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**PROGRAMA DE PÓS-GRADUAÇÃO EM ADMINISTRAÇÃO**

**ESCOLHAS BASEADAS EM MÚLTIPLOS OBJETIVOS:**

**a evolução do homo economicus ao homo aptabilis**

**MULTIPLE GOALS-BASED CHOICE:**

**the evolution from *homo economicus* to *homo aptabilis***

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## RESUMO

Escolhas são meios para que indivíduos e consumidores atinjam seus objetivos. São objeto de estudo em diversas disciplinas e eu me apoiei em três delas para desenvolver esta tese. Modelos normativos da economia que definem o *homo economicus*, modelos descritivos das teorias de decisão comportamental que forjam o *homo aptabilis*, capaz de fazer escolhas que permitam o atingimento de seus objetivos. E modelos econométricos de escolha discreta, que permitem o uso e teste de teorias comportamentais usando métodos flexíveis e realistas. O argumento central desta tese é que modelos econométricos devem considerar a heterogeneidade do comportamento individual em todo o processo de escolha, incluindo objetivos do consumidor, estratégias de decisão, formação de conjuntos de escolha subjetivos, além de preferência. O não reconhecimento desta complexidade nos processos de escolha produz modelos falsos, capturando a heterogeneidade no nível das preferências e induzindo organizações a tomarem decisões equivocadas. Para desenvolver este argumento, esta tese se organiza em três seções. Na primeira eu faço uma revisão da literatura com foco nos diversos níveis do processo de escolha onde a heterogeneidade se manifesta e relaciono os modelos de escolha com as teorias comportamentais de decisão. Na segunda seção é desenvolvido um estudo sobre os vieses provocados quando a heterogeneidade na formação de conjuntos subjetivos de escolha não é levada em consideração. Através de experimentos de Monte Carlo fica comprovado que os parâmetros de modelos econométricos de escolha são generalizadamente viesados, levando à estimadas equivocadas de probabilidades de escolhas das marcas e das elasticidades das probabilidades de escolha. Esses resultados são usados para motivar uma abordagem de teoria dos jogos que resulta em equilíbrio distante do ideal, do ponto de vista de resultados das empresas. Finalmente na terceira seção, é desenvolvido um modelo de escolha discreta baseado em múltiplos meta-objetivos e em diferentes processos de escolha individual. Mais um experimento de Monte Carlo comprova que o modelo é capaz de recuperar o parâmetros do processo gerador de dados. O modelo além de reconhecer a existência de diversos meta-objetivos que ativam diferentes regras comportamentais, também permite estudar a adaptação do processo de escolha individual em função de variáveis de contexto, de situação e individuais. O modelo articula modelos econométricos com teorias comportamentais de decisão e oferece suporte para a compreensão do *homo aptabilis*.

**Palavras-chave:** Comportamento do consumidor; Modelos de escolha discreta; Escolhas baseadas em múltiplos objetivos; Teorias comportamentais de decisão; Heterogeneidade na resposta do consumidor

## ABSTRACT

Choices are the means for individuals and consumers to attain their goals. They are the objects of study for several disciplines and I relied on three of them to develop this thesis. Normative models from economics defining the *homo economicus*, descriptive models from behavioral decision theories that forge the *homo aptabilis*, able to adaptively pursue multiple goals through choices. And discrete-choice econometric models that allow the use and testing of behavioral theories using flexible and realistic methods. The central argument of this thesis is that econometric models should consider the heterogeneity of individual behavior throughout the choice process, including consumer goals, decision strategies, choice set formation, and preferences. Failure to recognize this complexity in the choice process produces false models, capturing process heterogeneity at the level of preferences, and inducing organizations to make the wrong decisions. To develop this argument, this thesis is organized into three sections. In the first one, I review the literature focusing on the different levels of the choice process where the heterogeneity manifests itself and I relate the choice models to the behavioral decision theories. In the second section, a study is developed on the biases caused when heterogeneity in the choice set formation is not accounted for. Through Monte Carlo experiments it has been proven that the parameters of econometric choice models are generally biased, leading to misleading estimates of brands choice probabilities and of attribute's choice elasticities. These results are used to motivate a game theoretical approach that results in far-fetched equilibrium from the point of view of business results. Finally, in the third section, a discrete choice model based on multiple meta-goals and on different individual choice processes is developed. One more Monte Carlo experiment proves that the model is capable of retrieving the parameters of the data-generating process. The model, besides recognizing the existence of several meta-objectives that activate different behavioral rules, also allows studying the adaptation of the consumer choice process as a response to context, situation, and individual variables. The model articulates econometric models with behavioral decision theories and supports the understanding of the *homo aptabilis*.

