realising tasks by following pre-determined agendas and not questioning them. Creative execution is intrinsically linked to reflections on how to proceed, what to transform, what to create, and why all of this is done. This reflection eventually leads to modifying the existing ways of realising things and bringing changes to the system. A person expected to be creative from an Austrian point of view is called an "entrepreneur". He or she imagines opportunities based on personal interpretations of the economic environment and exploits them in order to make profit. This activity results in altering the existing state of affairs.

2.2. Intended and unintended consequences of process execution

An alteration of the system can be intended or unintended. Intended alterations modify the system in an expected way. It corresponds to plan conformity over time. The degree of conformity refers to actions' effectiveness. It is a measure of the difference between an action's effective and expected outcome. Unintended alterations have not been planned or foreseen. They participate to generate spontaneous orders that can be observed in any economic environment, but their emergence or evolution cannot exclusively be deemed the result of a human purpose (See Menger, 1883, book 3, on institutions, money, or agglomerations). The individual degree of control over chains of events engendered by actions can thus differ from case to case with respect to human capacity to effectively grasp the future.

2.3. The impact of process execution on the system

While both mechanical and creative actions and their consequences on the system are commonly accepted amongst Austrian scholars, the interpretation of their impact on the system has generated dissention among them. Recalling Section 1 of this appendix, the issue of equilibration depends on one's position regarding praxeological premises. This subsection consequently develops a view on equilibrium based on the presence, or absence, of entrepreneurial profit and presents the actions' impact on the system as equilibrating, disequilibrating, or neutral. In a classical Kirznerian sense, equilibrating consequences of actions bring the economy closer to evenly rotation by reducing the existing entrepreneurial profit through exploitation. Acting in an entrepreneurial way is expected to send signals to new entrants, which eventually reduces the individual shares of total entrepreneurial profit (ex: the iPhone as a precursor for smart phones).[102] Nevertheless, because the economy never reaches optimality, disequilibrating forces must exist and bring the economy further away from the hypothetical evenly rotation. Opportunity exploitation (the equilibrating force) is hence seen in this thesis as implicitly generating new information differentials which can be harvested by entrepreneurs (ex: smart phones and the market for apps). Every new opportunity, be it a Kirznerian system adaptation or a Schumpeterian radical innovation, therefore moves the economic system away from its path to stationarity by altering the state of affairs.

From the point of view of the author, the issue about the existence of disequilibrating forces is hence one of perspective. The focus on one opportunity and its exploitation over time has an equilibrating effect. But once considered in relationship to the whole, it has a disequilibrating effect on other elements of the system through the generation of additional opportunities. This way of describing the impact of actions on the system is in line with the praxeological view of a progressing economy and its path to equilibrium. Finally, a neutral consequence of actions does not impact entrepreneurial profit at all. It does not reduce it; it does not generate new scope for it. It is the outcome of mechanical process execution that exactly reflects market participants' expectations, without possible deviation. It is a theoretical representation of a state of affairs where opportunity generation or exploitation is impossible (ex: in presence of a kaleidic future or in a hypothetical state of evenly rotation).[103]

Such a neutral action has to be distinguished from the absence of action or inaction. For Mises, the only situation where the absence of action can exist is when two people exchange goods. If no mutual profit can be perceived (while freedom of action is guaranteed), both actors decide not to act. In a broader context, their inaction gives others, who value differently the transaction, the opportunity to interact with both primary actors. While the relationship between two actors can reach a Miesian "state of rest", the whole nexus of interconnected actions cannot. A slight epistemological

[102] See Kirzner(1973).

[103] Neutral consequence can be reached in an isolated exchange between two individuals in a Miesian sense (final state of rest).

contradiction thus exists in the mind of authors who simultaneously assert that actions have only equilibrating effects and new information provokes imagination of new opportunities.

2.4. Intended consequences of an entrepreneur's creative action

Any action undertaken in the real world alters the environment.[104] Acting in a world of imperfect information sets up the conditions for changes to occur in the system. Subjectivity of meaning always procures the scope for creativity in purposive actions for people who think differently. Heterogeneous information generates information differentials. People can use them deliberately in a creative way by bearing in mind a subjective meaning different than that of their peers. Only entrepreneurs are capable of doing so in the Austrian view. They are able to understand the market in a manner that non-entrepreneurs do not. Their ways of thinking about markets, opportunities, and profit are intrinsically different. They have the capacity to recognise information differentials, the ability to imagine ways of benefiting from them, and the aptitude to set the necessary conditions to eventually gain from them. What makes entrepreneurs a specific group of economic actors is their capacity to conceive opportunities and deliberately exploit this source for profit. While the actions of each market participant have intended and/or unintended consequences on the economy, only entrepreneurs can execute them in a creative way. Moreover, they are the only actors whose impact on the system can be deemed intended. They change the state of affairs on purpose.

The presence of entrepreneurs in the system constitutes the core reason why an economy cannot reach stationarity. If it were to do so, it would require the complete harvesting of current opportunities together with an abrupt stop of the generation process for direct or indirect new opportunities until exhaustion of all sources for entrepreneurial profit. It implies that current entrepreneurs consciously stop imagining new opportunities and no other individual takes this role until entrepreneurship has vanished. This is the very reason why a situation of even rotation is a mental construct used in the description of economic phenomena without being expected to mirror the economic reality. In real life, each individual action is expected to bring about changes in the system. Recognising these changes as potential profit sources and undertaking the consequent initiatives to exploit them make entrepreneurs "the engine of the economy" (Mises, 1949, p. 249).

2.5. The evenly rotating economy

Recalling the review of the school's thoughts, the concept of evenly rotating economy developed by Mises plays an important role in understanding equilibrating tendencies independently from Walrasian criteria (Mises, 1949, pp. 246-250). It takes the form of a hypothetical state of equilibrium that does not send any impulses to the system. In such a situation, entrepreneurial profit disappears.[105] The economy can be compared to a spinning top in a frictionless environment. It is

[104] See next subsection on actions' scope of system alteration

[105] The entrepreneurial profit is no marginal profit in the classical sense. It is rather a « price margin » on top of a money price that is generated by entrepreneurial activity (see section 1.2 above). While non-entrepreneurs can

"evenly rotating" because it seems static when balanced. This state of affairs is an active economy with passive actors. They perform their economic activity, live their daily lives, but never bring any change to their environment. Creativity doesn't exist; there is no way to alter the system. It is a simple world of pure mechanical process execution where the link between today and tomorrow effectively becomes rigid. Such a hypothetical economy cannot expand, or contract and no element can modify its balance. It has come to a definitive state; it is stationary.

3. Important features of a progressing economy

Relocating Austrian tenets in their systemic context in the last section has prepared the ground for understanding important features of the Mengerian tradition in the below text. They result from a study of economic phenomena in line with a praxeological progressing economy. To be sure, the fundamental praxeological characteristics presented above causes the features described in this section, including such Austrian ideas as customer sovereignty and political individualism. Some features considered important for the study of the role of entrepreneurship and management in the economic process are presented below.

3.1. Marginalism, tastes and preferences, and opportunity costs

In praxeological decision-making, the set of alternatives is oriented by preference and tastes. Preferences and taste influence human valuation and the "gradation" of means. Choosing implies setting aside. In a situation where man has to choose between *a* and *b*, he values either option (or means) with respect to his preferences and chooses one of them (disregarding time which can bring man to access the second option later). If he chooses *a*, "it is manifestation of a judgment that *a* is more intensely desired than *b*" (Mises, 1949, p.201).

Taste and preferences can be studied from the point of view of a chooser or an observer. The chooser faces a set of alternatives and needs to select one of them using a scale of preferences such as the law of marginality. As stated by Menger, this law stipulates that the degree of satisfaction procured by each supplementary unit of a good is inversely related to the degree of satisfaction for the need being satisfied. For example, the first glass of water is more satisfying than the second one. Indeed, the more satisfied a man is with regard to one specific need, the less he feels the need for the marginal unit of a related product. Hence, in technical Austrian terms, indifference does not exist (Block, 1999, p. 23). It is not important how tiny or how little understood the reason for choosing an alternative and setting the other aside are, they must simply exist for a choice to be made. Action could otherwise not be executed.

Preferences are seen as cardinal measures. This means that *a* can be preferred to *b*. The degree of preference differential, however, cannot be measured. Hence, such an assertion as $\frac{\mathrm{MU1}}{\mathrm{P1}} = \frac{\mathrm{MU1}}{\mathrm{P2}}$ is not

pretend to earn marginal profit, entrepreneurs earn marginal profit plus entrepreneurial profit. Entrepreneurial profit vanishes in an evenly rotating economy.

possible because cardinal numbers cannot be divided (Block, 1999, p. 26). If I rank in preferred order 2 units of *a*, 1 unit of *b* and 1 unit of *a*, I cannot aggregate, add, or divide these ranks in mathematical calculation. “It opens a field for application of ordinal numbers, but it is not open to application of cardinal numbers and arithmetical operations based on them” (Mises, 1949, p. 201). For Austrians, however, this law is fundamental to human action because of its relationship to human “valuation mechanisms” and economic calculation. It allows individuals to define monetary values for different alternatives (and thus opportunity cost), make a choice, and eventually act. “The task which acting man wants to achieve by economic calculation is to establish the outcome of acting by contrasting input and output” (Mises, 1949, p. 211). The evaluation method is used to appraise the outcome of past events and estimate the outcome of future events. “Its practical meaning is to show how much one is free to consume without impairing the future capacity to produce” (Mises, 1949, p. 212).

From the observer’s point of view, the chooser’s actions reflect his preferences. The observer can gain knowledge of these revealed preferences. He can infer probable economic behaviours and benefit from a particular market advantage. Marginalism allows people to choose and set aside options, value them according to tastes and preferences, and balance them against alternatives in order to act. The induced actions send signals to the market that alter its state of affairs. The understanding of these signals by system participants is expected to help better satisfy individual needs and overall leads to progress.

3.2. Money and price value

A very important aspect of the Austrian work is the role played by money in the economy. Its predominance is clearly stated in the school’s work. According to Mises, the science of human exchanges, called catallactic, deals “exclusively with what we may call the orbit of economics in the narrower sense, that is, with those actions which within a market society are transacted by the intermediary of money” (Mises, 1949, p. 232). The objects of interest of economic analysis are these acts of exchange. In the Austrian view, money is thus a means for exchange. It is a medium that translates human valuation of goods into cardinal information that can be understood and communicated.

The valuation mechanism is based upon human perception. It is a mechanism that requires time and knowledge. It is impossible for actors to define an optimum price at first. A repeated game is needed to tend to a money price. This includes a learning process. Importantly, the perception focuses on future events only. Only the actor’s opinion about the price of future exchanges counts. A producer is thus interested in the price a consumer will pay for his products at the time of selling it. This expected price can be higher or lower than the current market price. This expectation influences the valuation of all other goods in the market. It is the “[…] anticipation of the prices of the products that determines the state of the prices of the complementary factors of production”. “The past is instrumental in shaping the course of future production and in affecting the prices of the future” (Mises, 1949, p. 233). Mises’s writing is purely concerned with the changes in prices, not their levels. He argues that the level

of the price of a good does not influence a rising or falling of the price for that same good. Levels are an important bit of information to be used in decision-making. They are, however, no determinant of tomorrow's changes in prices. Consequently, entrepreneurs "merely transform what the past has transmitted in better adapting it to the altered conditions" (Mises, 1949, p. 233). Although the topics of money and prices have a great importance for Austrian economists; the valuation principle is the only element that is retained in the present context.

3.3. The fallacy of perfect competition

Austrian authors reject the classical understanding of the term "perfect competition". For them, this represents a state of the market that excludes any type of rival activity. In this case, homogenous actors benefit from perfect information and act in accordance to their objective rationality. They know their environment, maximise at the margin, produce an output with optimal cost structure and sell optimal quantities at optimal prises. The production function and all elements constitutive of the market place pre-exist and are known at any given point of time. The functioning of firms is reduced to a computational problem which solution is fully accessible to all economic agents in the environment.[106] In an economy that has reached this point, firms have no possibility to deviate from the optimum. The law of offer and demand places all actors in a position where they are better off acting in the exact same way than their competitors. Rival behaviours are completely excluded.

This contradiction constitutes the fer-de-lance of the Austrian school's critiques against the neoclassical literature. They design a world view of the economy that avoids this paradox. One consequence of reintroducing rival behaviours in the market is the existence of patterns of action deviating from the hypothetical optimal behaviour. Let's consider the firm under the neoclassical approach to understand this point. A representative firm is described as a production function balancing costs and revenues in order to maximise profit. The chosen functional form typically possesses mathematical characteristics allowing the computation of an optimal solution. Economists generally write the equation and derivate its optimal value to define the conditions for optimality. These conditions can be studied empirically by controlling if the model fits real statistical data. The problem with this approach is the implicit assumption of perfect competition as the state of the world in which the data have been measured. Only under perfect competition can a firm reach optimality. In addition, if one firm reaches this state of optimality, all firms do. The commonly called "representative firm" should thus be named a "model firm". It should be the model that is reproduced by each and every firm in a particular market. They all combine homogenous assets in the same way to realise the same result. There is no distribution of firm around the average firm. No empirical form other than that of the "model" one can be determined. In such a situation, homogenous prices and quantities implies that each firm in the sample should have the same cost/income ratio in their respective market. The impossibility to deviate from the optimal behaviour involves that each firm are

[106] See Kirzner (1973).

equally efficient in producing their goods. In an empirical study, if the cost/income ratio is heterogeneous within markets, the assumptions of perfect competition as a state of the world when gathering the data should be rejected, such as the idea that firms act at optimality.

It is well known that the neoclassical theory gives good results for studying macroeconomic phenomena. It is no less recognised that it lacks empirical support at the micro level. Confusing the "model firm" with a "representative firm" might be one of the reasons for this shortcoming. Austrian economists have avoided this trap by looking for general laws describing economic activity with an explicit mention that firms might deviate from optimality. The Austrian economic analysis of firm behaviour thus consists of defining general laws of firm behaviours and their empirical counterparts aim at controlling if real data tend to corroborate these laws. The idea is thus to measure the probability of firms to behave according to a theory. This approach makes it possible to argue that firms tend to produce an output with a certain input in order to "make profit, or at least avoid losses".[107] An Austrian study can hence measure the probability of an expected behaviour based on real market data and acknowledge at the same time that firms' effective behaviour is distributed around the expected pattern. This distribution results from subjective decision in a world of dispersed knowledge. Each action hence results from a decision based on the subjective meaning the decision-maker gives to his decision process. The consequence is firms' constant striving to bring novel ideas to the market and create new demand for their products and services in order to benefit, at least temporarily, from the related market power.

4. The Mengerian empirical-realist and exact orientations

Menger is critical about many authors' "one-sidedness". He denotes an uncompleted treatment of theoretical issues due to a failure to recognise the empirical-realist complement to exact economic theory. The exact orientation of research tries to explain economic phenomena with a mechanist approach. Menger explains that this view is closely related to one's interpretation of "human motives" as self-interests (Menger, 1883, p. 83ss). He summarises the line of argument in relation to exact laws as follows: "Only when we think of man as always being guided by the same motive, e.g., self-interest, in his economic actions, does the factor of arbitrariness appear to be out of question, only then does each action appear to be strictly determined. Only with the above presupposition are laws of economy conceivable, accordingly, and with them also an economics in the sense of an exact science". For Menger, the task of theoretical social research is "of reducing human phenomena to the expression of the most original and the most general forces and impulse of human nature". For many scholars, he explains, this force takes the form of self-interest as the only determinant of economic action, which is reductive. Consequently, exact economic theories only describe social phenomena in an incomplete way. They need to be completed by other theories depicting social phenomena from different angles. Menger emphasises this point by citing the work of Adam Smith, The Wealth of

[107] See Mises's discussion on the market.

Nations, that he completed with “a theory of moral sentiments, in which he made public spirit as well as self-interest a pivotal point of his work […]”. By defending his view on theoretical economy, Menger (1883) explains that an exact-theoretical researcher “makes the formation of social life the object of his research from the point of view of the free-play of self-interest uninfluenced by secondary considerations, by errors, by ignorance” (p. 88). In contrast, the realistic orientation of research describes general laws or regularities that tend to be observed in the real world. In this view, Menger recognises the possibility of “error”. “Even if economic humans always and everywhere let themselves be guided exclusively by their self-interest, the strict regularity of economic phenomena would nonetheless have to be considered impossible because of the fact given by experience that in innumerable cases they are in error about their economic interests, or ignorant of the economic state of affairs” (p. 88).

5. On praxeological theory building

In conclusion to the Appendix A, praxeologists who want to investigate the theoretical aspect of an economic phenomena “must see the world, not as `understanding’ beings employing `common sense’ to interpret a specific historical event, but as theorist in search of the *logical* patterns that underlie the actions of *all* `understanding’ individuals” (Selgin, 1990, p. 26, emphasis in the original). These patterns are used to define universal laws that hold with “apodictic certainty” (p. 22). These laws describe necessary elements that occur within a sequence of social events and are considered true in every circumstance, independently from any paradigm.

Furthermore, this approach is consistent with subjectivism by referring to “acts of valuation and choice” as exemplified by the law of diminishing marginal utility (Selgin, 1990, p. 23). This law, considered universal, is perceived as a justified true belief. It is an a priori knowledge that is expected to be true in any situation, independent from time or place. It describes people’s inner valuation principle by means of two premises: goods satisfy needs, and man’s ultimate end is to satisfy his needs. This law lets each individual free to value, choose, and act without imposing any positive statement on how or why he should do it.

Appendix B: A calculated example of firm performance with nested processes

The below table represents a model of organisation (O) with $N = 2$ processes, $n_N = 3$ sub-processes (sp_{Nn}), waste and margin = 10% and 30% for each n_N. xe^*_{Nn}, pxe^*_{Nn}, i^*_{Nn}. y^*_{Nn} are randomly drawn from a normal distribution and the cost of infrastructure is assumed to be attributed to each sub-process using repartition keys.

