UNIVERSITA' DEGLI STUDI DI PADOVA

DIPARTIMENTO DI SCIENZE ECONOMICHE ED AZIENDALI "M. FANNO"

CORSO DI LAUREA IN ECONOMIA

PROVA FINALE

DO INDIVIDUALS CARE ABOUT FAIRNESS AND INEQUALITY?

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ANNO ACCADEMICO 2022 – 2023

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Le tematiche legate alla giustizia e alle disuguaglianze rivestono un'importanza fondamentale, spesso in contrasto con le nostre percezioni quotidiane. Nella società odierna, sembra che le persone benestanti non si interessino ai sentimenti delle persone meno fortunate, e numerosi studi confermano questa dinamica, spiegando la tendenza degli agenti economici a massimizzare la propria utilità personale. Tuttavia, è essenziale riconoscere che gli individui possiedono anche preferenze sociali, come la ricerca di giustizia, uguaglianza, altruismo, aderenza ai principi di Rawls e persino l'invidia.

L'economia comportamentale, un campo di studio che si situa all'intersezione tra economia e psicologia, si occupa proprio di queste preferenze sociali e del loro impatto sulle decisioni individuali. Questa disciplina ci permette di esaminare le scelte economiche considerando non solo l'approccio tradizionale basato sulla razionalità, ma anche elementi apparentemente illogici che, tuttavia, ci avvicinano a una comprensione più realistica del comportamento degli agenti economici.

La presente tesi si propone di approfondire un interrogativo di fondamentale importanza: le persone sono effettivamente interessate all'equità e alle disuguaglianze? Attraverso un'analisi approfondita dell'economia comportamentale e dei modelli tradizionali, la ricerca mira a sottolineare l'importanza delle preferenze sociali e dell'attenzione alle altre persone nel processo decisionale individuale.

Inizialmente, saranno esaminati i modelli tradizionali, partendo dalle fondamentali assunzioni di Adam Smith, considerato il padre dell'economia. Questi modelli si basano principalmente sulla razionalità delle scelte individuali. Successivamente, attraverso una critica costruttiva, si metterà in discussione l'efficacia di tali modelli, evidenziando l'esistenza di altri fattori determinanti nell'ambito delle decisioni individuali.

Infine, l'attenzione si focalizzerà sui modelli economici più recenti, propri dell'economia comportamentale, per comprendere come anche le emozioni e i sentimenti possano influenzare le decisioni economiche. Questo approccio consente di tracciare un quadro più completo delle scelte umane, tenendo conto delle preferenze sociali e dei legami emotivi che svolgono un ruolo significativo nel processo decisionale.

Attraverso questa ricerca, l’obiettivo è quello di gettare luce sulle dinamiche complesse che caratterizzano il rapporto tra equità, disuguaglianze e scelte individuali, aprendo nuove prospettive per una comprensione più approfondita del comportamento economico umano.

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Introduction

In the field of economics, the study of equity and fairness has gained significant attention in recent years. Equity models provide valuable insights into the distribution of resources, income, and opportunities within a society. These models aim to understand and address the challenges of inequality, social justice, and economic well-being. By examining various equity models, economists can analyze the factors influencing resource allocation, evaluate the impact of policy interventions, and propose strategies to achieve a more equitable and inclusive economic system. Economic theorists and policymakers recognize that a fair and just society requires not only efficient economic outcomes but also equitable distribution of resources and opportunities. Equity models provide a framework to assess and quantify these dimensions, allowing researchers to delve deeper into the causes and consequences of inequality.

The study of equity models in economics goes beyond traditional theories of economic growth and efficiency. While economic growth is undoubtedly crucial for overall prosperity, it does not guarantee an equitable distribution of benefits. In fact, economic growth often exacerbates income and wealth disparities, leading to social unrest and political instability. Equity models offer an alternative lens through which economists can explore the complex dynamics between economic development, social justice, and the well-being of individuals and communities.

This thesis aims to examine and analyze various models in economics. By evaluating existing theories and empirical studies, the objective is to contribute to the ongoing discourse on equity and fairness in economic systems. The objective is to evaluate existing theories and empirical studies.

The exploration begins by focusing on traditional rationality-based models in economics, starting with the influential work of Smith, considered the father of economics, and moving on to more recent models like those proposed by Hammond or Levin and Milgrom.

In the second part, section delves into the captivating domain of behavioral economics, where a series of models are explored to analyze how individuals perceive and attribute value to the emotions and concerns of others. Empirical evidence consistently demonstrates that a majority of individuals exhibit a propensity to abstain from actions that would knowingly inflict harm upon others. To enhance the comprehension of the phenomenon, a thorough examination is conducted on the models proposed by Alexopoulos and Sapp.