Keywords: Consumer behavior; Discrete choice models; Multiple goals choice bases; Behavioral Decision Theories, Consumer response heterogeneity.

## 1 THESIS PRESENTATION

The object of study chosen for this thesis is consumer response heterogeneity, specifically its integration into discrete choice models.

Consumer response heterogeneity is the outcome of individual differences revealed throughout judgment and decision-making and the psychological processes involved in this kind of human activity (Desarbo et al., 1997). It is a fundamental concept to marketing strategy, supporting segmentation, targeting and positioning decisions, as well as to operational marketing given its importance for marketing mix management (Kamakura, Kim, & Lee, 1996). To make my point clearer, before deepening into more precise definitions, heterogeneity may rest on consumers' tastes as it is the dominant practice in choice modelling or on, what I am loosely naming by now, the choice process, i.e., everything related to decision-making including tastes.

In the study of consumers' choices, Adamowicz et al., (2008) identify three relevant schools of thought that emphasize the understanding of consumers' decision-making processes. These three different perspectives, that offer the building blocks for developing this thesis are: the economic theory of consumer behavior; the behavioral decision theories approach that comprehends fields like consumer behavior, mathematical as well as cognitive and consumer psychology and, more recently, behavioral economics; and the choice modeling stream, which is concerned about the development of econometric models of choice used in a variety disciplines like marketing, applied economics, transportation, and sociology to name a few.

I will rely on these three fonts of scientific knowledge to illustrate the sources of choice heterogeneity, i.e., how the consumers' decision-making processes vary between persons as a function of individual differences, and across occasions (within persons) as a function of the environment. As it will be reasoned, I will stand at the side of researchers proposing that consumers' choice is a mean to achieve multiple goals, which are important not only as representations of desired end states but also because they drive the choice process focusing the superior psychological processes, like attention and memory, toward their achievement (Weber & Johnson, 2009). Oriented by these multiple goals the individual decision-making is a process comprising both the selection of an available alternative in any choice task, and also of a

strategy that commands the efforts allocated to achieve the goals, i.e., a process of deciding how to decide (Swait & Feinberg, 2014), which I will refer to as a meta choice. The meta choice includes decisions about how to handle the context and task properties, i.e. goals activation and evaluation strategy, to select an alternative that best satisfies the consumer's goals.

Under the premise that choice is a multiple goal pursuing process, enabling a meta choice, the economic rationality gives place to a procedural rationality defined by H. A. Simon (1978 p. 9) as “the effectiveness, in light of human cognitive powers and limitations, of the procedures used to choose actions”. And aligned with this view of rationality the *homo economicus* gives place to a decision-maker that I name as the *homo aptabilis*, given its ability to continuously adapt both the meta choice and the choice to the environment in the search for multiples goals.

Back to consumer heterogeneity response, it emerges in its many dimensions as a consequence of consumers striving to achieve multiple goals , leading to the use of different decision rules or strategies, to the manifestation of different preferences and to the observation of different levels of stochasticity throughout the choice process.

It is quite a challenge to organize the knowledge generated to explain the same phenomena as belonging to one source or to the other, among the three above-mentioned. As time goes by, the different disciplines get confronted and inspired by each other, and the relevant findings end up crossing the borders. Nevertheless, I will try to keep the contribution of each discipline as transparent as possible, and my objective is just to use their core perspectives on human decision-making as the vertices of a triangle lending the references about the territory. The economic theory of consumer behavior occupies the vertex offering the normative viewpoint of the phenomenon, with great focus on consumers' tastes; the behavioral decision theories reside in the vertex concerned about psychological processes involved and descriptive theories that challenge the normative view, with emphasis on the choice processes; and the econometric models of choice stream rests in the vertex that develops statistical tools building stochastic models that can empirically combine and test the propositions from the other vertices, to realistically explain and predict human choices.