Levels	(1) xe^*_{Nn}	(2) pxe^*_{Nn}	(3) cxe_{Nn}= $(1 * 2) * (1 + w)$	(4) x_{Nn}= $y_{\mathrm{Nn}-1}$	(5) pxi^*_{Nn}= $p_{\mathrm{Nn}-1}$	(6) cxi_{Nn}= $(4 * 5)$	(7) i^*_{Nn}	(8) c^*_{Nn}= $(1 * 2) + 14_{Nn-1} + 7$	(9) c_{Nn}= 3+6+7
sp_{11}	55	104	6’292	0	0	0	5’160	10’880	11’452
sp_{12}	55	79	4’780	45	311	14’130	5’660	25’548	24’569
sp_{13}	30	106	3’498	36	912	33’179	15’090	54’767	51767
sp_{21}	60	107	7’062	0	0	0	10’700	17’120	17’762
sp_{22}	45	110	5’445	55	408	22’234	2’270	31’677	29949
sp_{23}	60	78	5’148	45	905	41’139	14’300	64’233	60’587
O	**90**	**92**	**8’646**	**82**	**909**	**74’318**	**29’390**	**119’000**	**112’354**
Levels	(10) y_{Nn}= $y^*_{Nn}/(1 + w)$	(11) ev^*_{Nn}= $8/(1 - m)$	(12) p= 11/10	(13) r^*_{Nn} 11-8	(14) ev_{Nn} 10*12	(15) r_{Nn} 14-9	(16) $waste_{Nn}$ Eq. 28	(17) $loss_{Nn}$ Eq. 29	(18) cw_{Nn} 13-15
sp_{11}	45	15’543	311	4’663	14’130	2’678	1’561	424	1’985
sp_{12}	36	36’497	912	10’949	33’179	8’610	1’344	995	2’339
sp_{13}	41	78’238	1739	23’472	71’126	19’359	1’979	2’134	4’113
sp_{21}	55	24’457	408	7’337	22’234	4’472	2’198	667	2’865
sp_{22}	45	45’253	905	13’576	41’139	11’190	1’151	1’234	2’386
sp_{23}	59	91’762	1412	27’528	83’420	22’832	2’193	2’503	4’696
O	**100**	**170’000**	**1545**	**51’000**	**154’546**	**42’191**	**4’172**	**4’636**	**8’809**
Levels	(19) w	(20) z	(21) E_{Nn}= (22*23)+24	(22) m	(23) θ_{Nn}= Eq. 41	(24) β_{Nn}= 9/11	(25) $A1_{Nn}$	(26) $A2_{Nn}$	
sp_{11}	10,0%	90,0%	90,9%	30,0%	57,4%	73,7%	90,9%	368,3%	
sp_{12}	10,0%	90,0%	90,9%	30,0%	78,6%	67,3%	90,9%	135,0%	
sp_{13}	10,0%	90,0%	90,9%	30,0%	82,5%	66,2%	90,9%	92,7%	
sp_{21}	10,0%	90,0%	90,9%	30,0%	60,9%	72,6%	90,9%	329,6%	
sp_{22}	10,0%	90,0%	90,9%	30,0%	82,4%	66,2%	90,9%	93,3%	
sp_{23}	10,0%	90,0%	90,9%	30,0%	82,9%	66,0%	90,9%	87,6%	
O	**10,0%**	**90,0%**	**90,9%**	**30,0%**	**82,7%**	**66,1%**	**90,9%**	**91,7%**	

Appendix C: On structuring and driving the firm

This appendix describes the link between economic theories, the authors' understanding of decision-making, and the consequent influence of decision-making on organisational structures. Section 1 presents two elements of decision mechanism that are (i) invariant over time and paradigms and therefore (ii) used in the theoretical development in Chapter 7 as basic elements characterising the functions in firms. These elements are the problem space in which the object of a decision is located, and decision rules used to select amongst alternatives. These notions are reviewed from the point of view of the theories of Bounded Rationality (BR) and the Austrian School of thought (AS), and in reference to the Neoclassical Theory (NT). Section 2 and 3 lay the foundations for separating the structuring and driving components of the organisational ability also described in Chapter 7. The rational for such a separation results from comparing specific organisational features in NIE, BR, AS, and NT. Section 2 also highlights element from each discipline of interest in the current context and shows that AS is the only perspective that explicitly theorises about the need to both structure and drive a firm. Section 2 shows that the driving activity is nevertheless only partially described in AS and explains the need to better understand these different aspects of organising a firm.

1. On decision making in firms

This thesis argues that the problem space and decision rules described below are common to all decision classes and yet specific to all of them. In other words, all decisions consist of making a choice among alternatives within a perceived problem space and each decision class has a specific problem space. The generality of these elements is due to human heuristics—the way humans mentally function—and their particularity is due to subjectivity —the fact that each individual has a different understanding of a given situation. A clear and intuitive connection to the Austrian limited and dispersed information at hand of individuals in a progressing economy exists. The below text proposes a comparison of the BR, NT, and AS perspectives with respect to their views on the problem space and the decision rules.

Defining the problem space

Much of the research on decision-making uses the allegory of chess to mirror real-world properties of choice making. The game consists of two interrelated sequences of moves in which two players repeatedly try to find (i) the best future strategy given the current state of the game and (ii) the accurate evaluation for possible alternatives. The problem space can be represented as a decision tree.

Given the classical assumption of perfect information and unlimited computational power, a complete set of strategies is assessable, and the entire game can be known beforehand. The decision tree representing all possible combinations of moves can be drawn and the best strategy can be measured at each intersection by means of backward induction. The behaviour of perfect maximisation arises

because chess players can choose the best move at any point in time. As Neumann and Morgenstern observed, no probability of future events or possible contingencies enter this neoclassical game.[108] A world of rational agents is a world where the unexpected does not exist, where surprising events have no place.

According to Simon, the limit of rationality starts where an agent's ability stops. He mentions three sources for such limitations. First, actors only have *incomplete information about alternatives* as a consequence of the cost of search. The amount of information gathered by each agent results from an individual resource allocation problem including a constraint linked to search. Second, the *complexity* of the situation prevents the actors from computing the best sequence of actions. The variety and intricacy of decision parameters consequently make agents unable to ascertain the structure of their environment. Third, the existence of these limitations to rationality raises doubts about what strategy other agents would choose in a given situation. Rather than acting in a deterministic way, they chose the following move with respect to their understanding of the situation, introducing *risk and uncertainty* in the individual decision model. An important assumption underlying Simon's work is, however, that information already exists beforehand. Agents can theoretically define the set of possible alternatives by computing information before the game starts. It is their condition of human beings that prevents them to do so. Despite the fact that each branch cannot be accessed, the tree already possesses all branches since the start.

From an Austrian point of view, the total information in the economy is constantly evolving as a result of both spontaneous market corrections and expected convergence to optimal outcomes. Considering that the effect of a decision is located further in time, market participants' knowledge of today's optimal choice cannot be perfect. This ignorance leads to a possible set of undetermined markets outcomes. As time goes, however, market participants learn from the results of their decisions—failures or successes—and they, as well as other participants who access this new information, build a new strategy upon revised sets of decisions. This way of seeing the market results in the existence of a chain of alterations of any "states" of the market in subsequent periods of correction. All market participants are continuously facing an unfolding future composed of the consequences of their own actions. The problem space is constantly redefined, the tree is growing.

The Austrian total incapacity of knowing the future state of the market is called sheer ignorance. A lower level of ignorance is, however, possible due to individuals' ability to recognise patterns of information leading them to make successful choices. People can nevertheless not access all information at any given time because the economy is a sequence of events unwrapping in a chronological order. As each event results from other events, information on period t+1 is a function of information on period t. Because the function of unwrapping events is not known, individuals cannot perfectly predict the future. They can neither access the information they do not have, nor know which information at time t+1 they don't possess at time t. They don't know what they don't

[108] Cited in Simon (1972, p. 165).

know. The principle of ignorance restrains individual knowledge to specialised knowledge resulting from peoples' ability to process and stock information. Individuals therefore act within an informational "silo" whose size and boundaries depend on them. This is the reason why individuals act in a subjective way. Subjectivity simply describes a world where individuals have heterogeneous interpretation of given situations.

The subjective problem spaces are dependents on people's knowledge of their environment. As presented in the table below, the neoclassical assumption of perfect information implies that accessible information is infinite, knowledge is complete, people simply know everything, and their problem space is complete. In the case of a bounded rational approach, the information is infinite but only a finite sample can be accessed. Knowledge is asymmetric and varies among people because of their incapacity of accessing some pieces of information. Consequently, a hypothetical construct of perfect knowledge is possible, and people could, theoretically, access any information. The reality of individual choice-making, however, results from incomplete problem sets. The same is true in an Austrian world but for other reasons. Information is finite because tomorrow's information has not been generated yet. Knowledge depends on people's access to the stock of current information and the rate of acquiring new pieces of information. Knowledge is dispersed through space and dependent on one's interaction with its environment. The inexistence of tomorrow's information makes it impossible to know with exactitude the bits of information which haven't been generated yet. People do not know what they don't know, and the problem set is incomplete.[109] Table 23 shows a comparison of the selected perspectives on information and knowledge.

Table 23: Comparing selected perspectives on information and knowledge

Perspective	Neoclassical theory	Bounded rationality	Austrian theory
Information	Infinite	Infinite	Finite
Access to information	Unlimited	Limited; dependent on mental process and environment	Limited; dependent on mental process, environment, time
Knowledge	Complete	Asymmetric	Dispersed, distributed
Axiom	I know	I (could) know what I don't know	I don't know what I don't know
Problem space	Complete	Incomplete	Incomplete

Source: Author's own representation

Setting the decision rules

An individual's representation of a problem depends on his knowledge of the problem under investigation and the potential forms the solution can take. He applies decision rules to segregate between potential outcomes and eventually decide. In the neoclassical theory, a causal link between the basic data of the market (e.g. consumer tastes or resource endowment) and the observed market

[109] Furthermore, as Simon (1979, p. 507) states, "[a] good deal of effort is now being devoted also to determining how initial representations for new problems are acquired. Even in simple problem domains, the problem solver has much latitude in the way he formulates the problem space in which he will search, a finding that underlines again how far the actual process is from a search for a uniquely determined optimum (see J. R. Hayes and Simon)".

structures (e.g. price and quantity of production factors and commodities) exists. This functional relationship implies exogenous market data that predetermines the market outcomes (Kirzner, 1973, p. 32). It is predetermined because the necessary information needed to compute the optimal resource allocation is already entailed in the market data. A general-equilibrium agent thus evolves in a world of given means and given ends.[110] His unique possible behaviour is computing existing information in order to find an optimal equilibrium point. He maximises something, has no costs of search for the information, is not subject to the possibility of not finding the optimum, is able to measure and value any outcome of a process, and is consequently always coherent and rational. His decision rule is, and can only be, maximisation. Every problem can be summarised by mathematical functions with a shape that presents a point of optimality. A weighted additive rule used to compute a unique value for the set of alternatives allows him to measure the point that maximises his well-being. His rationality thus consists in making consistent choices over fixed cardinal alternatives.[111]

As Simon (1979) states, however, "[t]he classical model calls for knowledge of all the alternatives that are open to choose. It calls for complete knowledge of, or ability to compute, the consequences that will follow on each of the alternatives. It calls for certainty in the decision maker's present and future evaluation of these consequences. It calls for the ability to compare consequences, no matter how diverse and heterogeneous, in terms of some consistent measure of utility" (p.500). In response to this critique Simon develops the two bounded-rational decision rules of approximation and satisfying.[112] They cover three shortens of rational decision-making. He states that the difficulty for an agent "in behaving rationally—and the impossibility of his behaving as game theory says he should—resides in the fact that he has incomplete information as to what alternatives (strategies) are open to him" (Simon, 1972, p. 169). Agents need to simplify real-world situations to a degree of complication that they can handle, resulting in two distinct decision rules. In a situation where agents are unable to compute all combinations delivered by a decision tree, they need to replace the exactness of deterministic decisions by approximation. They handle the information at hand and design strategies that they understand as being optimal. This random process also allows agents to use satisfactory rather that approximated best strategies. Individuals iteratively assess different moves, evaluate potential outcomes, and stop when they reach a predetermined aspiration level. Approximation and satisfying rely on actor's experience and knowledge of a situation. They can be complementary in cases where aspiration serves as a parameter for approximation. [113]

However, "[i]nformation processing theories envisage problem solving as involving very selective search through problem spaces that are often immense. Selectivity, based on rules of thumb or 'heuristics,' tends to guide the search into promising regions, so that solutions will generally be found

[110] See note 2 in Kirzner (1973).

[111] See Schwartz(1972) on consistency and transitivity.

[112] See Simon (1972, p. 161) for further explanation on normative, descriptive, individual or organisational rationality.

[113] See Simon (1972 p. 171) on dynamic optimisation introducing endogenous satisfying criteria as simplifying rule.

after search of only a tiny part of the total space" (Simon, 1979, p. 508). The study on decision making can therefore go deeper into the analysis of human decision mechanisms. Gigerenzer, for example, writes that the theories of bounded rationality present "[…] the need for further information search, heuristics that guide search and determine when it should end, and simple decision rules that make use of the information found" (Gigerenzer, 2002, p. 8). He writes that individuals do not always rely on calculations but sometimes react with respect to a rapid grasp of the situation. "Fast and frugal heuristic" are unconscious mechanisms allowing the understanding of environmental cues and eventually leading to a decision. While the current work does not intend to go that deep into the understanding of decision-making mechanisms, it recognises the interesting notions of eliminations and a selective toolbox proposed by Gigerenzer as methods to define individual stopping rule. Simon's aspiration level does not result from comparison only; it is based on people's learned set of decision principles (toolbox) used to eliminate unsatisfying options (or regions) found in the problem set. It complements the decision rule by characterising the way the stopping rule is defined. As Kahnemann writes: "What is natural and intuitive in a given situation is not the same for everyone: different cultural experiences favor different intuitions about the meaning of situations, and new behaviors become intuitive as skills are acquired" (Kahneman, 2003, p. 1469). In the theories of bounded rationality, rationality is bounded because the problem set cannot be entirely computed. Unattainable alternatives are located out of its boundaries because of the individual's lack of knowledge of their existence. This knowledge is different for each individual. The evaluation of a decision is not represented by an absolute cardinal number but rather by a relative correspondence between different subjective levels of satisfaction resulting from a decision.

"At the individual level Austrians have taken sharp exception to the manner in which neoclassical theory has portrayed the individual decision as a mechanical exercise in constrained maximization" (Kirzner, 1973, p. 64). The one and unique rule of computing the optimal solution with respect to given constraints is replaced by individual (subjective) rules related to individual goals. Despite the fact that some modern Austrian authors seemingly think in maximisation terms, early Austrian insisted on people's goal of satisfying needs. The law of marginality is presented by Menger as a negative relationship between a quantity of a good and the degree of satisfaction its consumption procures. Recalling that the goal of economic agents is based on their ordinal appraisal of satisfaction—or the feeling of having removed uneasiness in one's life—frees the economic goal from being maximisation only (or its material corollary of capital accumulation). The Austrian decision rule rather corresponds to "economizing". Menger sees in this term the universal striving for satisfaction of human needs. Kirzner understands it as the search for worthwhileness (expected positive process outcome). He writes that the social function of prices "consists in providing decision makers with meaningful cardinal numbers with which to calculate the worthwhileness of prospective actions. To be 'meaningful' we do not require these cardinal numbers to be roughly equal to or close to relevant equilibrium values. We require only that, at each point in time, these cardinal numbers reflect the interplay of the decisions

made by the keenest (as well as those less keen) of the entrepreneurial minds in the market economy" (Kirzner, 1996, p. 151).

Entrepreneurs are thus people open to the unexpected; they find pieces of information and generate additional market opportunities by exploiting this information; they inherently modify the problem set. Their decision rules are, however, difficult to extrapolate from Austrian texts. The very existence of information differentials seems to trigger the entrepreneurial action. A discovery invariantly generates the decision to exploit the related opportunity. The reason why people make this decision—principle guiding search—is because of their quest for satisfaction. Menger even writes that the principle that guides men in their economic activity is to "investigate the useful things surrounding them in nature and to subject them to their command (…)" in "*the effort to satisfy their needs as completely as possible*" (Menger, 1871, p. 180, emphasis in the original). The ever-changing environment constantly creates opportunities and forces entrepreneurs to react. Decision-makers with any level of entrepreneurship are expected to evaluate economic situations with respect to the information at hand. Their constancy in evaluating their environment allows them to make sound decisions. Their continuous reaction to market changes generates adaptation to the system's evolution through time. Mises gives a negative definition of "constancy". He states that, "[i]f constancy is viewed as faithfulness to a plan once designed without regard to changes in conditions, then the presence of mind and quick reaction are the very opposite to constancy" (Mises, 1949, p. 103).

This review of literature on the decision mechanism shows that the views of the theories of bounded rationality and the Austrian school of thought on information are different but their conclusions on decision-making are similar: decisions are subjective because people only possess limited information; each individual has different problem spaces for different decisions; and individuals define their own decision and stopping rules. Finally, the degree of satisfaction or removal of felt uneasiness resulting from the decision is determinant for its evaluation. Table 24 shows a comparison of the selected economics perspectives on decision-making.

Table 24: Comparing selected perspectives on decision-making

Perspective	Neoclassical theory	Bounded rationality	Austrian theory
Decision rule	Maximisation	Approximation or satisfying (Simon); Fast and frugal heuristic (Gigerenzer)	Economising (Menger, 2007) Worthwhileness (Kirzner 1996, p.151)
Principle guiding search	No search	Random, based on knowledge and experience	Entrepreneurship
Principle for stopping rule	Computed optimal	Aspiration level (Simon), cue-based (Gigerenzer)	Discovery
Principle for decision making	Weighted additive rule (Gigerenzer)	Elimination (Gigerenzer), selective tool box (Gigerenzer)	Satisfaction
Evaluation	Coherence (consistency and transitivity)	Correspondence (Gigerenzer, p.15)	Constancy (Mises, p. 103)

Source: Author's own representation

2. Separating the organisation and entrepreneurial aspects of running a firm

Table 25 compares general features of the organisational problem presented in Chapter 1 from the point of view of different perspectives. In NT, the organisations' internal structure is automatically determined by market conditions and people's maximisation behaviour defines how they should behave. This theory is deemed "deterministic" because it does not entail a human component that might result in any outcome deviating from expectations. The other economic approaches recognize some degree of information limitation and are deemed "non-deterministic". They commonly integrate risk and uncertainty in their analysis. In these perspectives, organising means reacting to the organisational problem and finding ways to reduce inefficiencies. In implies that frictions exist in system adaptation and people's behaviour might deviate from expectations. A need to constraint individual choices within the organisation arises. At firm level, this corresponds to defining the best possible organisational structure consisting of a specific labour division, coordination mechanisms, and motivation schemes.[114] This structure supports and constraints process execution. It supports it because it aims at helping individual parts of the system to reach the collective goal and constrains it because it reflects the system's scarce resources. A trade-off between the efficiency gain reached by the definition of the most appropriate system and the cost related to structuring the economic activity emerges. There is a need to define the firm's structure with respect to some constraints, an activity referred to as the process of structuring the firm.

The definition of firm structures entails a timely aspect in the non-deterministic approaches to the firm. Despite Sarasvathy's critic of the stability of network of contracts issued from the transaction costs theory, time is at least implicitly acknowledged in the NIE. Institutions evolve though time and contracts/institutional arrangements need to be modified after a certain period. The work of Simon also consists to some extent in determining how the structuring activity happens in organisations when time goes by. He describes the internal structure in terms of systems of roles rather than systems of rules but emphasises that individual decision-making come prior to any structure or coordination mechanism. The structural element of organisation (external boundaries or internal structure) thus results from a structuring force, itself based on decision mechanisms. But the underlying conditions for choice-making evolve in a progressing economic. The human perception of the environment adjusts in a subjective world. A constant force constrains the elements of the systems to adjust to the ever-evolving situations in order to reach the organisation's collective goal. This element ensures system consistency with respect to time. This aspect of the BR is closely related to the AS's control over production factors and entrepreneur and manager's need to adjust production to the changing environment. The system needs to be driven to ensure the effective outcome tends to what is expected. This task is the operational aspect of the running a firm.