In the final section, the investigation delves deeper into a concept known as inequity aversion, with specific attention directed towards the ultimatum game. This game serves as a potent tool for comprehending why individuals often reject situations characterized by significant disparities between the proposer and the recipient.

Chapter I. Rationality in economic decision-making

I.1 The Foundations and Implications of Standard Economic Theory

In *The Wealth of Nations*, Adam Smith writes that every individual, without intending it, "labors to render the annual revenue of the society as great as he can" (Smith, 1776). The work by Smith had a deep impact in shaping economics. Several models formulated conditions that guaranteed this approach to be sensible. The standard approach to economics is grounded on some key pillars including perfect rationality (i.e., "the belief that agents who make decisions have clear and measurable objectives" (Hammond, 1997)), and perfect information (i.e., in a game - defined as a strategic interaction between multiple decision-makers or players, where each player's outcome depends not only on their individual actions but also on the actions taken by other players – perfect information means that at each time only one of the players moves, that the game depends only on their choices, they remember the past, and in principle they know all possible futures of the game. (Mycielski, 1992). According to the standard paradigm in economics, for instance, economic agents must maximize a specific utility function, and must know everything they need to make the best choice. Other conditions are perfect divisibility of all factors of production, property rights on all goods, and non-increasing returns to scale for each factor. Factors of production are the inputs needed to finish a product. Land, labor, capital, and entrepreneurship are some common production inputs. Perfect divisibility means that you can implement some production techniques with any quantity of capital, and not just with huge quantities. Returns to scale for factors of production is the increase in output that is determined by an increase in the factors of production by the same proportion.
Standard economic theory has some clear implications. Rich people do not care about poorer ones, because they just need to maximize their own utility. If they were owners of a famous and profitable company, they would care more about maximizing their profits, than from making sure that their employees are satisfied with their jobs.

I.2 Rational paradigm and choice rationality

In this thesis, I would move away from this rational paradigm to delve into behavioral economics. Behavioral economics tries to explain the behavior of economic agents. These agents still react to incentives, such as financial motivations or improvements in one's economic condition. However, they also incorporate into their utility functions broader motivations, beyond mere self-interest.

Individuals in rational economics have preferences, and the relation between them establishes a relationship between the elements of the choice set. In the framework of rational economics, individuals are viewed as autonomous decision-makers who act in accordance with their own self-interest and rationality. While the actions of individuals can have implications for groups or aggregate outcomes in certain economic contexts, rational economics primarily focuses on analyzing individual decision-making and the strategic interactions between self-interested individuals in various economic settings. In contrast to the rational economics framework, behavioral economics acknowledges the role of preferences and the interplay between them in shaping choices. It is important to consider that the actions of individuals and their preferences can have implications for groups or aggregate outcomes in specific economic contexts. Preferences of individuals can be represented by indifference curves, which collect bundles of goods the individual is indifferent about. The Marginal Rate of Substitution (MRS) is the amount of a good that the individual is willing to give up in order to receive an additional unit of another good, while keeping satisfaction at the same level. The MRS is thus a way to mathematically represent the opportunity cost of getting an additional unit of some good. Individuals differ in their MRS, hence their indifference curves. Rational individuals maximize their utility function: to do so, according to rational theory, individuals make choices based on their own interests, without caring about the others. Their interests are represented by preference relations, which are a particular case of binary relations. The latter category puts one element of a choice set in relation with another element in the same set, while preference relations denote the subjective rankings or orderings of alternatives by individuals or economic agents based on their personal preferences. These relations reflect the individual's assessment of the desirability or attractiveness of different options or outcomes. Preference relations allow for the comparison and evaluation of alternatives, providing insights into the individual's choices and decision-making processes.

To represent the set of possible choices, the letter X may be used; elements may be listed with letters of the alphabet. If element $a \succcurlyeq b$, element a is at least as good as element b, if $a \succ b$, element a is strictly preferred to element b, it cannot be said that $b \succcurlyeq a$. A third type of preference relation is the case of indifference between two elements: $a \sim b$; that is, $a \succcurlyeq b$ and $b \succcurlyeq a$.