Econometric models of choice, specifically discrete choice, receive a particular emphasis in this thesis development since this is the tool that I have chosen to shape my

empirical contribution to the state of the art. This choice of mine rests on some good reasons: (i) these models are flexible enough to study several sources of data, like revealed or stated preference, experimental or non-experimental data in different aggregation levels and even to formally fuse data from different sources; (ii) this school of thought is strongly concerned about prediction, but it also considers increasingly important to offer realistic behavioral explanations to support its predictions, and (iii) although choice process heterogeneity has been debated in the literature for quite a while, only in the past few years, efforts to model the phenomenon are slowly spreading across the discipline, meaning there's a lot of room for contribution on extending the knowledge's frontier in the area.

Resulting from my motivation, when working through examples I will focus my efforts on identifying the econometric models of choice that illustrates the behavioral theories proposed in the other vertices of the triangle, i.e., I will try to identify the choice models developed to incorporate behavioral decision theories. This is also a challenge, and to do this I count on a small group of researchers that has been pioneering the exploration of these possibilities and that have already achieved promising results.

As this thesis unfolds I will: (i) present a literature review bridging the disciplines; (ii) followed by an empirical evidence intended to work as a compelling argument of the inevitability of considering choice process heterogeneity in choice models; and (iii) finish proposing and testing, with synthetic data, an econometric choice model that reflects some of the ideas presented in this document.

## **1.1 Justification**

Consumer choices concerning the selection, consumption, and disposal of products and services can often be difficult and are important to the consumer, to marketers, and to policy makers. As a result, the study of consumer decision processes has been a focal interest in consumer behavior for over 30 years. (Bettman, Luce, & Payne, 1998, p. 186)

And so the statement above is true 20 years after it was published. A reason to the scientific curiosity about choice processes is that making choices is a natural state of activity in any society, in any domain of human action (Louviere, Hensher, & Swait, 2000 p. 1). From a positive psychology perspective, to exercise choice among valued options fosters individual autonomy and competence, which facilitates intrinsic motivation development, supporting a

natural human tendency toward activity and integration (Moller, Deci, & Ryan, 2006; Ryan & Deci, 2000).

Choice is also intimately related to the notion of freedom and Berlin (as cited by Bavetta, 2004) proposes positive freedom as the individual preservation of a personal sphere within which she exercises liberty through possibility to act, which requires alternative courses of action, and the existence of conditions under which one is capable of following her own desires. The same author defines negative freedom as the exercise of freedom with no constraints, nor imposed by other individuals neither by the State.

This notion of positive freedom describes our everyday choices, including those which are made much beyond the consumption domain, shaping the natural and social environment surrounding us. Usually, our possibilities to act, or choose among alternatives, are bounded by factors that may relate to our possible psychological states or by exogenous constraints. Remember that we can decide to vote or not to vote (when living under democratic systems) once we are registered and have our political rights intact. Then we choose among political parties or candidates that must be able themselves to run in electoral disputes. We can choose a professional career and when to change it or not, but our skills and knowledge restrict our choices. We can also decide how to share our time between work and leisure, but more leisure implies less money in and, probably, more money out, and this equation must be balanced. We may decide to have kids or not, to have safe sex or not, but these choices imply agreement with our partners. We may choose to recycle our garbage or not, but we need to find a proper place to dispose of it. Thus, in any choice domain, the freedom of choice is constrained by personal characteristics and contextual or situational variables, as I will detail in this dissertation. However, if, on one hand, the constraints are part of the choice process and integrated to a view of positive freedom, on the other hand, if individuals feel that free behaviors are eliminated or threatened with elimination, a psychological state of reactance will arouse toward the restoration of those behaviors (Miron & Brehm, 2006). These ideas are also consistent with the conception of free will, which is supported by self-control, conscious reasoning, and internal decision and it is “understood as one of these abilities that humans developed to be able to create, to function in, and to benefit from culture” (Baumeister, Sparks, Stillman, & Vohs, 2008).