[114] See Chapter 1 for definitions.

Table 25 : Comparing selected perspectives on general features of organisation research

	Neoclassic theory (NT)	New Institutional economics (NIE)	Theories of bounded rationality (BR)	The Austro-American school (AS)
Uncertainty and risk	No	Yes	Yes	Yes
Type of behaviour	Deterministic	Non-deterministic	Non-deterministic	Non-deterministic
System adaptation	Simultaneous	With frictions	Dependent on human decision	Dependent on time and human decision
Structuring activity	No	Trade-off between efficiency gain and cost of organising at any organisation level.	Coping with ever evolving information.	Role of the entrepreneur, owner and manager (Mises)
Driving activity	None	Implicit	Implicit	Role of the entrepreneur, owner and manager (Mises)

Source: Own composition

While Austrian's and most authors' writing about entrepreneurship give entrepreneurs the role of structuring the economic activity, the NIE and BR propose interesting points of view that can help separate the organisational function from the entrepreneurial one. First, organisation is closely linked to the notion of efficiency. The comparison of the cost of organising and the potential efficiency increase cannot be overlooked. Second, an organisation is a dynamic entity. It constantly has to evolve within its environment. It has to be run over time to ensure the expected and effective outputs correspond. Third, every decision taken with respect to the organisation is subjective. It is hard to understand how people maximise in the NIE when maximisation requires completed information but analysing this inconsistency is no part of the current study. The main outcome of the review on organisation is that behaviours in worlds of incomplete information are subjective. People's rationality is at best objective within the limit of their understanding of the world. Any kind of structuring activity thus corresponds to the people's specific, subjective, representation of their situations. Fourth, the literature on organisation does not mention the role entrepreneurs might have in the process. Finally, the organisational function seems to be linked to both the structuring and driving activities of the firm.

3. Influencing the organisational structures over time

The need to organise is due to our living in a world of scarcity. The difficulty to organise is due to incomplete information. It limits people knowledge of the appropriate organisational structure needed to reach the organisation' goal. The solution to the organisational problem consists in defining the best possible structure regarding labour division, coordination mechanisms and motivation schemes. In Austrian words, the organisational problem consists in "employing the available means in such a way that no wants more urgently felt should remain unsatisfied because the mean suitable for

its attainment were employed – wasted – for the attainment of a want less urgently felt."[115] But structures are not immutable. What is valid today might turn wrong or inadequate tomorrow. And people might also change their mind or forget why they need to undertake a task. They constantly need to be motivated to realise the organisations' objectives.

The comparison of the NT, NIE, BR, and AS perspectives on selected theoretical elements with respect to the organisation structure is presented in Table 26. The stating point of the reflection relays on the idea that an organisational structure reflects individual decisions. People react to their environment with respect to their perception of what they want to - or have to - execute. Their actions are preceded by decisions. In the NT, decision-makers are however omniscient, production cannot deviate from expectation (full effectiveness), organisations are absolutely efficient (one model firm), the labour division is dictated by market data, the internal coordination results from automatic stimuli, and individuals are pure automations and do not need to be motivated. The NIE presents a mixed view on organisation. Acknowledging for the role of human subjectivity and treating individuals as maximisers at the same time is difficult to defend with respect to the earlier discussions on subjectivity. To cope with this inconsistency, the decision-maker is deemed to have a "limited omniscience" as shown in Table 26. Deviation from the organisation's objective is possible due to frictions in system adaptation but can theoretically be avoided leading to theoretical perfect system effectiveness. The necessity to organise the organisation is recognised and is realise by setting in place systems of rules or institutions.

In contrast, the incomplete information in the BR and AS approaches implies that decision-makers are limited specialists. In Simons' words, it is necessary to take into account limited information in the economic study of real phenomena, because "[w]e cannot use the *in vacua* version of the law of falling bodies to predict the sinking of a heavy body in molasses."[116] People do not possess all information needed to eliminate any risk and uncertainty and thus can only organise relatively efficiently with respect to what they know. Both literature strands recognise the need to structure the organisation that supports economic activity. The internal coordination mechanisms however differ in the two approaches. Simon's focus on roles puts the finger on inter-individual coordination mechanisms such as trust, communication, and the feeling of justice implied by democratic procedures. The AS says little about human feelings and proposes a vision on coordination close to the NIE in relation to rules and institutions. All three perspective of BR, NIE, and AS recognise the need to develop efficient motivation mechanisms to cope with the human element in the economic process and reach the organisation's goals.

[115] *Ibid*., p. 208

[116] Simon, 1979, p. 509

Table 26 : Comparing selected perspectives on general features of organisational structures

Perspective	Neoclassical theory	New institutional economics	Bounded rationality	Austrian theory
Decision maker	Omniscient	Limited omniscience	Limited specialist	Limited specialist
Goal effectiveness	Full	Partial to full	Partial	Partial
Organisational efficiency	Absolutely efficient	Relatively efficient	Relatively efficient	Relatively efficient
Labour division	Exogenous	Endogenous	Endogenous	Endogenous
Coordination mechanisms (Foss 2013, p.17)	Automatic stimuli	Rules and Institutions	Roles, Trust, communication, community, democratic procedures) (Foss 2013, p.17)	Rules, institution, delegation, and decentralization (Foss, 2013, p.23)
Motivation schemes	No need	Needed	Needed	Needed

Source: Own composition

One element that is not explicitly treated in these perspectives is the need to drive an organisation. It is implicit in all views but not theorised as such. This second element is however present in any firm in the active life. Each of them is constantly investing energy to ensure all tasks are executed with respect to their plan. Combining structuring and driving activities at firm level brings the first complete and intuitive logical description of managerial activities. The proposition described in Chapter 7 is that the managerial function entails both (a) structuring and (b) driving activities in firms. They are devoted to setting the conditions for the economic process to reach its goal and, hence, internalise the perceived entrepreneurial advantage. They can be divided in four elements: (a1) defining the goals, inputs, outputs, and infrastructure in firms, (b1) implementing the structure, (b2) driving the execution of the process, (a2) adapting the goals, inputs, outputs, and infrastructure until completion of the firms' goal.

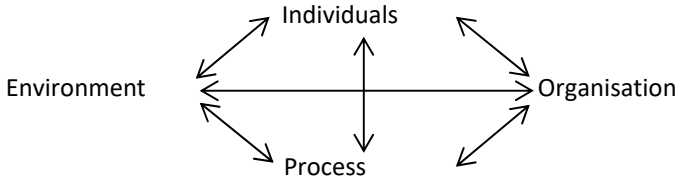
Appendix D: Landmarks to understanding the entrepreneurial process

This appendix reviews five models considered as "converging on conceptualizing the entrepreneurial process" by Moroz (2012) or landmarks to understanding entrepreneurship by Hindle (2010)[117]. It adds to this list Hindle (2010)'s model of entrepreneurial process which uses the five previously mentioned models as reference for its development and combines of all benefits and critics on the past literature. Also reviewed below is Baker (2005)'s "Bricolage" perspective that gained attention in the recent literature for its focus on economic value generation in a constraint environment. All these models have a process event-based perspective in common that serves as methodological prerequisite in this context (see Appendix F for details).

1. Gartner (1985): A multidimensional approach

Gartner implicitly defines entrepreneurship as "new venture creation". He states that "[n]ew venture creation is the organising (in the Weickian sense) of new organisations". "To organise is to assemble ongoing interdependent actions into sensible sequences that generate sensible outcomes" (Weick, 1979, p. 3)".[118]

Figure 36 : Gartner's framework for describing new venture creation



Source: Reproduction of Gartner (1985)'s model

Based on a literature review, Gartner (1985) critics the fact that many scholars see entrepreneurs as a homogenous group of individuals rather than a variety of actors creating highly diverse ventures. He argues that the differences among entrepreneurs should not be undervalued because they shed light on the complex and multidimensional process of venture creation. He proposes a framework for the study of entrepreneurship that adds three dimensions to the entrepreneurs and account for different elements that shape the entrepreneurial actions (Figure 36). While individuals are fundamental to new venture creations, this framework recognizes the existence of (i) an organisational structure, (ii) passing time, and (iii) an influence of the surrounding environment on the new venture. The elements

[117] This review of the model presented in Moroz (2012) is based on the original texts and focus on information that further help the current analysis. The reader who is interested should turn to Moroz (2012) for a more complete summary or the original texts.

[118] Gartner, 1985, p. 697

of the system additionally show bi-directional connections to their counterparts allowing each element to influence others and being influenced by others. Gartner's main contribution lies in refusing "the notion that all entrepreneurs are alike, and all new venture creation is the same".[119]

2. Bruyat and Julien (2000): The function of entrepreneurship

Bruyat et al. implicitly define entrepreneurship as the activity of entrepreneurs. For them, "the entrepreneur is the individual responsible for the process of creating new value (an innovation and/or a new organisation)—in other words, the individual without whom the new value would not be created".[120]

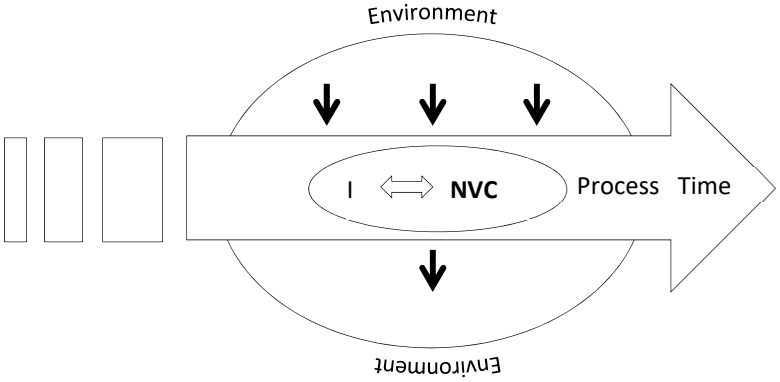
This model adopts a functionalist approach to emphasise that entrepreneurship is an activity, not a trait. In Bruyat and Julien's words, "entrepreneurs are people who perform the function of reforming or revolutionizing the productive system, and they continue to be entrepreneurs only as long as they continue to perform the function".[121] As a consequence, entrepreneurs are active actors that do not only react to external stimuli but are capable to learn and create within defined environmental boundaries that they can influence with a certain degree of freedom of action. The authors underlie that entrepreneurs' specific goal is to create value within an open system, which places emphasis on the relationship between individuals and new value creation. These two elements are combined within a complex set of relations without their duality vanishing by combination. Based on this idea, Bruyat and Julien define a typology of entrepreneurial activity according to the degree of individual change implied by the new value creation and the degree of value creation observed by implementing a project. Four categories emerge:

1. Entrepreneurial venture: the less controversial perspective on entrepreneurship where a great new value is created – such as a radical innovation – with simultaneous transformation of the individual' s career or knowledge base along with the evolution of the process (ex. Apple, Microsoft).
2. Entrepreneurial valorisation: the entrepreneur creates a great new value using technologies that he already masters, such as an engineer that valorises his existing qualities in a virgin market.
3. Entrepreneurial imitation: A little new value is created but the entrepreneur undergoes a specific personal evolution by implementation of a project in a field that is new to him, however already exploited by others.
4. Entrepreneurial reproduction: A little new value is created by an individual that used a technology or knowledge that already exist on the market and that he masters. An example would be a cook leaving his job to open his own restaurant, or individuals turning to independent activity to avoid unemployment.

[119] Gartner, 1985, p. 701
[120] Bruyat, 2011, p. 169
[121] *Ibid*., p. 167

This model highlights the learning effect of the system through time as well as the possibility for the process to end when individuals stop acting in an entrepreneurial way. It also emphasises the need to consider the individual and his project in order to study the entrepreneurial activity and finally, this open system points out to the unpredictability of its outcome.

Figure 37 : Bruyat and Julien's model of the entrepreneurial



Source: Reproduction of Bruyat and Julien's (2000)'s model

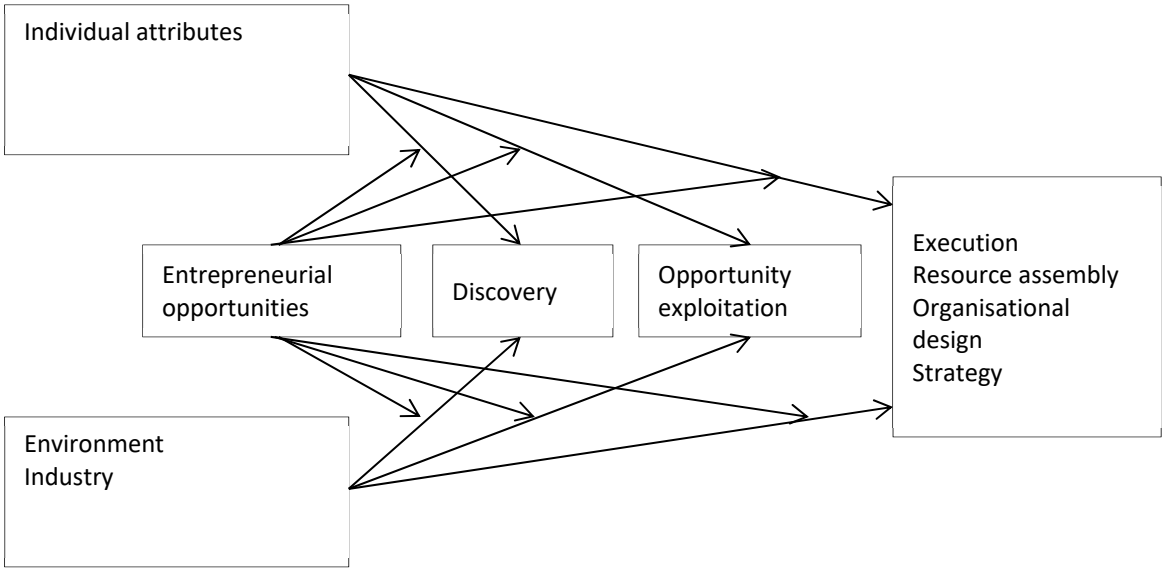
3. Shane (2003): An Individual-Opportunity nexus

For Shane, "[e]ntrepreneurship is an activity that involves the discovery, evaluation, and exploitation of opportunities to introduce new goods and services, ways of organising, markets, processes, and raw materials through organising efforts that previously had not existed (Venkataraman, 1997; Shane and Venkataraman 2000)".[122]

This general theory of entrepreneurship is based on an individual-opportunity nexus that serves as the fundamental support for discovering and exploiting opportunities. The opportunities are present in the environment. Their discovery initiates and influence a process where enterprising individuals acquire resources, develop strategies and engage in an organising process in order to exploit these opportunities. "Because the economy operates in a continual state of disequilibrium and changes, situation arise in which people can transform resources into a form […] that they believe will have greater value that their cost to create".[123] Based on a very rich literature review on empirical studies of entrepreneurship, Shane differentiates between several types of opportunities, and investigates the role of individuals in their discovery process, their decision to exploit, the factors influencing this decision, as well as the development and implementation of organisational modes supporting exploitation. This model provides a holistic framework for entrepreneurship research and underlies the essential role of the individual over the whole process, from discovery to exploitation. One of Shane's main contributions is his argumentation that opportunities shape the whole entrepreneurial activity, a principle called causation.

[122] Shane, 2003, p. 4
[123] *Ibid.*, p. 10

Figure 38 : Shane's model of the entrepreneurial process



Source: Reproduction of Shane (2003)'s model

4. Sarasvathy (2004): Effectuation

Sarasvathy does not propose a strict definition of entrepreneurship. She develops a model that focuses on entrepreneurial effectuation and advocates for the need to go beyond the theory of the frim and put "the entrepreneur central stage".[124] Sarasvathy defines "effectuation" as a theory of entrepreneurs. They are a "tool for problem-solving" in a world of unknown future, undefined goals and adaptable environment. She insists on the fact that entrepreneurs' cognitive capabilities and propensity to learn are essential to success, which makes entrepreneurs a different entity from the organisational structure of the firms. She criticises the idea of homogeneity of goals among entrepreneurs because they evolve in a non-deterministic world that can (partially) be influenced and reshaped by their actions. As Sarasvathy wrote, this implies that "firms are products of individual abilities and expectations that are heterogeneous to begin with".[125] Essential to her approach is also the assumption of non-opportunistic goals of entrepreneurs. This view opposes common economic theories describing that a firm is "a portfolio of future cash flows (view from neoclassical economics); or that a firm is a stable network of contracts (Transaction costs theory); or that a firm is a set of core competencies and dynamic capabilities that provide sustained competitive advantage in a marketplace (evolutionary theories and strategy)"[126]. Indeed, she sees the firm as an artificial construct that has been developed by an entrepreneur and that continuously, iteratively and actively reshapes the reality as it goes. One of Sarasvathy's main contribution is her emphasis on entrepreneur's active role in enacting the opportunity called the principle of effectuation.