Focusing on this thesis's domain, as consumers we also make choices every day, and they can be more elaborate like when we need to choose a neighborhood to live in; or our next vacation destination; or whether we are going to buy a new car or to solve our mobility needs using the myriad of available transport modes in the urban areas, which include public (bus or train) versus private (taxi or bike) alternatives. And even choosing a private mode we may opt to be alone in an Uber X or to share the ride in an Uber Pool. The choices may also be more trivial, like which alternatives to eat in one of the self-service restaurants where we have our everyday lunch. And they can even become automatic, as the habitual choice that a smoker uses to make when she, every time, lights a cigarette right after drinking a coffee. All these choices are also constrained by our cognitive ability to process information, by our budgetary restrictions, by our time availability to decide or even by the social desirability of the choices we make. Despite all these restrictions, experimental evidence show that longer choice sequences are preferred to shorter ones even when leading to the same outcomes (Bown, Read, & Summers, 2003), and that consumers are more satisfied when they have the chance of choosing an incentive after completing a task than when the incentive is chosen by someone else (Iyengar & Lepper, 2000).

To conclude, the study of human choice process and specifically of choice process heterogeneity is, firstly, justifiable from a theoretical-methodological perspective, but also to develop the strategic management in private and public organizations and, finally, to develop individuals' decision-making skills in every domain, including the consumption one.

From a theoretical-methodological viewpoint, despite the variety of choice models investigating heterogeneity beyond preferences and the growing interest in choice process heterogeneity, the adoption of these ideas, as an alternative to the pure random utility models based on the economic normative standpoint, is still a challenge to the discipline, as noted in Hensher (2014 p. 1):

These presumptions have been questioned in the broader literature on heuristics and decision making that has evolved in a number of literatures, notably, psychology, economics and marketing; however the migration of ideas from this literature, which we refer to as process heuristics, has been slow to influence the way that discrete choice modeling has been represented. This is changing now, with a growing number of studies questioning the standard fully compensatory choice paradigm.

Another evidence of the necessity of the discipline to incorporate choice process heterogeneity is given in Dellaert et al. (2017 p. 2):

The different goals we select and how we prioritize them affect our behavior and the choices that we make. Yet only recently has research begun to address the question of how goals can be directly incorporated in econometric models of individual decision-making to test theories about goals and improve our understanding and prediction of individuals' choices.

These two recent citations from leading scholars support my conviction that there is a lot of room to contribute to the enlargement of the knowledge's frontier in this discipline, attending to the persuasive call from Adamowicz et al., (2008) to close the gaps among the three scientific traditions involved in this thesis.

The variety of applied disciplines using choice models to develop strategies and policies, to the many stakeholders involved, includes marketing as well transportation planning, urban planning, health economics, environmental economics, labor economics, transport and sociology (Dellaert et al., 2017; Swait & Feinberg, 2014). It means that the knowledge originated from this kind of approach can support the efficacy of strategic planning, the policy formulation and the operations of a wide variety of public and private organizations.

Last, but not least, choices are individuals' means of pursuing their goals (Austin & Vancouver, 1996; Bettman et al., 1998; van Osselaer & Janiszewski, 2012). To know how individuals make decisions, in a world that demand conscious consumers, is to be able to empower better choices as a way to pursue individuals' and social's objectives.

## **1.2 Thesis structure**

This thesis is comprised by six chapters articulating the ideas presented in this introduction. The three initial chapters composes a theoretical block, including the introduction and two other reviewing the literature. A second block is formed by the next two chapters portraying two empirical studies. Finally, I lay down my final considerations in the sixth chapter..

The chapter 2 has the objective of setting the normative reference and to present the tools to smooth the comprehension of the remaining content of this thesis. The first section is a

brief review of the economic theory of consumer behavior, and it has the objective to make clear to the reader what the economic rationality is and what the *homo economicus* means, in behavioral terms. After a conceptual warm-up, a pause is required to present the initial notation used in discrete choice models and basic concepts from the behavioral decision theories. Thus, the objective of the second chapter is to introduce the initial layer of concepts, which supports the presentation of the last sub-section of the literature review and the empirical sections of this thesis. The reader who is unfamiliar with the specificity of either the behavioral decision theories or the discrete choice models is the one who I expect to benefit the most from this sub-section.

Chapter 3 is the most important of the theoretical block, and it is organized around goal based choice, once this is the concept that brings the proposed decision-making perspective of the *homo aptabilis* and, also, completes the structure to explore the different sources of heterogeneity proposed either in the behavioral decision theories or in the discrete choice models.