[124] Sarasvathy, 2009, p. 519

[125] *Ibid*., p. 521

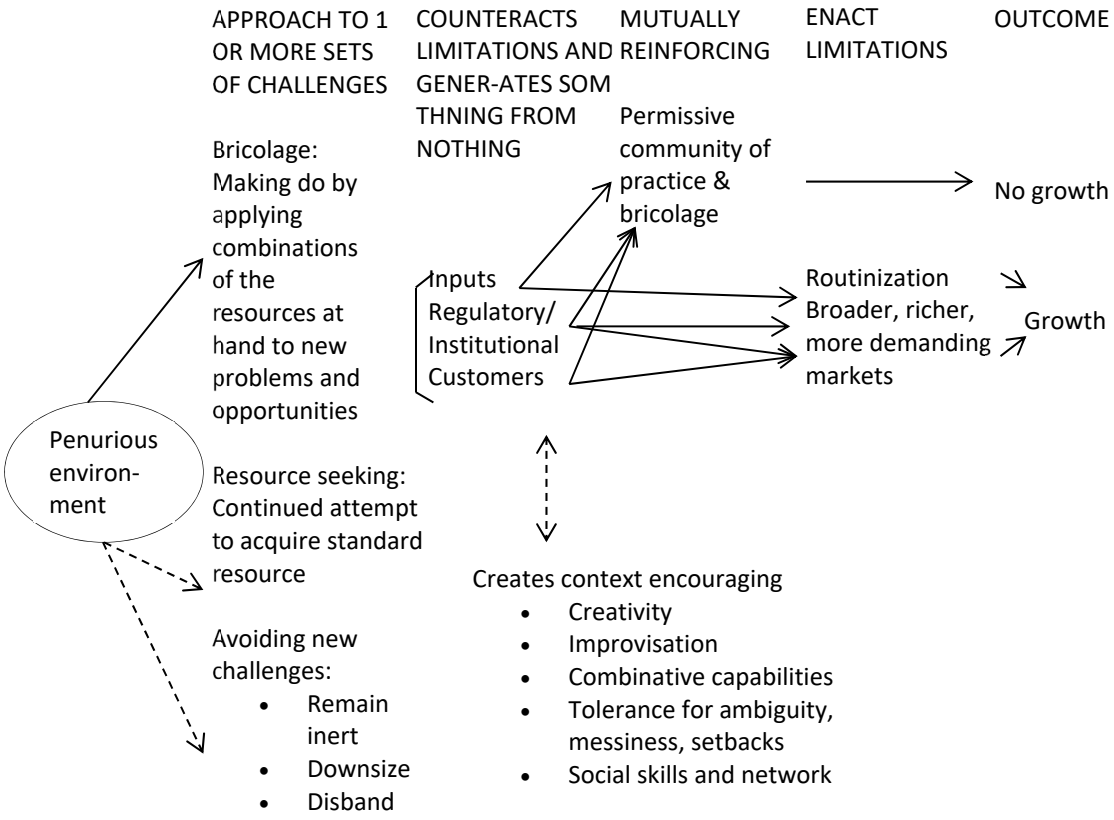
[126] *Ibid*. p. 522. TCE is Transaction Cost Economy

5. Baker and Nelson 2005: Bricolage

Baker et al. focus on entrepreneurship in a constraint environment and define "bricolage" as "making do with what is at hand" or the ability of small firms "to create something from nothing by exploiting physical, social, or institutional inputs that other firms rejected or ignored".[127]

Central to this approach is the notion that small firms in resource-poor environment find a way to "create something from nothing".[128] The authors argue that most of the entrepreneurship literature build upon given and unproblematic access to resources. If this assumption fails, Baker and Nelson explain that the entrepreneur can choose between three strategies: resource seeking (find the habitual resources), avoidance (find a way to escape the situation where scarce resources are needed), or bricolage ("making do by applying combination of resources at hand to new problems or opportunities").[129]

Figure 39: Baker and Nelson (2005)'s process model of bricolage and growth



Source: Reproduction of Baker and Nelson (2005)'s model

In their empirical study of 24 small firms, the authors found that firms can act on three domains while engaging in bricolage: (i) their inputs (material, skills and labour), (ii) their customer base or (iii) their

[127] Baker, 2005, p. 329

[128] *Ibid*., p .329

[129] *Ibid*., p. 353

institutional framework. Either they engage in selective bricolage by focusing on one of these domains with chances of growth based on organising the current structure through routines, enlarging the market base or aiming at richer customers; or they can enter a parallel bricolage framework and generate mutually reinforcing patterns across the three domains.

This second strategy can also lead to growth despite dilution of energy on plural activities. Their empirical analysis finds week explanation to the rent seeking and avoiding challenge hypotheses (represented by a doted arrow in Figure 39) but suitable proof to support the bricolage theory. They argue that the way entrepreneurs answer the question ""how do you create something with nothing" is by refusing to treat (and therefore see) the resources at hand as nothing. This refusal calls upon and provides a context in which firms actively exercise their creative and combinatorial capabilities, their tolerance for ambiguity and messiness and setbacks, and their ability to improvise and take advantage of emerging resources and opportunities".[130] This paper also calls for differences in the way that firms apply bricolage, which implies the existence of a so called "bricolage capability". This capability is expected to increase the survival rate of small firms in the event of environmental shocks and generates a competitive advantage compared to those that do not possess them. The ability to find an alternative use for resources where others don't should also increase the organisational flexibility and allow adaptability. Furthermore, the authors argue that opportunities could be enacted rather than discovered. Enactment is therefore the creation of value through creative combination of existing resources. New combination of means renders possible the creation of value without any kind of destruction through withdrawing a resource from an alternative profitable use. Finally, entrepreneurs must be alert to opportunities and resources at the same time to be able to react to new combination possibilities. Their ability to successfully doing so is sharpened by previous knowledge.

6. Steyaert (2007): The ontology of "Becoming"

Steyaert does not explicitly define entrepreneurship but rather describes the process of entrepreneurship as "entrepreneuring". Reviewing a variety of theoretical and philosophical concepts underlying entrepreneurship studies, Steyaert places the field "into the social ontology of becoming".[131] He advocates that the concept of "entrepreneuring" can provide great support to further studying of entrepreneurship. He bases his say on fundamental parameters that allow seeing entrepreneurship as a process:

1. the recursive character of the process;
2. the interrelatedness of individuals and their entrepreneurial project;
3. their inclusion in a string of the past and the present,
4. their connection to cultural, political and social forces, as well as;

[130] *Ibid*., p. 356

[131] Steyaert, 2007, p. 453

5. "new forms of connectivity and assemblage where both human and non-human elements are included to give form to trajectories of a world in his becoming".[132]

This practice-based view builds on a creative process approach to break with the view that entrepreneurs act in a stable world where their activity is summarised by discovery or resource allocation. It also departs from the view that an outcome can result from "mindless forces", stochastic processes, or environmentalist selection".[133]

7. Hindle (2010): A Model of Entrepreneurial Process

According to Hindle, "Entrepreneurship is the process of evaluating, committing to and achieving, under contextual constraints, the creation of new value from new knowledge for the benefit of defined stakeholders".[134]

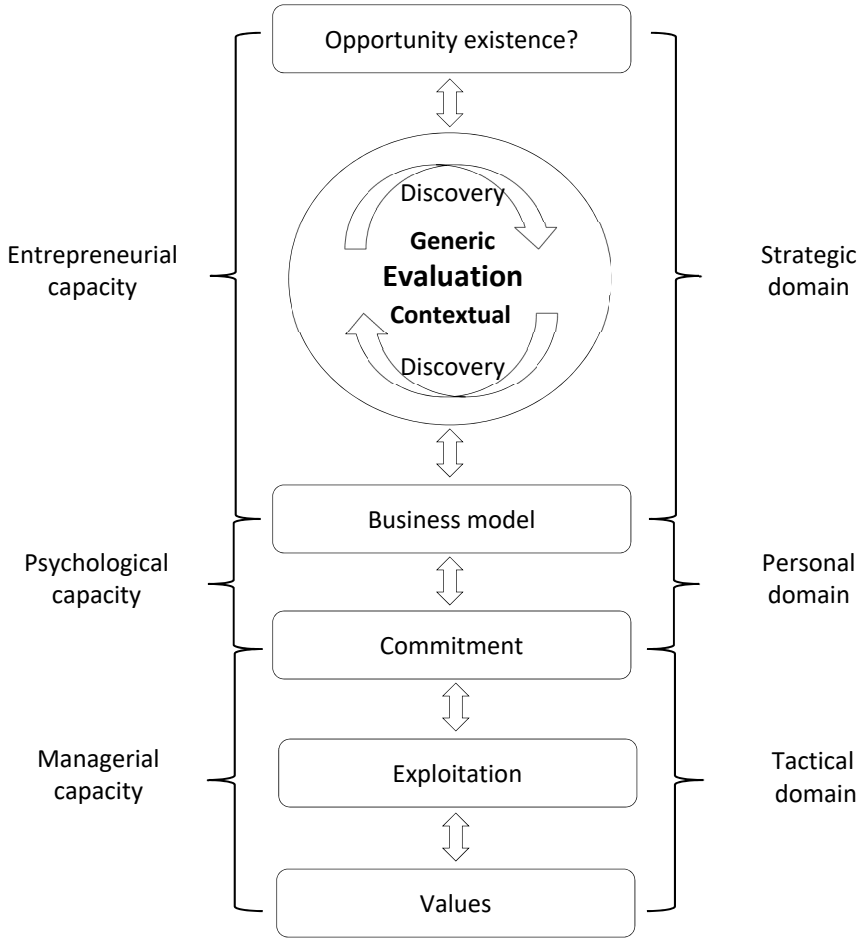
In reaction to the ongoing fragmentation of the field of entrepreneurship, Hindle proposes a generic model of entrepreneurial process (MEP). Its development is based on a study on 40 years of entrepreneurship process literature that he jointly published with Morrow in 2011. They show that authors have preliminary concepts in mind while formulating their view which leads to a posteriori contradiction. Shane's concept of causation is to some extent mutually exclusive to Sarasvathy's effectuation principle. The former implies a well-planned activity while the second relays on incremental adaptation. Commonalities associated with the phenomenon of entrepreneurship are however present. These points of convergence are the unequal alertness among individuals, critical evaluation of knowledge, a clear link to value-creation through creative exploitation of opportunities, the influence of time and the surrounding context, and finally, the need for entrepreneurs to act - to take initiatives - to enact their visions.

The MEP describes 3 complementary elements of the entrepreneurial process: the strategic, personal and tactical domains. The strategic domain consists in transforming perceived opportunities into business plans. This element continues as long as the entrepreneur evaluates the worthwhileness of opportunities present in its environment. His entrepreneurial capacity is the specific skills he needs for evaluation. This view allows the reconciliation of causation and effectuation or even bricolage for example. They can all be seen as different forms of evaluation. An individual can thus discover an idea and fully plan its exploitation prior to launching a firm (causation), he can see the combination of resources at hand as possible opportunity and take a try (effectuation), or simply use what he possesses in order to generate a value (bricolage). The strategic element does not bind the entrepreneur to any kind of evaluation method. The evaluated opportunity however needs to be concealed in a business plan. This represents the formal expression to the future exploitation of a perceived opportunity. Prior to implement the business plan, entrepreneurs need to commit to doing

[132] *Ibid*., p. 471
[133] *Ibid*., p. 471
[134] Hindle, 2010, p. 100

the work. This corresponds to their specific psychological capacity to get involved in every dimension of the business and engage the necessary energy to make it happen. The tactical domain corresponds to the phase of value-creation. Entrepreneurs exploit their idea by generating an output in an organised entity. Their managerial capacities allow them to efficiently create value.

Figure 40 : Hindle (2012)'s model of entrepreneurial process



Source: Reproduction of Hindle (2012)'s model

Each element of the model presents a bi-directional relation to the others. They are based on different capacities but continuously influence each other. A consequence of the distinction between domains is a decoupling between opportunity recognition/evaluation and enactment. An organisation has to be created to support an opportunity's exploitation. This takes time and resources and is no automatic consequence of discovery. Some discovery might thus not be exploited because of a lack of means, a lack of commitment, or a lack of organisational skills. This turns entrepreneurship into a phenomenon. The strategic element transforms an idea into a business plan through evaluations, the personal element transforms the plan into expectations through commitment, and the tactical element transforms the commitment into a functioning organisation producing the desired output. Entrepreneurship is the trigger of creative organisation and influences systems as a whole. The main contribution of the MEP is the recognition of that systemic view and the separation of the strategic element (entrepreneurial activity) from the tactic element (managerial activity).

Appendix E: Descriptive statistics

Table 27: Descriptive statistics grouped by chapter

Description	Var. name	N	Mean	Std. Dev	Min	Max
Chapter 8						
G_i = Goal expressed in 2006?						
Income	$G_1$06	10077	.2169296	.4121748	0	1
Labour	$G_2$06	10077	.2350898	.424076	0	1
Investment	$G_3$06	10077	.1644339	.3706872	0	1
Customer base	$G_4$06	10077	.3489134	.4766502	0	1
Y_i = Goal realised in 2009?						
Income	$G_1$09	10077	.5191029	.4996597	0	1
Labour	$G_2$09	10077	.3104098	.4626844	0	1
Investment	$G_3$09	10077	.34415	.4751139	0	1
Customer base	$G_4$09	10077	.2403493	.4273168	0	1
E_{if} = Effectiveness in reaching goals						
Income	E_1	10077	.170785	.3763396	0	1
Labour	E_2	10077	.126228	.3321227	0	1
Investment	E_3	10077	.0720453	.2585757	0	1
Customer base	E_4	10077	.1040984	.3054034	0	1
X and I = Input and Infrastructure						
Input	X	10077	.3650888	.4814789	0	1
Capital	K	10077	.279746	.4488966	0	1
Labour force	L	10077	.1728689	.3781527	0	1
Rule 1 (franchise)	R_1	10077	.0939764	.2918103	0	1
Rule 2 (subsidiary)	R_2	10077	.0523965	.2228364	0	1
Chapter 9 and 10						
Action items (A_f)						
Launch a parallel firm	a_1	10077	.0251067	.1564569	0	1
Implement product/services	a_2	10077	.3079289	.4616599	0	1
Implement processes	a_3	10077	.0602362	.2379357	0	1
Implement com. Method	a_4	10077	.1419073	.3489724	0	1
Implement mgnt method	a_5	10077	.145579	.3527012	0	1
Novelty items (N_f)						
Novel business idea	n_1	10077	.0117098	.1075819	0	1
Buy licence	n_2	10077	.1688002	.374594	0	1
Product innovation	n_3	10077	.0932817	.2908413	0	1
Process innovation	n_4	10077	.3265853	.4689874	0	1
Innovative sales method	n_5	10077	.1378386	.3447477	0	1
Design items (SO_f)						
Active prospection	so_1	10077	.363501	.4810312	0	1
Strong marketing actions	so_2	10077	.1938077	.3952996	0	1
Aggressive price strategy	so_3	10077	.1395257	.3465114	0	1
Competitive procurement	so_4	10077	.107274	.3094766	0	1
Increased network	so_5	10077	.0977473	.2969875	0	1
Driving items (DO_f)						
Subcontracted administration	do_1	10077	.2311204	.4215701	0	1
Subcontracted marketing	do_2	10077	.2033343	.4024991	0	1
Liquidity management	do_3	10077	.2893718	.4534933	0	1

- Table breaks –

- Table continues -

Description	Var. name	N	Mean	Std. Dev	Min	Max
Human capital						
Education (general)	h_1	10077	1.094.076	.8365186	0	2
Low	h_{11}	10077	.3072343	.4613702	0	1
Med	h_{12}	10077	.2914558	.4544555	0	1
High	h_{13}	10077	.4013099	.4901878	0	1
Specific training to launch firm	h_2	10077	.2392577	.4266515	0	1
Entrepreneurial exp. (general)	h_3	10077	.5047137	.8556508	0	3
0 creation	h_{31}	10077	.6800635	.4664748	0	1
1 creation	h_{32}	10077	.191426	.3934431	0	1
2 creation	h_{33}	10077	.0722437	.2589039	0	1
3 or more creations	h_{34}	10077	.0562667	.2304475	0	1
Prior exp. in sector (general)	h_4	10077	1.198.769	1.288.283	0	3
None	h_{41}	10077	.4987596	.5000233	0	1
< 3 years	h_{42}	10077	.0550759	.2281397	0	1
3-10 years	h_{43}	10077	.1948	.3960663	0	1
> years	h_{44}	10077	.2513645	.4338192	0	1
Former hierarchical level	h_5	10077	4.095.266	1.794.265	1	6
A = Non-salaried	h_{51}	10077	.1193808	.3242521	0	1
B = worker	h_{52}	10077	.0589461	.2355355	0	1
C = Employee	h_{53}	10077	.2842116	.4510605	0	1
D = Technician	h_{54}	10077	.0710529	.2569259	0	1
E = Manager	h_{55}	10077	.0773048	.2670876	0	1
F = Top manager	h_{56}	10077	.3891039	.4875712	0	1
Social capital						
Professional network	s_1	10077	.7001092	.4582327	0	1
Entrepreneurial entourage	s_2	10077	.1811055	.3851247	0	1
Supplier network	s_3	10077	.2625781	.4400569	0	1
Customer network	s_4	10077	.0385035	.192418	0	1
Entrepreneurial network	s_5	10077	.0564652	.2308293	0	1
Gender	s_6	10077	.6701399	.4701854	0	1
Nationality	s_7	10077	.9267639	.2605366	0	1
Motivation						
Want to stay small	m_1	10077	.6264761	.4837634	0	1
Growth of employment	m_2	10077	.17922	.3835555	0	1
Income growth – loan	m_3	10077	.0839536	.2773319	0	1
Income growth – dilution	m_4	10077	.0302669	.1713294	0	1
Projected evolution	m_5	10077	1.447.951	.7552877	0	2
Decrease size	m_{51}	10077	.161556	.3680613	0	1
Stay same size	m_{52}	10077	.2289372	.4201696	0	1
Grow	m_{53}	10077	.6095068	.4878851	0	1
Chapter 11						
Managerial abilities						
Entrepreneurship	Ent_f	10077	-8.37e-10	.0635655	-.101	.132
Design ability	SO_f	10077	-9.54e-08	.2150423	-.496	1.02
Driving ability	DO_f	10077	-1.94e-06	.0951938	-.188	.345
Mean sectorial income growth	msec	10077	2.50014	.1474482	2.084	3

Appendix F: Model specification

This appendix presents some considerations about empirical research in entrepreneurship and describes the methodology behind the choice explained variables, the selection between binary or count models, and the determination of the most efficient model specification for all Item-Response models presented in this thesis.

1. Empirical research in entrepreneurship

1.1. The process event-based perspective

This subsection lists the general critiques about the empirical assessment of entrepreneurial phenomenon and ways to overcome them described in the literature. One of the main weaknesses of empirical analyses on entrepreneurship is the lack of explicit reference to theoretical underpinnings. This led to fuzzy definitions of the studied object and several inconsistencies among theorists (Moroz and Hindle, 2012; Hindle and Senderovitz, 2010; Ucbasaran et al.; 2001; c; 2007). Steyaert (2007) thus classifies entrepreneurship studies of the last 20 years in eight different epistemological stances. His review presents simultaneously the chronological evolution of thoughts and a combination of notions from related fields or philosophies leading to the definition of distinct groups: “equilibrium-based”, “complexity and chaos theory”, “interpretive and phenomenological”, “social constructionist”, “pragmatic and practice-based”, “relational materialist” and “the ontology of Becoming”.[135] While all approaches have helped increasing the knowledge base in the field, the most recent literature tend to advocate for the use of a framework that explains entrepreneurship “as the creation of artefacts by imaginative actors fashioning purpose and meaning out of contingent endowments and endeavors” in line with Steyaert’s last category (Sarasvathy, 2009, pp. 261–262). Such a creative process view opens the notion of entrepreneurship to a continuous process of world-making (Steyaert, 2007, p.471). In this sense, the use of a “theory of process” itself clarifies at least two key fundaments:

1. A process of entrepreneurship “is founded upon a worldview that conceptualizes processes, rather than objects, as the basic building block of how we understand the world around us” (Moroz and Hindle, 2012, p. 786);
2. Entrepreneurship is an action-based phenomenon[136] and therefore is suited to a process theorizing that explains (i) “how changes occur” (the transformational process) and (ii) “what is the outcome of these changes” (the result of the transformational process or the ontology of Becoming) (Moroz and Hindle, 2012, p. 786).

[135] For a detailed definition of each epistemological stance, see Steyaert (2007).

[136] See Moroz and Hindle (2012, p. 786), for an explanation of Whitehead (1929), Berguson (1889/2001), and Heidegger’s (1927/1962) philosophical perspectives advocating for the action-based aspect of processes.

According to this view, defining entrepreneurship as an action-based phenomenon places it *in fine* in an ontology of "becoming". However, researchers should call for caution with respect to the process/variance perspectives, the referential framework, and the above-mentioned creativity in the process in order to avoid the four potential biases presented below.

1.2. A focus on events, not outcome

Selecting a referential framework consists of choosing between event- and outcome-based perspectives. This distinction is based on the organisation and management theory (OMT) that Aldrich (2011) developed in "Who Wants to Be an Evolutionary Theorist?". According to Moroz and Hindle (2012), the majority of researchers adopt an outcome-based perspective and therefore start with selecting observable outcomes before trying to determine their causes (backward perspective). As explained in Aldrich (2011), there is a risk to introduce a researcher bias because of the lack of solid underpinning theory supporting the choice of determinants for outcomes. Moreover, outcomes are observed at a single point of time that does not tell everything about the past. Three reasons might explain this. First, this approach might introduce a selection bias because some organisation which influenced an event in the past might have gone out of existence at the time of observation. Second, keeping track of information is a heterogeneous process because basic administrative paper work is easier to file, and record compared to less formally defined information, leading to an information bias. As a result, some information might be missing for reconstruction of the past at a given point of time. Third, a respondent bias might appear in surveys as people tend to better remember positive experiences or increase their personal importance with respect to the occurrence of an event. Most of the above-mentioned problems seem to be less influential when an event-based perspective is adopted. In this case, researchers focus on events and record their occurrence through time (forward perspective) mainly in longitudinal empirical analysis (Aldrich, 2011). Several scholars have advocated for this approach, but it also suffers a lack of theorizing background supporting the selection of events, difficulties in gathering data through time, and the fact that an event can be part of different chains of causation. Despite these problems, process theorists tend to advocate for this approach because of its focus on a temporal order (Van de Ven, 2004). The theoretical development proposed in this thesis thus takes a forward perspective and the empirical analysis is based on a survey recorded at two distinct points in time allowing (to some extent) to control for the event-base principle.

1.3. An incremental process of change: unfolding events

In a context of theory development for the study of organisations, Mohr (1992) describes a fundamental difference between the process and variance theories.[137] The variance theory explains

[137] Mohr (1992), cited in Moroz and Hindle (2012). He uses the word "narrative" instead of "process". Moroz and Hindle (2012) explain that "[i]t is linguistically if not conceptually unfortunate that Mohr's nomenclature produces, as one of the two identified streams, a 'process theory' of process. We prefer to name this the 'narrative' stream." I follow Mohr in the terminology choice to focus on an incremental change over time rather than emphasising that this incremental change is being studied on "any form of textual material".

an outcome through a combination of necessary and sufficient variables that pertain to an action. This leads authors to explain the entrepreneurial activity by a stochastic process or an environmental selection with a direct causality between dependent variables and outcome (class probabilities) and might fail to account for the environmentally embedded nature of the entrepreneur (Sarasvathy, 2009). This is the base for a quantitative methodological bias that has been observed in empirical studies (Moroz and Hindle, 2012). By contrast, the process theory explains the outcome by a probabilistic rearrangement of discrete events, focusing on an incremental evolution, a process of change. This can be compared to a narrative description of how things evolve and unfold. Time becomes a critical notion in the process theory and is no more immaterial as it is in the variance theory. The choice of perspective therefore influences the definition of process and the interpretation of empirical studies based on these processes. This study chooses a process approach in order to take the development of chains of actions into consideration. The use of latent variables methods allows embedding the firm in its context controlling for unobserved heterogeneity in line with case probabilities.

2. A replication of Wiklund's model for the measurement of new economic activity

This section presents an extensive econometric analysis of the database that leads to the selection of the best model specification for the various models based on the Item-Response Theory (IRT) used in the empirical analysis. Because both entrepreneurial and organisational abilities assessed in Chapter 9 and 10 result from decision-making, the same specification is used for both measurements. This specification is developed below in the entrepreneurial context.

This empirical analysis develops an indicator for the firm's level of entrepreneurial activity based on their observed activity during the three first years of existence and measures the "*emergence of new economic activity*" in reference to Wiklund (2011) and Davidsson (2002). The degree to which a firm triggers a variation in the economy is a function of its initiative pattern, or its ability to induce change that will have repercussion on its economic milieu. The degree to which a firm introduces innovation in its environment is function of its novelty pattern, or the degree to which its actions are different from what is observed in its environment. Both abilities are the result of firms' capacity to make decisions that trigger an action or an innovation. In this view entrepreneurship is "characterised by change, newness, and development that transcends organisational contexts" (Wiklund, 2011, p. 11).

This approach echoes the literature reviewed in Chapter 1 and refers to the notions of "effectuation" and "opportunity-individual nexus". While "effectuation" underlines the fact that entrepreneurs are tools for problem-solving that allow the firm to evolve and adapt to an unknown future (the initiative-side in the current context), the "opportunity-individual nexus" rather refers to entrepreneurs' ability to discover, evaluate, and exploit opportunities (the novelty-side in the current context). It is inherent from the overall discourse that decision-making in firms is a general concept relating to every firm—independent from age, size, or industry.

The firms' initiative and novelty patterns are measured in Chapter 9 in an IRT framework. Such models are very intensive in computation power and time. I therefore test different specifications on various dependent variables to examine the effect of the introduction or omission of explanatory variables on model robustness. The below methodology defines the most efficient specification to be used in the various IRTs. It starts with an attempt to reproducing Wiklund's (2001) study on the emergence of new economic activity in the closest way possible given the current data set. Wiklund's (2001) surveyed a cohort of new firms registered in 1994 and gathered indicators for new business activity, motivation, human capital, and social capital over 6 years. In a sample of 4,950 firms, he finds that the willingness to expand activity in young business ventures is positively influenced by all components of motivation and knowledge in accordance with the literature. In an attempt to test for Hypothesis B1 (see Chapter 9, section 1), this subsection reproduces Wiklund's framework with the available information and expends it to additional proxies accounting for supplementary aspects of knowledge and motivation. An exact reproduction of Wiklund's approach with the cohort of firms created in France in 2006 is not possible because the database deviates to some extent from Wiklund's indicators. Similar information can, however, be generated and allow realization of a comparable study. Hypothesis B1 from Chapter 9, Section 1, can be divided into three sub hypotheses and the model tests if (1) human capital, (2) social capital, and (3) motivation are positively related to new economic activity. Table 28 shows the results of 10 models derived from Wiklund's setup. Model 1 replicates Wiklund's specification with the closest possible indicators available in the French database. The dependent variable takes the value of 1 if the firm's creator has founded a second firm over the studied period and 0 otherwise (Y1). The analysis of a binary dependent variable allows predicting the probability of this variable to take a value of 1 conditional to specific variables. The estimates are to be interpreted as the log of the odds, or the log value of the probability of an event to occur divided by the probability that it does not occur (measured in logits). The human capital indicators are composed of two items. The first one takes a value of 0 to 2 and accounts for the highest education level of the firm's creator as per French standards. The second variable captures former entrepreneurial activity and takes the values of 0 to 3 for creation of zero, one, two, or three or more ventures prior to the current business. The social capital is composed of three items: enrolment in any business network, gender and nationality. The two last variables are thought to influence the ability to develop valuable networks contacts (Wiklund, 2001).

Table 28: Result table: binary models of new economic activity

Model	m1	m2a	m3	m4	m5	m6b		m7c	m8d	m9e	mc1
Ind. Variable	(Y1)	(Y1)	(Y1)	(Y1)	(Y1)	(Y1)		(Y1)	(Y1)	(Y1)	(Y1)
Regression type	logit	logit	logit	logit	logit	logit		logit	logit	logit	logit
Human capital											
Education	0.022	0.029	-0.023	-0.021	-0.021	0.021	Med	0.294	0.336	-0.300	0.293
	(0.086)	(0.083)	(0.089)	(0.089)	(0.087)	(0.084)		(0.171)	(0.172)	(0.651)	(0.177)
							High	0.109	0.116	-1.321	0.050
								(0.182)	(0.185)	(1.295)	(0.212)
Specific training to		-0.078	0.004	-0.002	-0.002	-0.076		-0.092	-0.131	-16.089	-0.070
launch firm		(0.156)	(0.158)	(0.158)	(0.127)	(0.156)		(0.157)	(0.159)	(907.68)	(0.117)
Entrepreneurial	0.149*	0.169*	0.163*	0.157*	0.157	0.063**	1 cre	-0.018	-0.022	-0.401	-0.000
experience	(0.067)	(0.067)	(0.068)	(0.068)	(0.090)	(0.024)		(0.175)	(0.177)	(0.544)	(0.195)
							2 cre	0.363	0.395	-0.431	0.388
								(0.221)	(0.221)	(1.064)	(0.238)
							3 cre	0.515*	0.501*	-0.700	0.492
								(0.231)	(0.234)	(1.608)	(0.357)
Prior experience in		-0.061	-0.066	-0.066	-0.066	-0.018	<3 y	0.114	0.050	-0.208	0.089
sector		(0.051)	(0.051)	(0.052)	(0.086)	(0.018)		(0.281)	(0.290)	(0.467)	(0.356)
							3-10y	-0.271	-0.295	-0.892	-0.297
								(0.186)	(0.188)	(0.756)	(0.363)
							10y+	-0.115	-0.166	-1.043	-0.190
								(0.159)	(0.162)	(1.128)	(0.227)
Former hierar.		0.064	0.049	0.052	0.052*	0.008	B	-0.016	0.016	0.500	0.184
Level		(0.038)	(0.038)	(0.039)	(0.023)	(0.005)		(0.374)	(0.375)	(0.509)	(0.286)
							C	-0.063	-0.090	0.785	-0.007
								(0.252)	(0.254)	(0.626)	(0.247)
							D	0.458	0.465	1.633	0.531
								(0.293)	(0.294)	(0.875)	(0.291)
							E	0.498	0.510	2.027	0.548
								(0.281)	(0.282)	(1.130)	(0.282)
							F	0.219	0.208	2.112	0.212
								(0.222)	(0.223)	(1.387)	(0.199)
Social capital											
Professional	0.192	0.521*	0.524*	0.541*	0.541	0.526*		0.525*	0.517*	-0.754	0.525
network	(0.131)	(0.221)	(0.222)	(0.223)	(0.297)	(0.221)		(0.221)	(0.230)	(1.932)	(0.285)
Entrepreneurial	0.208	0.220	0.201	0.199	0.199	0.218		0.207	0.224	1.630	0.205
entourage	(0.153)	(0.153)	(0.153)	(0.153)	(0.124)	(0.153)		(0.153)	(0.156)	(1.043)	(0.133)
Supplier network		0.181	0.153	0.166	0.166	0.183		0.152	0.149	0.297	0.136
		(0.158)	(0.161)	(0.162)	(0.137)	(0.158)		(0.159)	(0.161)	(1.148)	(0.150)
Customer network		-0.174	-0.176	-0.178	-0.178	-0.174		-0.165	-0.180	-0.185	-0.186
		(0.154)	(0.157)	(0.157)	(0.108)	(0.154)		(0.155)	(0.157)	(1.165)	(0.129)
Entrepreneurial		0.737**	0.713**	0.702**	0.702**	0.742**		0.729**	0.845***	1.164	0.819**
network		(0.231)	(0.232)	(0.234)	(0.245)	(0.231)		(0.231)	(0.233)	(1.806)	(0.254)
Gender	0.281	0.299	0.270	0.261	0.261	0.298		0.267	0.257	0.311	0.226
	(0.157)	(0.156)	(0.158)	(0.159)	(0.179)	(0.156)		(0.158)	(0.160)	(1.080)	(0.173)
Nationality	0.321	0.304	0.257	0.237	0.237	0.308		0.274	0.333	0.884	0.286
	(0.291)	(0.291)	(0.292)	(0.294)	(0.229)	(0.291)		(0.292)	(0.303)	(1.651)	(0.244)

- Table breaks –

- Table continues -

Model	m1	m2a	m3	m4	m5	m6b		m7c	m8d	m9e	mc1
Ind. Variable	(Y1)	(Y1)	(Y1)	(Y1)	(Y1)	(Y1)		(Y1)	(Y1)	(Y1)	(Y1)
Regression type	logit	logit	logit	logit	logit	logit		logit	logit	logit	logit
Motivation											
Want to stay small	-0.518*	-0.592**	-0.498*	-0.515*	-0.515*	-0.586**		-0.568**	-0.527*	-0.634	-0.454*
	(0.214)	(0.210)	(0.214)	(0.215)	(0.203)	(0.210)		(0.211)	(0.217)	(1.360)	(0.230)
Growth of	0.297	0.317	0.308	0.281	0.281	0.314		0.319	0.387	2.909*	0.360
employment	(0.218)	(0.218)	(0.219)	(0.220)	(0.186)	(0.218)		(0.218)	(0.223)	(1.368)	(0.211)
Income growth –	0.562*	0.536*	0.538*	0.524*	0.524*	0.543*		0.546*	0.602*	-14.027	0.602**
loan	(0.236)	(0.235)	(0.237)	(0.239)	(0.232)	(0.235)		(0.237)	(0.241)	(1375.20)	(0.224)
Income growth –	-0.201	-0.178	-0.214	-0.252	-0.252	-0.200		-0.222	0.104	-0.630	0.039
dilution	(0.318)	(0.318)	(0.319)	(0.321)	(0.345)	(0.319)		(0.320)	(0.324)	(2.683)	(0.354)
Projected	0.085	0.096	0.079	0.075	0.075	0.097	S	-0.227	-0.187	-0.292	-0.179
evolution	(0.096)	(0.096)	(0.097)	(0.097)	(0.116)	(0.097)		(0.244)	(0.250)	(0.691)	(0.261)
							G	0.083	0.129	-0.151	0.099
								(0.198)	(0.203)	(1.313)	(0.256)
Constant	-4.15***	-4.69***	-4.22***	-4.24***	-4.24***	-4.57***		-4.46***	0.336	-0.300	0.293
	(0.499)	(0.405)	(0.513)	(0.519)	(0.509)	(0.395)		(0.453)	(0.172)	(0.651)	(0.177)
Observations	10027	10077	10027	10027	10027	10077		10077	10031	10036	9982
Ll	-1'124	-1'127	-1'116	-1'108	-1'108	-1'127		-1'120	-1'095	-1'052	-1'077
Pseudo R2	0.0317	0.0315	0.0341	0.0225	0.0225	0.0314		0.0290	0.0337	0.0235	0.0248
BIC	2'424	2'420	2'461	2'640	2'410	2'420		2'498	2'449	3'550	2'346
Specification											
legal,sect,Reg	l,s	No	l,s	l,s,r	l,s,r	No		No	No	No	l,s,r
Interaction	No	No	No	No	No	No		No	No	Yes	Yes
Outlierstreated	No	No	No	No	No	No		No	Yes	No	Yes

Note:B=worker,C=Employee,D=Technician,E=Manager,F=Topmanager,S=Willprobablystaysamesizeinthefuture,G=Willprobablygrowinthefuture,thePseudo-R^2isMcFaden'sR^2,*p<0.05,**p<0.01,***p<0.001, standard errors in brackets, the Pseudo R2 is the adjusted McFaden Pseudo R^2.

The five motivation indicators represent four dummies and one categorical variable. The dummies are the will to stay small, the will to increase the number of employees, the will to grow through bank loans, the will to grow through dilution (or inclusion of new partners), and the categorical variable represents the projected size of the firm at the time of the first survey, taking the value of 2 for "the company will grow", 1 for "maintain actual size", and 0 for "currently facing difficulties" or "do not know".

In addition, control variables for the legal form and sector of activity are used. According to Wiklund, the rationale for controlling for the legal form—being a physical or moral entity—lies in the additional time and money needed to register a company in comparison to using a simpler legal form. Dummies for sectors and regions control for sectorial and geographic heterogeneity. The descriptive statistics concerning all variables used in the study are presented in Appendix D.

The results of the logit regression in M1 reports estimates that are similar to Wiklund's study but are relatively weak. The level of entrepreneurial experiences and the wish to growth through bank loan positively influence new business creation. The wish to stay small, as intuitively expected, has a negative impact. All indicators for education, professional networks, entrepreneurial entourage, gender, nationality, growth of employment, and the projected evolution of the firm, however, do not seem to explain parallel new venture creation. This lack of a statistical link might correspond to the

reality or originate from a weak model specification or bad proxies for new economic activity. These two last possibilities are treated below in a meticulous way.[138]

3. Development of Wiklund's model in the present context

The French database allows extracting additional information corresponding to new economic activity with respect to the above definition of entrepreneurship. The ten initiative and novelty items presented in Chapter 9, section 1 are dummy variables that take a value of 1 for "yes" and 0 for "no". This new information allows analysing the impact of knowledge and motivation on alternative proxies for new economic activity. It makes it possible to study the existence or absence of entrepreneurial decision-making in a framework similar to that proposed by Wiklund by defining an indicator Y2 taking a value of "1" if the firm answers positively to any of the above mentioned item ($\mathrm{Y}_2 = \{0,1\}$), and an indicator Y3 corresponding to the sum of items per firms, giving more weight to businesses that cumulate them ($\mathrm{Y}_3 = \{0,1,..,10\}$). Differences between determinants for initiatives and novelty can be observed by reducing of Y_2 and Y_3 into $\mathrm{Y}_{2\mathrm{i}} = \{0,1\}$, $\mathrm{Y}_{2\mathrm{n}} = \{0,1\}$, $\mathrm{Y}_{3\mathrm{i}} = \{0,\dots,5\}$, $\mathrm{Y}_{3\mathrm{n}} = \{0,\dots 5\}$ for binary or categorical indicators for initiative (with subscript *i*) and novelty (with subscript *n*).

This amounts to seven dependent variables that will be tested in different models. Those based on the dependent variables Y_1 from the previous section (taking a value of 1 for item A = "Yes", zero otherwise) and Y_2 or $\mathrm{Y}_{2\mathrm{i,n}}$ are dichotomous models using logit regressions. The models using the count dependent variables Y_3 or $\mathrm{Y}_{3\mathrm{i,n}}$ use Poisson regression.[139] Various model specifications are tested for each independent variable. The goal is to define which independent variable can legitimately be used for the development of the indicator for entrepreneurial activity by analysing their robustness across models. The methodology used to define the best model specification is presented below. The first step consists of introducing new predictors for knowledge and motivation and adding different sets of control variables (legal form, sector, location). Step 2 and 3 control for non-linearity of predictors and outliers or influential data. Step 4 introduces interactions between the proposed predictors.