After reviewing the literature, the first empirical study in chapter 4, is a Monte Carlo experiment followed by a game theoretical approach. The objective is to study the effects of misattributing consumers' choice process heterogeneity into preferences. The Monte Carlo experiment is used to build demand representations for two marketing contexts, being two representations for each context. One representation is the true model accounting for choice process heterogeneity, and the other is the biased one, allowing taste heterogeneity and imposing choice homogeneity. The results are used as inputs to a game theoretical analysis to understand the effects of not accounting for consumers' choice process heterogeneity in a focal firm's payoff and in the market equilibrium.

In chapter 5, I use the knowledge generated in the previous ones to develop an econometric discrete choice model. This model assumes that choice is driven by the pursuit of multiple goals, it allows for individual adaptation based on context, task and individual heterogeneity, and also accommodates a two-stage decision process allowing for choice set heterogeneity.

Finally, in the final considerations I review the main findings of the four initial parts and also indicate some directions for future research.

## 6 FINAL CONSIDERATIONS

The objective of this thesis was to explore consumer response heterogeneity, specifically in the choice process. I have explored the literature in economics, behavioral decision theories, and choice modeling.

In the first section, I have organized the knowledge based on how BDT see the choice process, reminding that this school of thought has been advocating heterogeneity in the choice process for a long time (Bettman et al., 1998; Payne, 1982). From the idea of an adaptive choice process, I have reviewed the concepts driving human decision-making and identified the parallel concepts and models already developed in the choice modeling literature.

The main idea is that choice is an outcome of the interaction among context, task and individuals' characteristics. This interaction is what challenges the normative rationality implied by the *homo economicus*, preventing the behavioral invariance implicit in the expected utility theory. Thus, characteristics of the choice set, like the amount and the structure of information available to the consumer, as well as tasks characteristics, like time pressure and necessity of choice justification, trigger different cognitive processes that lead to different outcomes when compared to the expect utility maximization framework. In the extreme opposition to the normative rationality is the concept of constructive choice process, proposing that preferences fully emerge during decision-making, leaving a marginal role to preferences as a driver of the choice process. However, task characteristics, like consumer involvement or accumulated experience, and individual characteristics, like personality traits, give room to preferences playing varying roles in the choice process.

The variability in the cognitive processes involved in human decision-making rests in the limits of the storage and processing power of the human brain. The adaptive responses are: actively managing the amount of information to consider in the choice process; relying on perceptual judgments; and using heuristics that produces outcomes, which are ecologically as good as the ones produced by the normative rationality.

The psychological construct that orders the choice process is the individual's goals, defined as cognitive structures associated with other concepts in memory, supporting the

adaptive process, and working as the reference to the consumer approach over the choice scenario. These goals are hierarchical structures encompassing since the goals proximal to the multi-attribute space that defines the choice task up to long-term goals related to the choice process itself or the more subjective goals shaping lifestyles and values. Multiple goals based choice brings rationality to the human decision-making process, preferences may have a role that is contingent on the whole choice setting, and constant adaptation is the skill that allows the individual to navigate the environment in search of the goals. Now, the normative rationality may give room to the procedural rationality.

Following my original objective, I have reviewed the choice modeling literature to illustrate how BDT has been used in the development of econometric models of choice, and how this is an increasing concern among these scholars. I have demonstrated the benefit of the study of choice supported by the three schools of thought that I have chosen to explore and how the integration is already happening. Goal based choice is a common denominator to overcome the limits of normative rationality, or the *homo economicus*, and goal-based choice models that bring a flexible and adaptive rationality to the choice process, with stochasticity in the choice process being explained by multiple goals pursuit. I have named the individual that behaves in such a flexible way as *homo aptabilis*.

A common effect of this flexible and adaptive choice process is the simplification in the choice scenario leading to choice set formation, i.e., a process of selection or elimination of information causing the choice to be based on unobserved choice sets. The idea of multiple meta-goals-pursuit, choice set formation, and flexibility in the choice process have driven my empirical investigation.