This four-step methodology allows analysing estimates' changes linked to the different model specifications. The goal is to eliminate the information that does not modify the interpretation of the results in order to reduce model complexity and consequently the computation time needed to measure abilities. Predictors that participate in the models' informative power will be considered; predictors—such as the control variable, non-linear regressors, and interaction terms—that do not univocally and robustly change the interpretation of the results will be crossed out. The aim of this analysis is therefore to optimise the model's specification rather than maximise its performance.

A total of 10 models for Y_1 (M1-M9e and MC1), 6 models for Y_2 (M10a-M14e and MC2), and 5 models for Y_3 (M15-M18d and MC3) are developed. In addition, the independent analyses of novelty and

[138] The magnitude of the coefficients is not interpreted yet because of the need to measure the marginal impact of the predictors on new economic activity as explained in the next subsection.

[139] A control for zero-inflation is realised, see the below technical note for details.

initiative include 12 models for the initiative trait Y_{2i} and Y_{3i} (M19a-M27d and MC4/5) and 12 models for novelty Y_{2n} and Y_{3n} (M31a-M39d and MC6/7). The number of models per dependent variable differs due to the use of different specifications. A letter representing the model specification (a, b, c, d, e) is added to the models' name for ease of understanding. All model names ending with an "a" have the same specification. Models without a letter in their name will be dropped for the following analytic steps, such that the last step presents the results for model M.a to M.e only. The four-step methodology is illustrated below using Y_1 and is repeated four each dependent variable in six supplementary sequences.

Step 1: Introducing new predictors

The difference between models M1 and M2a in the above Table 28 is the introduction of new predictors for Y_1 and the elimination of all control variables. It becomes the base model for the below analysis. Its specification is labelled "a" in all following sequences. The human capital is complemented by three new indicators: a dummy capturing the fact that some firm creators have followed a specific training in order to launch the firm, the length of the individual's experience in the specific branch of the current new venture, and the creator's previous hierarchical level. The social capital is split into four indicators capturing the effect of several types of business networks: customers or suppliers helping launch the firm and the firm creator's participation in specific entrepreneurial or general support programs offered by the state. It is then complemented by a final dummy for the existence of an entrepreneurial entourage in the family of the firm creator. Model M3 introduces Wiklund's proposed control variables for legal form and sectorial activity and model M4 adds dummies controlling for regional heterogeneity. The model M5 replicated M4 but controls for regional intragroup correlation (clustered standard deviation).

The introduction of new predictors in M2a to M5 does not modify the interpretation of the estimates across models (see Table 28). There is no change in significance, no change of signs, and very little change in magnitudes to be observed. While some control variables are significant, they do not change the models' interpretation. Given the structure of the data, using the control variable and allowing for intragroup correlation therefore does not drive interpretation of the results and these features will be dropped in the following analytic sequences. Saturated models (re-introducing all dropped features) are, however, introduced in the last column of the result tables as control models (name MC1/7) in order confirm this finding in further steps.

Step 2: Controlling for non-linearity of predictors

The non-linear change of a dependent variable on a predictor can be assessed by transforming a predictor x into $\beta_1 + \beta_2 x^p$, where p represents the optimal value found by maximum likelihood for a parameter that would take a value of p=1 for a linear prediction.[140] This transformation is known as the Box-Tidwell model and suggests a square root transformation of the entrepreneurial experience

[140] www.stata.com, boxtid.

(h3), the length of former experience in the field (h4) and the former hierarchical level (h5) for models based on Y_1, Y_2 and Y_3. For example, the optimal values of p for h3, h4, and h5 in models using Y_1 are p^{h3}=-2.36, p^{h4}= -0.74, p^{h5}= 0.58. These values show a sign of non-linearity for each predictor. The significance of p is, however, very poor across all models and it thus cannot be concluded that its values are different from 1. This leads to the conclusion that these predictors are linear. Breaking down Y_2 and Y_3 into subgroups $Y_{2i,n}$ and $Y_{3i,n}$ in order to isolate possible effects of the predictors on the initiative and novelty items leads to same conclusion, except for two cases of count models for novelty items, where h4 and h5 indicated a significant squared root transformation. In order to test the eventual effect of non-linear predictors on the model interpretation, the model noted "b" use the squared values of h3, h4 and h5 (their coefficients are underlined to indicate this transformation). M6b shows an increased significance of the entrepreneurial experience for example, but no difference in interpretation for the two additional estimates. This difference fades out in the following models, indicating that the squared variables do not drive the results.

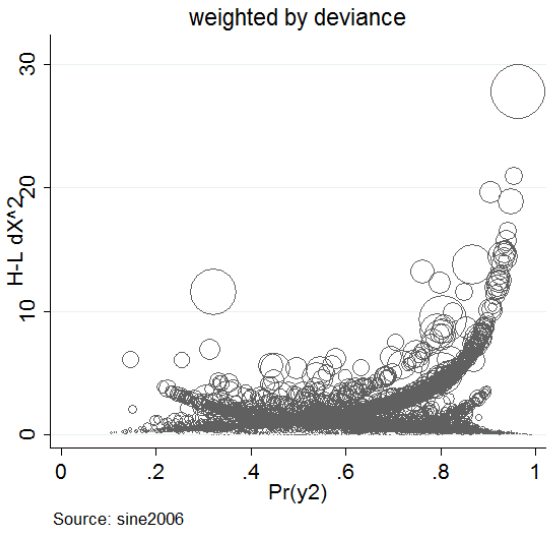
For more care regarding this issue, model M7c tests the transformation of all categorical independent variables into dummies. For example, the entrepreneurial experience that used to take the value of 0 to 3 is now replaced with three dummies accounting for the creation of 1, 2, or more firms prior to the focal business. The dummy representing 0 prior firm creation has been dropped for identification. The letter "c" is attached to all models with this specification. In addition to an increase in goodness of fit and explanatory power that will be discussed below, this transformation changes for the first time the interpretation of the results. The human capital indicators indeed lose their significance in models M7c, M8d and M9e. It is a sign that the use of dummies unveils a hidden effect on Y_1 that wasn't considered previously. This effect is further tested below with respect to the role of influential data and interaction terms.

Step 3: Controlling for outliers and influential data

Influential observations have a potential significant impact on the models. The behaviour of the data can be analysed in a way similar to OLS by looking at the grouping of data (with potential outliers) or observations' leverage on the regression line. Influential data are defined with the Delta chi-squared influence statistic and the Delta-D influence statistic from Lemeshow (2000), as well as the Delta-Beta influence statistic form Pregibon (1981). For a Delta-Beta influence statistic ranging between 0 and 1 for example, the influential observations are defined as those which statistic is greater than 0.9. The combined analysis of these three measures leads to mark 57 influential firms in the sample of 10,077 entries. Figure 41 shows a representation of the person residuals (H-L dX^2) plotted against the predicted probabilities of model M8d. The patterns of decreasing and increasing asymptotes represent the cases where Y_1 =1 or Y_1 =0. The size of the circles refers to the Delta-D influence statistic. The bigger the diameter, the greater the influence on the error term. This confirms the existence of few outliers and a few influential data.

Figure 41: Analysis of outliers and influential data

Person residual vs. predicted probabilities in model M8d



Model M8d reproduces M7c without outliers. The results are very similar to M7c and it therefore can be concluded that outliers don't drive the results. The outliers are kept in the sample for the future analysis because the entrepreneurial activity might be expressed in the form of exceptional behaviour. While interpreting the future results, it has to be kept in mind that some individuals might play a special role in explaining entrepreneurial activity.

Step 4: Adding interaction terms

All plausible and available variables assumed to influence the models have been introduced at this point. The interactions between predictors can, however, still deliver additional information modifying the current interpretation of the results. A model class is tested by introduction of all possible interactions, independent from their theoretical meaning. Controlling for all possible interactions leads, for the first time, to multicollinearity problems. This occurs when two or more predictors in the model represent a linear combination of other explanatory variables. The variables are no longer independent and standard errors can be misleading. The problem can be solved by centring the variables by deduction of their mean prior to generation of the interaction terms.[141] The Table 29 shows the value of two common collinearity diagnostics after treatment of the interaction terms. The variance inflation factor (VIF) shows how strongly standard errors can be inflated by multicollinearity and the tolerance expresses the level of collinearity that a model can support. The closer both measures come to 1, the smaller the correlation between variables and therefore their impact on the models' standard error. The results in Table 29 show a good behaviour of the variables after transformation and little suspicion of multicollinearity.

[141] www.ats.ucla.edu, citing Berry and Feldman (1985, pp. 46–50).

Table 29: Collinearity diagnostics

Variables		VIF	Tolerance	Variables		VIF	Tolerance
Human capital				Social capital			
Education	Med	1.53	0.6532	Professional network		1.04	0.9571
	High			Entrepreneurial			
		1.82	0.5483	entourage		1.14	0.8792
Specific training to				Supplier network			
launch firm		1.12	0.8896			1.14	0.8771
Entrepreneurial	1 cre			Customer network			
experience		1.09	0.9144			1.02	0.9768
	2 cre			Entrepreneurial			
		1.16	0.8616	network		1.05	0.9569
	3 cre	1.40	0.7142	Gender		1.18	0.8498
Prior experience in	<3 y			Nationality			
sector		1.13	0.8877			1.12	0.8957
	3-10y	1.19	0.8383	Motivation			
	10y+	1.22	0.8175	Want to stay small		3.04	0.3289
Former hierar. level	B			Growth of			
		1.66	0.6006	employment		2.57	0.3887
	C			Income growth –			
		2.94	0.3399	loan		2.01	0.4987
	D			Income growth -			
		1.67	0.5984	dilution		2.34	0.4282
	E	1.7	0.5872	Projected evolution	S	2.03	0.4937
	F	3.11	0.3213		G	2.11	0.4743

Note: The VIF and Tolerance for interactions variables are not shown here. They are similar to the other variables, except for 8 interaction terms with VIF values bigger than 4 with a maximum of 8.37. They are omitted in the following analysis.

Model M9e shows the results of the introduction of non-collinear interaction terms in the model specification. Despite good measures of fit, the standard deviations of some variables strongly increase in contradiction to the former collinearity results. Babyak (2004) describes situations of overfitting that appear when the specification has reached the upper limit of complexity of the model (such as after introduction of interaction terms). In addition, rare outcomes ($Y_1 = 1$ in 253 cases on 10,077 firms for example) combined to a reduce degree of freedom (the number of predictors in M9e: 27 covariates + 85 interaction terms = 112) could make the model instable and weaken its predictability.[142] The saturated model including all interaction and control variables, however, shows no obvious signs of instability. The model fit is nevertheless poorer than other models and the significance of the estimates varies. The interpretation of results based on Y_1 might for these two reasons be misleading. They show a lack of robustness across models. The next section therefore proposes a closer look at the behaviour of the data by changing the dependent variable to Y_2 and Y_3 and their reduction to initiative and novelty items only.

[142] www.stata.com

3.1. Assessing the presence and level of economic activity within firms

The last subsection has ruled out Y_1 as an indicator for economic activity because of the lack of robustness of predictors across models and a risk of instable results. This section introduces the use of Y_2 and Y_3 accounting for the presence or level of new economic activity in firms and reproduces the above methodology to optimise the model specification. These new indicators widen the notion of economic activity by encompassing changes introduced to the firm's activity in form of initiatives and novelty after firm creation. Three measures of fit are given per model following Hoetker (2007)'s best practice for the use of logit models (2 measures for Poisson models). First, the McFaden's pseudo-R^2 indicates the percent increase in the log-likelihood function from one model to another (Hoetker, 2007, p. 340). Its value cannot be interpreted as the OLS-R^2 in term of share of variance explained by the model, but an increasing pseudo-R^2 across models advocates for improvement. The second measure is the adjusted count R^2 which gives the predicted probability of correct prediction of the model (in a repeated game). The third measure is the Bayesian Information Criterion (BIC) that compares the relative plausibility of two models. The results are given in Table 30.

The effect of knowledge and motivation on the existence of initiatives and novelty together at the firm level is yet assessed in M10a to M14e. Their impact of the level of initiative and novelty in a firm is assessed in M15a to M18d. The effect of the change of the dependent variable is very similar in all models. For example, the standard deviation of all estimates in model M10a has sharply decreased and 10 coefficients out of 17 are now significant. All pseudo-R^2 show a better explanation power than before and the constant—accounting for the overall unexplained heterogeneity—has greatly decreased and is even insignificant in some models. However, the adjusted count R^2 for logit models vary between 9% and 12%, indicating that the model only allows a correct prediction of Y_2 in few cases.

In addition, changing the dependent variable form Y1 to Y2 adds interesting information in the model. The gain in significance of the specific training, the former hierarchical level, as well as suppliers and customer networks and gender, are determinants of the presence, or absence, of global initiative and novelty patterns in firms but not directly of firm creation itself. This implies that they are predictors of the on-going decisions in the firms rather than that of launching a firm. The sudden negative significant sign of the length of experience in the field of activity is, however, a priori disturbing. A possible interpretation could be a form of inertia due to experience. A long practice in a defined sector would therefore imply a reduced need to be entrepreneurial once the firm is launched.

Table 30: Result table: count models on the level of initiative and novelty in firm

Model		M10a	M11b	m12c	M13d	M14e	m15a	m16b	m17c	m18d	mc2	mc3
Ind. Variable		(Y2)	(Y2)	(Y2)	(Y2)	(Y2)	(Y3)	(Y3)	(Y3)	(Y3)	(Y2)	(Y3)
Regression type		logit	logit	logit	logit	logit	poisson	poisson	poisson	poisson	logit	poisson
Human capital												
Education	Med	-0.055*	-0.066*	0.288***	0.288***	0.281***	0.005	0.001	0.096***	0.107***	0.287***	0.093**
		(0.028)	(0.028)	(0.061)	(0.061)	(0.062)	(0.011)	(0.011)	(0.022)	(0.023)	(0.073)	(0.031)
	High			-0.071	-0.066	-0.058			0.030	0.017	0.036	0.067***
				(0.059)	(0.059)	(0.062)			(0.023)	(0.023)	(0.059)	(0.018)
Specific training		0.197***	0.203***	0.191***	0.200***	0.208***	0.063**	0.064***	0.058**	0.067**	0.362***	0.127***
to launch firm		(0.054)	(0.054)	(0.055)	(0.055)	(0.057)	(0.019)	(0.019)	(0.020)	(0.020)	(0.041)	(0.023)
Entrepreneurial	1cre	0.016	0.003	-0.026	-0.024	-0.065	0.026**	0.009*	0.024	0.015	-0.029	0.021
experience		(0.027)	(0.011)	(0.058)	(0.059)	(0.060)	(0.010)	(0.004)	(0.022)	(0.023)	(0.066)	(0.026)
	2cre			0.174	0.183*	0.247*			0.059	0.051	0.185	0.055
				(0.092)	(0.092)	(0.099)			(0.032)	(0.036)	(0.106)	(0.037)
	3cre			-0.068	-0.066	0.036			0.065	0.015	-0.066	0.058
				(0.103)	(0.103)	(0.120)			(0.037)	(0.046)	(0.103)	(0.039)
Prior experience	<3y	-	-	-	-	-0.215*	-	-	-	-	-0.265**	-0.102*
in sector		0.145***	0.047***	0.369***	0.369***	(0.108)	0.076***	0.025***	0.145***	0.139***	(0.085)	(0.043)
		(0.017)	(0.006)	(0.098)	(0.098)		(0.007)	(0.002)	(0.039)	(0.042)		
	3-10y			-	-	-			-	-	-	-
				0.282***	0.279***	0.275***			0.151***	0.164***	0.207***	0.119***
				(0.060)	(0.060)	(0.062)			(0.023)	(0.024)	(0.051)	(0.031)
	10y+			-0.39***	-0.39***	-0.36***			-0.20***	-0.20***	-0.35***	-0.19***
				(0.055)	(0.055)	(0.058)			(0.022)	(0.022)	(0.052)	(0.023)
Former hierar.	B	0.081***	0.010***	-0.122	-0.145	-0.196	0.031***	0.004***	-0.001	0.036	-0.068	0.046
Level		(0.013)	(0.002)	(0.111)	(0.111)	(0.120)	(0.005)	(0.001)	(0.047)	(0.050)	(0.123)	(0.062)
	C			0.219**	0.218**	0.098			0.089**	0.085*	0.257***	0.110***
				(0.077)	(0.077)	(0.086)			(0.032)	(0.035)	(0.063)	(0.028)
	D			0.132	0.137	0.088			0.112**	0.137**	0.238**	0.167***
				(0.106)	(0.106)	(0.116)			(0.041)	(0.045)	(0.087)	(0.049)
	E			0.389***	0.409***	0.313**			0.175***	0.191***	0.435***	0.190***
				(0.106)	(0.106)	(0.114)			(0.039)	(0.042)	(0.103)	(0.040)
	F			0.359***	0.357***	0.284**			0.151***	0.178***	0.395***	0.167***
				(0.074)	(0.074)	(0.083)			(0.030)	(0.033)	(0.087)	(0.036)
Social capital												
Professional		0.857***	0.859***	0.850***	0.860***	0.972***	0.287***	0.288***	0.280***	0.286***	0.871***	0.265***
network		(0.117)	(0.117)	(0.118)	(0.119)	(0.130)	(0.031)	(0.031)	(0.031)	(0.032)	(0.122)	(0.025)
Entrepreneurial		0.229***	0.229***	0.219***	0.226***	0.186***	0.097***	0.097***	0.092***	0.099***	0.217***	0.083***
entourage		(0.048)	(0.048)	(0.048)	(0.048)	(0.051)	(0.019)	(0.019)	(0.019)	(0.020)	(0.042)	(0.021)
Supplier network		0.634***	0.633***	0.618***	0.618***	0.653***	0.229***	0.229***	0.218***	0.255***	0.511***	0.171***
		(0.065)	(0.065)	(0.066)	(0.066)	(0.068)	(0.020)	(0.020)	(0.021)	(0.022)	(0.059)	(0.014)
Customer		0.039	0.034	0.046	0.045	0.081	0.058**	0.056**	0.065***	0.057**	0.103*	0.094***
network		(0.053)	(0.053)	(0.054)	(0.054)	(0.056)	(0.019)	(0.019)	(0.019)	(0.020)	(0.046)	(0.022)
Entrepreneurial		0.688***	0.692***	0.648***	0.646***	0.656***	0.340***	0.342***	0.328***	0.313***	0.560***	0.280***
network		(0.139)	(0.139)	(0.140)	(0.140)	(0.144)	(0.035)	(0.035)	(0.035)	(0.036)	(0.119)	(0.035)
Gender		0.050	0.048	0.062	0.056	-0.003	0.062**	0.062**	0.063***	0.054**	0.050	0.058***
		(0.048)	(0.048)	(0.049)	(0.049)	(0.054)	(0.019)	(0.019)	(0.019)	(0.020)	(0.032)	(0.014)
Nationality		0.130	0.137	0.110	0.125	0.022	0.026	0.029	0.019	0.020	0.090	0.002
		(0.084)	(0.084)	(0.085)	(0.085)	(0.098)	(0.033)	(0.033)	(0.033)	(0.034)	(0.083)	(0.040)

- Table breaks –

- Table continues -

Model		M10a	M11b	m12c	M13d	M14e	m15a	m16b	m17c	m18d	mc2	mc3
Ind. Variable		(Y2)	(Y2)	(Y2)	(Y2)	(Y2)	(Y3)	(Y3)	(Y3)	(Y3)	(Y2)	(Y3)
Regression type		logit	logit	logit	logit	logit	poisson	poisson	poisson	poisson	logit	poisson
Motivation												
Want to stay		-0.46***	-0.46***	-0.42***	-0.42***	-0.35***	-0.28***	-0.28***	-0.26***	-0.24***	-0.36***	-0.23***
small		(0.077)	(0.077)	(0.078)	(0.078)	(0.083)	(0.027)	(0.027)	(0.027)	(0.029)	(0.059)	(0.023)
Growth of		0.137	0.132	0.145	0.137	0.207*	0.041	0.039	0.040	0.049	0.149*	0.037
employment		(0.093)	(0.093)	(0.094)	(0.094)	(0.099)	(0.030)	(0.030)	(0.030)	(0.032)	(0.072)	(0.029)
Income growth –		0.175	0.172	0.182	0.174	0.402**	0.032	0.032	0.035	0.115**	0.108	0.009
loan		(0.109)	(0.109)	(0.110)	(0.110)	(0.123)	(0.035)	(0.035)	(0.035)	(0.040)	(0.113)	(0.038)
Income growth –		-0.157	-0.160	-0.170	-0.174	0.133	-0.048	-0.051	-0.054	-0.003	-0.224	-0.059
dilution		(0.148)	(0.148)	(0.149)	(0.149)	(0.225)	(0.047)	(0.047)	(0.048)	(0.069)	(0.175)	(0.053)
Projected	S	0.469***	0.470***	-0.003	0.004	-0.052	0.272***	0.273***	-0.095**	-0.110**	0.023	-0.082**
evolution		(0.029)	(0.029)	(0.068)	(0.068)	(0.073)	(0.013)	(0.013)	(0.033)	(0.034)	(0.058)	(0.030)
	G			0.800***	0.811***	0.743***			0.407***	0.409***	0.287***	0.093**
				(0.061)	(0.061)	(0.066)			(0.027)	(0.028)	(0.073)	(0.031)
Constant		-0.361**	-0.253*	-0.181	-0.201	0.042	-0.23***	-0.18***	-0.082	-0.099	-0.051	0.152
		(0.126)	(0.123)	(0.138)	(0.139)	(0.156)	(0.050)	(0.049)	(0.056)	(0.059)	(0.521)	(0.153)
Observations		10077	10077	10077	10067	10077	10077	10077	10077	10077	10067	10077
Ll		-5'976	-5'982	-5'914	-5'901	-5'783	-15'794	-15'803	-15'707	-15'522	-5'741	-15'433
Pseudo R2		0.0753	0.0744	0.0833	0.0843	0.0904	0.0548	0.0543	0.0594	0.0653	0.1043	0.0740
ajd count R2		9.16%	8.24%	10.43%	10.68%	12.98%	-	-	-	-	14.38%	-
BIC		12'117	12'129	12'085	12'060	12'607	31'753	31'771	31'672	32'086	11'676	31'059
Specification												
legal, sect, Reg		No	No	No	No	No	No	No	No	No	l,s,r	l,s,r
Interaction		No	No	No	No	Yes	No	No	No	Yes	Yes	Yes
outliers treated		No	No	No	Yes	No	No	No	No	No	Yes	No

Note: B=worker, C=Employee, D=Technician, E=Manager, F=Top manager, S=Will probably stay same size in the future, G=Will probably grow in the future, $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$. Standard errors in brackets, the Pseudo R2 is the adjusted McFaden Pseudo R^2.

This is confirmed by the predictive margins in Table 31. It shows that the conditional probability of Y1 knowing the duration of the experience decreases with increased experience, but the confidence intervals do not discriminate between groups. In comparison, the conditional probability of Y2 decreases with experience and have almost non-overlapping confidence intervals.

Table 31: Predictive margins conditional to the length of experience in sector

Y1 = venture creation	Margin	Std. Err.	Z	P>|z|	[95% conf.	Interval]
No experience	0.027195	0.002262	12.02	0.00	0.022762	0.031629
Less than 3 years	0.025533	0.00158	16.16	0.00	0.022436	0.028629
3 to 10 years	0.023968	0.001792	13.37	0.00	0.020454	0.027481
More than 10 years	0.022495	0.002493	9.02	0.00	0.017608	0.027382
A1 = Initiatives	Margin	Std. Err.	Z	P>|z|	[95% conf.	Interval]
No experience	0.526691	0.006562	80.26	0.00	0.513829	0.539553
Less than 3 years	0.507318	0.004796	105.77	0.00	0.497918	0.516719
3 to 10 years	0.487929	0.005642	86.48	0.00	0.47687	0.498987
More than 10 years	0.468577	0.008325	56.28	0.00	0.45226	0.484895

Source: Own calculation

This change of impact of a coefficient due to the change of dependent variable does not clarify the information content of the parameter. Indeed, the above pattern could imply a resistance to change

or the excellence of the firm's creator, where excellence results from the development of a "state-of-the-art" business model that requires no changes. The current framework does not allow for distinguishing between two hypothetical meanings of a proxy, and therefore the only conclusion for this coefficient is that a long experience in the field of the young firm creation decreases firms' propensity to be entrepreneurial. In other words, experts tend to stop innovating after the launch of the firm.

3.2. Young firms' initiative pattern measured with binary and categorical variables

"The role of the entrepreneur is to turn the potential of new knowledge, networks, and markets into concrete actions to generate—and take advantage of—new business opportunities" (Hekkert, 2007, p. 421). To investigate this particular aspect of the entrepreneurial activity, we introduce a dependent variable referring to the initiative pattern only. These are items A to E from Chapter 9, section 1. As described in that chapter, the variation that firms induce in the economic environment is a function of the firm's ability to take initiatives and carry them on until completion. As Johannisson (2011) mentions, entrepreneurship is about "actionable knowledge" or "knowledge that is appropriate for getting things done".[143] In an empirical study, he asks Swedish successful family businesses how they allocate their time between action, planning and vision. He finds that successful entrepreneurs spend more time doing concrete actions with rapid feedback than on planning and strategy, which have a prolonged feedback period. The initiative aspect of entrepreneurship thus has a specific importance. The various initiative items are empirically assessed with respect to all mentioned determinants with the goal to investigate differences in estimates. This subsection compares three indicators for initiative in a binary, categorical, and one- and two-parameter structural models.

Models M19a to M23e use a binary variable for the presence of initiative in firms (A1) in Table 32. Human capital loses a bit of significance while social capital and motivation undergoes little changes. The adjusted R^2 is a bit reduced but the adjusted count R^2 and the BIC criterion show a better specification that can be interpreted as a better fit of the models.

The goodness-of-fit of all models is further studied using the Hosmer and Lemeshow methodology for Poisson and logit models with 10 groups in Table 33.[144] For example, the Pearson chi^2 in model M23e is highly insignificant (0.54) and acknowledges for a good fit of the model. As A1 can take a value of 0 or 1, a blind prediction of every firm taking any sort of initiative would imply a 50% rate of success at guessing. Based on cross-tabulation of the predicted probabilities and the observed initiative patterns, the model predicts if firm creators take initiative in 64.14% and therefore has a better explanation power than an empty model.

[143] Johannisson (2011) citing Jarzabkowski and Wilson (2006).

[144] http://www.ats.ucla.edu

The measure of sensitivity of Table 32 indicates that the model can truly predict that an individual does have a propensity to act in 64.15% (true positive) and that somebody does not have a propensity to act in 62.12% all of cases (true negative).

Table 32: Sensitivity and specificity analysis of the binary index for initiative

Classified + if predicted Pr(D) >= 0.5 TRUE D defined as A1 != 0		
Sensitivity	Pr(+|D)	64.15%
Specificity	Pr(-|~D)	62.12%
Positive predictive value	Pr(D|+)	63.20%
Negative predictive value	Pr(~D|-)	63.08%
FALSE + rate for TRUE ~D	Pr(+|~D)	37.88%
FALSE - rate for TRUE D	Pr(-|D)	35.85%
FALSE + rate for classified +	Pr(~D| +)	36.80%
FALSE - rate for classified -	Pr(D| -)	36.93%
Correctly classified		63.14%

Figure 42: Analysis of the LROC curve Based on A1 in M23e

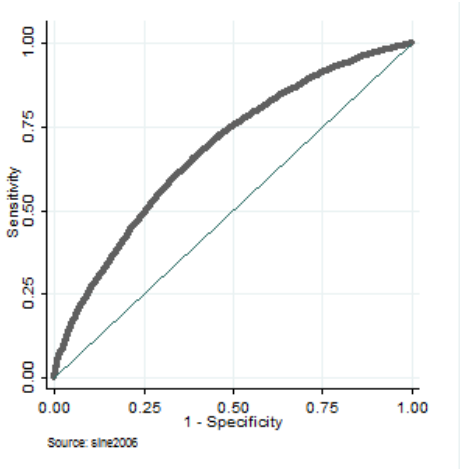


Table 33: Result table: binary and count models for initiative

Model		M19a	M20b	M21c	M22d	M23e	M24a	M25b	M26c	M27d	mc4	mc5
.dta name		M16	M17	M18	M20	M19	M32	M33	M34	M35	mc4	mc5
Ind. Variable		(A1)	(A1)	(A1)	(A1)	(A1)	(A2)	(A2)	(A2)	(A2)	(A1)	(A2)
Regression type		logit	logit	logit	logit	logit	poisson	poisson	poisson	poisson	logit	poisson
Human capital												
Education	Med	-0.012	-0.022	0.189***	0.177**	0.184**	0.014	0.009	0.128***	0.139***	0.170*	0.122**
		(0.027)	(0.027)	(0.056)	(0.056)	(0.057)	(0.016)	(0.016)	(0.032)	(0.033)	(0.083)	(0.046)
	High			-0.028	-0.034	-0.032			0.036	0.027	0.045	0.069
				(0.056)	(0.056)	(0.058)			(0.034)	(0.034)	(0.060)	(0.036)
Specific training		0.160**	0.164***	0.159**	0.168***	0.156**	0.077**	0.079**	0.075**	0.077**	0.285***	0.131***
to launch firm		(0.050)	(0.050)	(0.050)	(0.050)	(0.053)	(0.028)	(0.028)	(0.028)	(0.029)	(0.056)	(0.031)
Entrepreneurial	1cre	-0.004	-0.002	-0.054	-0.051	-0.075	0.011	0.004	-0.006	-0.007	-0.065	-0.009
experience		(0.025)	(0.010)	(0.055)	(0.055)	(0.056)	(0.014)	(0.005)	(0.032)	(0.033)	(0.052)	(0.029)
	2cre			0.064	0.076	0.074			0.039	0.026	0.063	0.032
				(0.083)	(0.083)	(0.088)			(0.047)	(0.053)	(0.085)	(0.039)
	3cre			-0.069	-0.067	-0.011			0.028	0.015	-0.085	0.012
				(0.095)	(0.095)	(0.109)			(0.054)	(0.064)	(0.082)	(0.043)
Prior experience	<3y	-	-	-0.108	-0.099	-0.042	-	-	-0.028	-0.023	-0.009	0.011
in sector		0.098***	0.034***	(0.094)	(0.094)	(0.099)	0.054***	0.020***	(0.055)	(0.057)	(0.097)	(0.045)
		(0.016)	(0.006)				(0.010)	(0.003)				
	3-10y			-0.136*	-0.127*	-0.143*			-0.064	-0.076*	-0.069	-0.036
				(0.056)	(0.056)	(0.058)			(0.033)	(0.034)	(0.046)	(0.027)
	10y+			-0.28***	-0.27***	-0.26***			-0.16***	-0.15***	-0.25***	-0.15***
				(0.052)	(0.052)	(0.054)			(0.031)	(0.032)	(0.059)	(0.024)
Former hierar.	B	0.077***	0.010***	-0.189	-0.203	-0.184	0.037***	0.005***	-0.076	-0.038	-0.144	-0.028
Level		(0.012)	(0.002)	(0.109)	(0.109)	(0.116)	(0.007)	(0.001)	(0.069)	(0.072)	(0.108)	(0.071)
	C			0.083	0.058	0.005			0.050	0.031	0.099	0.080**
				(0.075)	(0.075)	(0.081)			(0.046)	(0.049)	(0.100)	(0.028)
	D			0.101	0.097	0.089			0.087	0.075	0.183	0.144**
				(0.100)	(0.101)	(0.108)			(0.060)	(0.064)	(0.124)	(0.046)
	E			0.322**	0.314**	0.241*			0.194***	0.175**	0.340**	0.210***
				(0.098)	(0.098)	(0.104)			(0.056)	(0.060)	(0.112)	(0.040)
	F			0.306***	0.299***	0.263***			0.155***	0.159***	0.338***	0.176***
				(0.071)	(0.071)	(0.077)			(0.043)	(0.046)	(0.086)	(0.036)

- Table breaks –

- Table continues -

Model		M19a	M20b	M21c	M22d	M23e	M24a	M25b	M26c	M27d	mc4	mc5
.dta name		M16	M17	M18	M20	M19	M32	M33	M34	M35	mc4	mc5
Ind. Variable		(A1)	(A1)	(A1)	(A1)	(A1)	(A2)	(A2)	(A2)	(A2)	(A1)	(A2)
Regression type		logit	logit	logit	logit	logit	poisson	poisson	poisson	poisson	logit	poisson
Social capital												
Professional		0.866***	0.868***	0.865***	0.883***	0.940***	0.373***	0.374***	0.372***	0.385***	0.892***	0.359***
network		(0.099)	(0.099)	(0.099)	(0.099)	(0.104)	(0.043)	(0.043)	(0.043)	(0.044)	(0.102)	(0.039)
Entrepreneurial		0.205***	0.204***	0.196***	0.192***	0.189***	0.111***	0.111***	0.104***	0.109***	0.182***	0.095***
entourage		(0.046)	(0.046)	(0.046)	(0.046)	(0.047)	(0.028)	(0.028)	(0.028)	(0.028)	(0.049)	(0.025)
Supplier network		0.357***	0.357***	0.341***	0.336***	0.388***	0.181***	0.182***	0.170***	0.212***	0.239***	0.122***
		(0.056)	(0.056)	(0.056)	(0.057)	(0.058)	(0.030)	(0.030)	(0.030)	(0.032)	(0.056)	(0.027)
Customer		0.074	0.072	0.080	0.077	0.094	0.051	0.051	0.054	0.049	0.112***	0.075**
network		(0.049)	(0.049)	(0.049)	(0.049)	(0.051)	(0.028)	(0.028)	(0.028)	(0.030)	(0.030)	(0.024)
Entrepreneurial		0.800***	0.802***	0.775***	0.778***	0.757***	0.375***	0.377***	0.366***	0.357***	0.704***	0.318***
network		(0.119)	(0.119)	(0.120)	(0.120)	(0.122)	(0.050)	(0.050)	(0.050)	(0.051)	(0.108)	(0.040)
Gender		0.140**	0.136**	0.143**	0.144**	0.115*	0.121***	0.120***	0.121***	0.112***	0.121***	0.108***
		(0.046)	(0.046)	(0.046)	(0.047)	(0.049)	(0.028)	(0.028)	(0.028)	(0.029)	(0.036)	(0.018)
Nationality		0.163*	0.167*	0.147	0.140	0.081	0.054	0.056	0.043	0.037	0.091	0.019
		(0.081)	(0.081)	(0.081)	(0.081)	(0.088)	(0.049)	(0.049)	(0.049)	(0.050)	(0.082)	(0.049)
Motivation												
Want to stay		-0.41***	-0.40***	-0.37***	-0.38***	-0.33***	-0.24***	-0.24***	-0.23***	-0.20***	-0.31***	-0.18***
small		(0.071)	(0.071)	(0.071)	(0.071)	(0.076)	(0.039)	(0.039)	(0.040)	(0.042)	(0.056)	(0.036)
Growth of		0.009	0.007	0.012	0.002	0.029	0.010	0.010	0.009	0.008	-0.003	0.003
employment		(0.083)	(0.083)	(0.083)	(0.083)	(0.088)	(0.044)	(0.044)	(0.044)	(0.047)	(0.104)	(0.047)
Income growth –		0.192*	0.191*	0.196*	0.193*	0.411***	0.091	0.091	0.090	0.175**	0.143	0.068
loan		(0.097)	(0.097)	(0.097)	(0.097)	(0.109)	(0.050)	(0.050)	(0.050)	(0.056)	(0.093)	(0.050)
Income growth –		-0.217	-0.223	-0.238	-0.243	0.004	-0.121	-0.124	-0.132	-0.046	-0.280*	-
dilution		(0.132)	(0.132)	(0.132)	(0.132)	(0.200)	(0.070)	(0.070)	(0.071)	(0.102)	(0.131)	0.152***
												(0.042)
Projected	S	0.367***	0.367***	-0.012	-0.	-0.023	0.209***	0.209***	-0.046	-0.036	0.003	-0.034
evolution		(0.029)	(0.029)	(0.069)	(0.069)	(0.073)	(0.019)	(0.019)	(0.046)	(0.048)	(0.098)	(0.064)
	G			0.607***	0.603***	0.602***			0.322***	0.349***	0.577***	0.300***
				(0.060)	(0.060)	(0.064)			(0.039)	(0.040)	(0.095)	(0.070)
Constant		-1.03***	-0.92***	-0.78***	-0.75***	-0.67***	-1.00***	-0.95***	-0.87***	-0.89***	-0.612	-0.70***
		(0.120)	(0.117)	(0.133)	(0.133)	(0.144)	(0.072)	(0.070)	(0.081)	(0.085)	(0.430)	(0.166)
Observations		10077	10077	10077	10046	10077	10077	10077	10077	10077	10046	10077
Ll		-6'589	-6'589	-6'555	-6'535	-6'428	-10'527	-10'527	-10'495	-10'392	-6'413	-10'388
Pseudo R2		0.054	0.0540	0.0575	0.0574	0.0635	0.0330	0.0330	0.0350	0.0367	0.0707	0.0421
ajd count R2		22.65%	22.65%	23.33%	23.20%	26.90%	-	-	-	-	26.87%	-
BIC		13'343	13'344	13'368	13'329	13'897	21'220	21'220	21'248	21'826	13'020	20'970
Specification												
legal, sect, Reg		No	No	No	No	No	No	No	No	No	l,s,r	l,s,r
Interaction		No	No	No	No	Yes	No	No	No	Yes	Yes	Yes
outliers treated		No	No	No	Yes	No	No	No	No	No	Yes	No

Note: B=worker, C=Employee, D=Technician, E=Manager, F=Top manager, S=Will probably stay same size in the future, G=Will probably grow in the future, $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$. Standard errors in brackets, the Pseudo R2 is the adjusted McFaden Pseudo R^2.