The first empirical project has explored the risks of ignoring choice process heterogeneity, which includes channeling the phenomenon all the way down to the preferences. I have started using Monte Carlo experiments to develop demand representations for two common marketing contexts: a fast movable consumer goods and a service context. These representations rest in choice set heterogeneity and taste homogeneity, depicting a relatively simple view of the *homo aptabilis*. In the modeling side of this investigation, I relied on the (yet) dominant practice of accounting for taste heterogeneity and choice process homogeneity, i.e., the assumption of the *homo economicus* behavior. The result was that all the parameters were biased and the firm-

specific constants, although being the most seriously affected variables, were not able to capture the totality of biases. The firm-specific attributes (prices in my empirical application) were also importantly affected by the model misspecification, with an interplay such that the larger the bias in firm-specific constant the smaller it was in the firm-specific attributes, and vice-versa. Additionally, since one of the firm-specific constants needed to be omitted for identification, the effect over this firm rested entirely on the firm-specific attribute. At the end, even the generic attributes ended up biased as an outcome of the wrong model. To conclude, the biases not only spread all over the parameter space, as its distribution is affected by the analyst's decisions of how to code the attributes' matrix.

The model parameters do not enter the firm decision-making process, which takes the policy measures into account. Through the Monte Carlo experiment, it was possible to demonstrate that the parameters' biases were large enough to cause severe deviation in the choice probabilities and in the choice elasticities, meaning that information used as input for strategic decisions at the firm level were also wrong.

Finally, to understand the impact of bad information entering the firm decision-making process I used a game theoretical approach to evaluate the effects of misattribution consumers' choice process heterogeneity into tastes. The result confirmed that firms were driven away from payoff maximization, with profits of the focal firm and producer surplus being significantly reduced. My expectation is that this result serves as a compelling argument to choice modelers to adopt choice process heterogeneity as a standard feature in their models.

This empirical application can be expanded in several directions at the demand and at the supply side. At the demand, it is possible to introduce preference heterogeneity in the data generation process and to study other conditions, in terms of substitutability patterns. It is also possible to study contexts with the consumers' experiences varying more intensely, which can include prices varying across occasions, for instance. It also possible to develop more advanced theoretical games, introducing the possibility of the firm adopting mixed strategies, i.e., adding uncertainty about the others players behaviors. Also, private intelligence can be included as a feature of the game, creating information asymmetry. Finally, a dynamic game may study the possibility of corrective behaviors by the firm and the time that would take to the market achieve the optimum equilibrium, if it ever happens.

After this enterprise, I have developed a multiple meta-goal based choice model, incorporating the strive for accuracy, for reducing negative emotion, and a combination of both based on theoretical knowledge. The model has also given room for adaptation across choice occasions at the individual level. It was an effortful development, assimilating choice process heterogeneity, sitting on the best knowledge offered by both schools of thought.

The model allows the pursuit of multiple meta-goals, combined through a linear optimization process. The weights of the goals may vary as a function of context, task and individual characteristics and consumer may choose to be consistent in the way they weight the meta-goals or they can adjust such weights across occasions. Moreover, the model also opens the possibility of choice set heterogeneity allowing for a two-stage choice process.

One important, and obvious, opportunity is an empirical test of this model to understand if it recovers parameters for the proposed choice processes in stated or revealed preference data. Only in the empirical application the performance may be compared to competitive models, both in internal and external validity. Moreover, the econometric model is also flexible enough to accommodate other meta-goals, like reason-based choice, cost/benefit considerations in information usage among others. All in all, it is a model with the personality of the *homo aptabilis*.

Finally, the integration between behavioral decision theories and choice modeling is still a challenge. My perspective is that one improves the weaknesses of the other. Many of BDT theories have strong internal validity but suffer from the lack of external validity. The laboratory conditions do not hold in reality, and there it is difficult to isolate the effects to validate the theories and to understand their effects in real contexts.

Discrete modeling operates closer to the “real world”, sometimes in the laboratory, sometimes in reality. And there are tools to fuse the data from different sources. However, econometric models are “as if” models, meaning that they are compatible with some psychological processes but, usually, do not establish the occurrence of such processes. The choice process is unobserved, and the farther the analyst is from the observed choice, the more latent is the nature of the phenomenon.

Manipulation of context variables is a common feature in discrete choice experiments. The tool box can be enriched by manipulation of task variables and self-reported information, structured or not, that help the understanding if psychological processes assumed in the econometric formulation of the choice models are really occurring. To incorporate theories and methods to develop and test behavioral decision theories using choice models is a great opportunity already being explored.

To conclude, the accumulated behavioral knowledge, in three scientific streams explored in this thesis, works as a Pandora box that once opened cannot be ignored. Add to this knowledge the enormous technology advancement that defines our time, and the call to widespread the space of the *homo aptabilis* into choice models is roaring.

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