However, almost one-third of the cases remain unexplained by the model. By plotting the true positive rate (sensitivity) against the false positive rate (1-specificity) for a probability of action moving from 0 to 1, the ROC in Figure 42 curve shows that the explanatory power of the models reaches 68.06% (the area under the curve), making the upper left corner of the graph unpredictable. Despite the fact that the significance of coefficients has increased in M23e, the prediction of initiatives within firms seems to be driven by something not yet captured by the specification.

An intuitive way to improve the model is to account for the *level* of the propensity to act rather than its presence. Models M24a to M27d use a count variable for the cumulative initiative traits (A2). This approach sums up the binary indicators of initiative (new creation, change in product, change in production, change in sales, change in organisation) per firm and generate an index rating from 0 to 5, 5 being the higher degree of implementing changes. The results for these models in Table 33, however, show very little differences in the estimates' magnitude and significance levels. The pseudo R^2 is nevertheless almost half of those of the last models, which indicates a poor specification of the count models. The best specification at this stage is that of model M21c and will be used for the final analytical step (IRT). It shows that the focus on initiatives items has improved the model specification.

3.3. Young firms' novelty pattern measured with binary and categorical variables

The process of new venture emergence in Gartner's model may be associated with non-innovative outcomes that may generate profits, but it would not be considered by many scholars as creating new "innovative" value, that is generic to all entrepreneurial processes (Parker, 2004; van Prasg, 1999)" (Moroz, 2012, p. 801). The following analysis thus repeats the methodology presented in the section 2.1 using novelty items as the dependent variable.

Using a binary index N1 taking a value of 1 for firms which positively answered any of the novelty questions and 0 otherwise, we can study the effect of knowledge and motivation on the existence of novel actions in firms. The count index N2 sums up the dummies n1 to n5 for each firm giving more weight to those who implemented various items in parallel. The results are presented in Table 34 for N1 (models M31a to M35e) and N2 (models M36a to M39d).

Table 34: Result table: binary and count models for novelty

Model		m31a	m32b	m33c	m34d	m35e	m36a	m37b	m38c	m39d	mc6	mc7
.dta name		m21	m22	m23	m25	m24	m38	m39	m40	m41	mc6	mc7
Ind. Variable		(N1)	(N1)	(N1)	(N1)	(N1)	(N2)	(N2)	(N2)	(N2)	(N1)	(N2)
Regression type		logit	logit	logit	logit	logit	poisson	poisson	poisson	poisson	logit	poisson
Human capital												
Education	Med	-0.022	-0.029	0.221***	0.227***	0.234***	-0.003	-0.008	0.066*	0.076*	0.238***	0.067
		(0.027)	(0.027)	(0.056)	(0.056)	(0.058)	(0.015)	(0.015)	(0.031)	(0.032)	(0.053)	(0.035)
	High			0.027	0.030	0.022			0.025	0.010	0.131	0.065
				(0.057)	(0.058)	(0.059)			(0.032)	(0.033)	(0.082)	(0.050)
Specific training		0.055	0.059	0.040	0.036	0.053	0.050	0.051	0.043	0.056	0.181***	0.124***
to launch firm		(0.050)	(0.050)	(0.050)	(0.051)	(0.053)	(0.027)	(0.027)	(0.027)	(0.029)	(0.044)	(0.027)
Entrepreneurial	1cre	0.059*	0.020*	0.071	0.079	0.038	0.040**	0.014**	0.052	0.032	0.077	0.049
experience		(0.025)	(0.010)	(0.056)	(0.056)	(0.057)	(0.013)	(0.005)	(0.030)	(0.033)	(0.054)	(0.033)
	2cre			0.140	0.149	0.163			0.078	0.070	0.153	0.077
				(0.083)	(0.084)	(0.090)			(0.044)	(0.051)	(0.099)	(0.052)
	3cre			0.152	0.174	0.094			0.100*	-0.011	0.197*	0.100
				(0.096)	(0.096)	(0.116)			(0.050)	(0.068)	(0.097)	(0.052)
Prior experience	<3y	-0.16***	-0.05***	-0.37***	-0.37***	-0.35***	-0.09***	-0.03***	-0.25***	-0.27***	-0.289**	-0.21***
in sector		(0.017)	(0.006)	(0.097)	(0.097)	(0.106)	(0.009)	(0.003)	(0.057)	(0.062)	(0.102)	(0.060)
	3-10y			-0.42***	-0.42***	-0.42***			-0.23***	-0.24***	-0.36***	-0.19***
				(0.058)	(0.058)	(0.059)			(0.032)	(0.033)	(0.055)	(0.046)
	10y+			-0.42***	-0.44***	-0.42***			-0.24***	-0.24***	-0.40***	-0.22***
				(0.054)	(0.054)	(0.055)			(0.030)	(0.030)	(0.044)	(0.032)

- Table breaks –

- Table continues -

Model		m31a	m32b	m33c	m34d	m35e	m36a	m37b	m38c	m39d	mc6	mc7
.dta name		m21	m22	m23	m25	m24	m38	m39	m40	m41	mc6	mc7
Ind. Variable		(N1)	(N1)	(N1)	(N1)	(N1)	(N2)	(N2)	(N2)	(N2)	(N1)	(N2)
Regression type		logit	logit	logit	logit	logit	poisson	poisson	poisson	poisson	logit	poisson
Former hierar.	B	0.055***	0.006***	0.135	0.161	0.096	0.026***	0.003***	0.065	0.100	0.233*	0.111
Level		(0.013)	(0.002)	(0.112)	(0.113)	(0.120)	(0.007)	(0.001)	(0.064)	(0.071)	(0.118)	(0.074)
	C			0.297***	0.311***	0.236**			0.124**	0.138**	0.345***	0.137**
				(0.077)	(0.078)	(0.084)			(0.044)	(0.049)	(0.063)	(0.051)
	D			0.237*	0.250*	0.221*			0.134*	0.189**	0.353***	0.188*
				(0.103)	(0.103)	(0.110)			(0.057)	(0.063)	(0.104)	(0.075)
	E			0.332***	0.345***	0.323**			0.156**	0.210***	0.380***	0.171*
				(0.100)	(0.100)	(0.106)			(0.055)	(0.060)	(0.100)	(0.068)
	F			0.325***	0.330***	0.317***			0.147***	0.202***	0.373***	0.159**
				(0.074)	(0.074)	(0.080)			(0.041)	(0.047)	(0.058)	(0.049)
Social capital												
Professional		0.335***	0.336***	0.319***	0.322***	0.337***	0.203***	0.203***	0.191***	0.180***	0.308***	0.172***
network		(0.091)	(0.091)	(0.091)	(0.091)	(0.095)	(0.044)	(0.044)	(0.044)	(0.047)	(0.080)	(0.035)
Entrepreneurial		0.147**	0.146**	0.139**	0.133**	0.143**	0.083**	0.084**	0.081**	0.091***	0.124**	0.071*
entourage		(0.047)	(0.047)	(0.047)	(0.047)	(0.048)	(0.027)	(0.027)	(0.027)	(0.027)	(0.048)	(0.032)
Supplier network		0.504***	0.502***	0.490***	0.493***	0.514***	0.271***	0.271***	0.261***	0.296***	0.409***	0.215***
		(0.056)	(0.055)	(0.056)	(0.056)	(0.058)	(0.028)	(0.028)	(0.028)	(0.031)	(0.045)	(0.016)
Customer		0.062	0.056	0.079	0.087	0.080	0.065*	0.060*	0.075**	0.064*	0.159***	0.112***
network		(0.049)	(0.049)	(0.050)	(0.050)	(0.052)	(0.026)	(0.026)	(0.027)	(0.028)	(0.048)	(0.029)
Entrepreneurial		0.524***	0.529***	0.494***	0.498***	0.487***	0.307***	0.309***	0.293***	0.273***	0.422***	0.245***
network		(0.110)	(0.110)	(0.110)	(0.110)	(0.113)	(0.050)	(0.050)	(0.050)	(0.051)	(0.096)	(0.050)
Gender		-0.048	-0.046	-0.037	-0.039	-0.068	0.007	0.009	0.011	0.004	-0.031	0.013
		(0.046)	(0.046)	(0.047)	(0.047)	(0.050)	(0.026)	(0.026)	(0.026)	(0.027)	(0.045)	(0.025)
Nationality		0.019	0.026	0.009	0.007	0.008	0.001	0.005	-0.002	0.014	-0.017	-0.012
		(0.082)	(0.082)	(0.083)	(0.083)	(0.088)	(0.045)	(0.045)	(0.046)	(0.048)	(0.077)	(0.044)
Motivation												
Want to stay		-0.32***	-0.32***	-0.28***	-0.29***	-0.26***	-0.38***	-0.39***	-0.29***	-0.28***	-	-
small		(0.071)	(0.071)	(0.071)	(0.071)	(0.076)	(0.037)	(0.037)	(0.038)	(0.040)	0.269***	0.273***
											(0.052)	(0.024)
Growth of		0.157	0.149	0.162*	0.162*	0.189*	0.068	0.064	0.066	0.083	0.173**	0.068*
employment		(0.082)	(0.082)	(0.082)	(0.082)	(0.088)	(0.041)	(0.041)	(0.041)	(0.044)	(0.057)	(0.032)
Income growth –		0.055	0.053	0.069	0.069	0.185	-0.022	-0.023	-0.016	0.049	0.007	-0.045
loan		(0.095)	(0.095)	(0.095)	(0.095)	(0.107)	(0.048)	(0.048)	(0.048)	(0.056)	(0.099)	(0.045)
Income growth –		0.026	0.021	0.023	0.022	0.022	0.015	0.012	0.015	0.014	0.042	0.024
dilution		(0.130)	(0.130)	(0.131)	(0.131)	(0.191)	(0.064)	(0.064)	(0.064)	(0.095)	(0.161)	(0.086)
Projected	S	0.482***	0.483***	-0.093	-0.105	-0.144	0.334***	0.336***	-0.151**	-0.18***	-0.089	-0.137
evolution		(0.030)	(0.030)	(0.073)	(0.074)	(0.076)	(0.019)	(0.019)	(0.048)	(0.049)	(0.092)	(0.078)
	G			0.766***	0.765***	0.727***			0.487***	0.474***	0.756***	0.472***
				(0.063)	(0.063)	(0.065)			(0.039)	(0.039)	(0.068)	(0.039)
Constant		-1.14***	-1.07***	-1.03***	-1.03***	-0.95***	-0.85***	-0.82***	-0.69***	-0.72***	-0.531	-0.394*
		(0.122)	(0.119)	(0.136)	(0.136)	(0.147)	(0.069)	(0.067)	(0.077)	(0.083)	(0.421)	(0.185)
Observations		10077	10077	10077	10061	10077	10077	10077	10077	10077	10061	10077
Ll		-6'462	-6'473	-6'406	-6'387	-6'273	-11'744	-11'756	-11'675	-11'528	-6'227	-11'482
Pseudo R2		0.0567	0.0551	0.0633	0.0645	0.0703	0.0468	0.0459	0.0516	0.0567	0.0834	0.0648
ajd count R2		11.08%	11.64%	12.63%	12.48%	15.97%	.	.	.	.	17.50%	.
BIC		13'090	13'112	13'071	13'031	13'588	23'655	23'677	23'607	24'097	12'647	23'158
Specification												
legal, sect, Reg		No	No	No	No	No	No	No	No	No	l,s,r	l,s,r
Interaction		No	No	No	No	Yes	No	No	No	Yes	Yes	Yes
outliers treated		No	No	No	Yes	No	No	No	No	No	Yes	No

Note: B=worker, C=Employee, D=Technician, E=Manager, F=Top manager, S=Will probably stay same size in the future, G=Will probably grow in the future, $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.00$. Standard errors in brackets, the Pseudo R2 is the adjusted McFaden Pseudo R^2.

The estimates are once again very similar and robust across models. The (pseudo) R^2 has risen compared to the initiative framework but the count R^2 is slightly smaller, ranging between 11% and 16%. Both measures of fit are, however, better than the joint approach that accounted for initiative and novelty at the same time. This result confirms that an independent analysis of the initiative and novelty traits provides more information about the underlying structure of the data than a global approach such as those using Y_1, Y_2 and Y_3.

3.4. Conclusion on the selection of dependent and independent variables:

On dependent variables

The summing up approach (count) assumes that all new economic activities in new businesses have the same innovative content. It could, however, be argued that implementing various novelty items have different relevance for each firm. Weighting innovation indices would allow accounting for this issue by giving more importance to certain component of novelty. Simultaneously, the problem remains that firms do not share the same attribute when bringing a new idea to the market. These elements are thus accounted for in the IRT in Chapter 9.

On dependent variables

The four-step methodology shows that specification "c" with all human capital, social capital, and motivation proxies is the best one. It includes outliers but omits legal, sectorial, and regional dummies as well as interaction terms because they do not drive the interpretation of the result. The rationale for this decision is related to the measurement of latent variables in the final models, which implies a drastic increase in computation time with each supplementary parameter estimated. The robustness of the regression results across the whole study supports this choice. Moreover, because both organisational and entrepreneurial functions are defined as the sum of specific decisions in firms, the model specification "c" is used in both IRT. In other words, the characteristics of sound decision-making, knowledge, and motivation are expected to positively and significantly influence both latent constructs.

3.5. Technical note

Dichotomous outcome: logit vs. probit

The dichotomous character of a firm's behaviour in models using Y1 and Y2 renders the use of traditional OLS regression invalid. The discrete dependent variable needs to be transformed into a continuous variable to allow estimation. A link function is commonly used in the case. A well-known model transformation using a link function is the log linearization. While the estimation of a linear model $Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \varepsilon \equiv X\beta + \varepsilon$ allows interpreting the resulting coefficients as the unit-increase of Y for a one-unit increase in X, the transformation of the dependent variable Y

into $\log(Y) \equiv Y' = X\beta + \varepsilon$ modifies the meaning of the parameter estimates into a percentage increase in Y given a one-unit increase in X. The log transformation in this example represents the use of a link function $\mathrm{F}(.)$, where $\mathrm{F}(Y) = \log(Y)$. Two functions are usually used to assess binary models. A probit link allows transforming the observed outcome $Y = \{0,1\}$ into $Y \in \{0, \infty\}$ using the cumulative normal distribution Φ. The probit link therefore takes the form $\mathrm{probit(Y)} = \mathrm{F(Y)} = \Phi^{-1}(Y)$ (Bowen, 2004, p. 94). The logit link allows transforming the observed outcome $Y = \{0,1\}$ into $Y \in \{-\infty, \infty\}$ using the log odds ratio of the outcome. If an event occurs with a probability p, then its odds of happening is $O(p) = p/(1-p)$. The odds represent the probability of an event to occur divided by the probability of the same even not to occur. In other words, if one thinks that the chance to observe an event is equal to the chance not to observe it, its odd ratio is unity (called 1 against 1, 1 to 1, or 1/1), and the probability of the event happening is 50% ($O(0.5) = 0.5/(1-0.5) = 1$). If the chance to observe the event is three times greater than the chance not to observe it (3 to 1), its probability to occur is 75% ($O(0.75) = 0.75/(1-0.75) = 3$). While the odds takes a value $O(p) \in \{0, \infty\}$, its log value belongs to $\log[O(p)] \in \{-\infty, \infty\}$, and the link function become $logit(Y) = F(Y) = \log[O(y)] = \log[y/(1-y)]$, where y is the predicted probability that $Y = 1$. This function has a logit distribution function that is close to the normal distribution function.[145]

The choice between the two types of models is arbitrary for the analysis of binary outcome from random samples (Xie, 1988, p. 1). This work is based on a logit approach for ease of interpretation. In particular, in a logit framework, the effect of a one-unit change of X_i can be interpreted as a change in the odds of Y by a factor of $\exp(\beta_i)$[146] and the coefficient sign has the common OLS meaning (except that it refers to the change of the probability of the choice for which $Y = 1$) (Bowen, 2004, p. 110) .

Poisson, negative binomial, and zero-inflated models

The Poisson regression is characterised by observing a discrete number of events $Y = \{0,1,2,3 \dots\}$ given an underlying rate of events. It allows measuring the probability of the event Y taking a certain value given the observed rate of Y. In other words, if Y represents the above-mentioned indicator for new economic activity with a range $Y = \{0,1, \dots ,10\}$, a Poisson regression allows the measurement of the probability of a frim to take the value of 0, 1, or 10 given the underlying average value of Y. A Poisson regression analyses the relationship between the natural logarithm of the mean or expected number of events for firm i and the sum of the product of each of the K independent variables multiplied by its estimate parameter $\ln(\lambda_i) = \sum_{k=0}^{K} \beta_k x_i$. The probability of the observed outcome Y_i follows a poisson distribution such as $P(Y = Y_i) = (e^{\lambda_i} \lambda_i^{y_i})/y_i!)$. The validity of the regression depends on the good fit of the model to the data. In particular, the underlying assumption of a Poisson distribution is that variables' variance equals variable's mean and firms' new activity level is independent from their counterparts (Osgood, 2000, p. 28). A violation of these assumptions results

[145] www.ats.ucla.edu

[146] Hoetker (2007, p. 334).

in a residual variance that exceeds λ_i, also called overdispersion, and it leads to underestimated standard errors. Overdispersion is tested in order to avoid introducing a bias due to competition or regulation, for example. In such a case, the use of a negative binomial regression can overcome the problem by assuming an unexplained variation in the true mean of the event λ_i that follows a gamma distribution. The probability of $P(Y)$ becomes $P(Y = Y_i) = [\Gamma(y_i + \phi)/y_i!\,\Gamma(\phi)] * [\phi^{\phi}\lambda_i^{y_i}/(\phi + \lambda_i)^{\phi - y_i}]$, where Γ is the gamma distribution and ϕ the reciprocal of the residual variance of the mean count of event. (Osgood, 2000, p. 29) In the case where the model predicts more "0" than expected, zero-inflated models can be used. The underlying assumption is either that heterogeneity blurs the model or that the event generation process has a dual state for 0s and 1s and therefore follows two distinct distributions. Both cases are solved by using Poisson mixed models with a probability distribution function $P(Y = Y_i) = \alpha(\lambda_1^n e^{-\lambda_1}/n!) + (1 - \alpha)(\lambda_2^n e^{-\lambda_2}/n!)$, where $\lambda_1 < \lambda_2$ are the means of the distribution functions, and n the observed count data (0,1,2…N) (Lord, 2005, p. 38). All models using Y3 test for overdispersion and various measures of fit in order to avoid biases in interpretation.

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