For a choice to be rational, it must be complete and transitive. A preference relation is complete if, for every two elements a and b in the choice set X, $a \succcurlyeq b$, or $b \succcurlyeq a$, or both. An individual with a complete preference relation can rank all the alternatives in the choice set. If the agent is asked to make a choice between two options, he will necessarily have a preference concerning the one he likes the most. A preference relation is transitive if, for every three elements in the

choice set *X*, for example *a*, *b* and *c*, if $a \succcurlyeq b$ and $b \succcurlyeq c$, then $a \succcurlyeq c$. By starting from binary relations, the preference relation can be extended to the entire set without encountering contradictions, and a comprehensive preference relation can be established. Rational individuals must have rational and transitive preference relations, but this is not enough. In order to define rationality, the relationship between preference relations and utility functions must be investigated. which provide a quantitative representation of preferences. Utility functions serve as mathematical tools to model and analyze rational decision-making by assigning numerical values to different alternatives based on the individual's preferences. A utility function represents a preference relation if for every pair of elements, *a* and *b*, $a \succcurlyeq b$ if and only if $u(a) \geq u(b)$. This means that element *a* is preferred to element *b* if and only if the utility function of the individual for alternative *a* provides greater or equal utility than the one provided by alternative *b*.

Are these conditions always met? Is the individual always rational? Are the elements always consciously considered in order to be under the perfect information case? Is the rationalization of choices achieved through the maximization of utility functions?

I.3 Analyzing choice rules and assumptions in economic decision-making

In economics, a choice rule refers to the mechanism or decision-making process through which individuals or economic agents select a particular alternative from a set of available options. It outlines the method or criteria used to make choices in different situations.

If an agent's choice is rational and transitive, as observed in rational economics, then "the choice rule won't be completely arbitrary" (Levin & Milgrom, 2004). To demonstrate this statement, it is important to understand that the agent's choice rule within a set of elements can be characterized by all the elements in the group that are consistently preferred over other elements within the same group, regardless of the specific choice scenario. To illustrate this, consider an example where the agent's choice rule stipulates that when presented with element *X* from the set of elements *B*, element *X* is preferred over any other element *Y* within the group *B*. This choice rule remains consistent across all possible choices made by the agent. By establishing a preference order within the group *B*, the agent's choice rule exhibits a degree of consistency and non-arbitrariness. The agent consistently favors element *X* over any other element *Y* within the same group, indicating a coherent and predictable decision-making pattern. Therefore, if an agent's choice is rational and transitive, it implies that their choice rule exhibits logical consistency and is not merely random or arbitrary. The preference order

established by the choice rule provides a framework for making consistent and predictable choices within the set of elements.

Once this concept is clarified, propositions that enable us to assert that a choice made by an agent is non-arbitrary, can be examined. The first proposition to analyze is the one that says, "if *B* is a finite set, the choice rule cannot be empty". As a proof, let *B* be a finite set. It will be demonstrated that when the number of elements in the group is one, *X* is preferred to *X*, thus establishing *X* as the choice rule. Hence, for all sets with one element, if *C* is defined as the choice rule, it is found that *C* is non-empty. Consider a set *A* with one element, denoted by *X*. Since there is only one element in *A*, *X* is the only available choice. Therefore, *X* is preferred to itself, making *X* the choice rule. This proves that for sets with one element, the choice rule is non-empty.

Now, let's assume that the proposition holds for a set with n elements, and it is desired to demonstrate that it holds for a set with n+1 elements.

Let *A* be a set with *n+1* elements, denoted by *{X1, X2, ..., Xn, X{n+1}}*. Based on the assumption, it is known that for any set with n elements, the choice rule is non-empty. Consider the set *A′* = {X1, X2, ..., Xn}. Since *A′* has n elements, the choice rule, denoted by *C′*, is non-empty. Let the chosen element from *C′* be denoted as *X**.

Now, consider the set *A″ = {X*, X{n+1}}*. Since *A″* has two elements, the reasoning from the case of sets with one element can be applied. *X** is preferred to itself, making *X** the choice rule for *A″*. Thus, the choice rule for *A* is non-empty.

By induction, it has been demonstrated that for all sets with *n+1* elements, the choice rule is non-empty. Therefore, if *B* is a finite set, the choice rule cannot be empty.

The second proposition to take into consideration is the one that regards to transitivity of choice sets: "If *X* and *Y* are elements belonging to the groups *A* and *B*, respectively, which intersect, and *X* is the choice set of group *A*, while *Y* is the choice set of group *B*, then *X* is the choice set of group *B* and *Y* is the choice set of group *A"*. As a proof, let *X* and *Y* be elements belonging to the intersected groups *A* and *B*, respectively. Suppose *X* is the choice set of group *A*, denoted by $C(A;\succcurlyeq)$, and *Y* is the choice set of group *B*, denoted by $C(B;\succcurlyeq)$. Since *X* is the choice set of *A*, it means that for any element *a* in *A*, *a* is preferred to *X*. Similarly, since *Y* is the choice set of *B*, for any element *b* in *B*, *b* is preferred to *Y*.

Now, let's consider an arbitrary element *b* in *B*. Since *b* belongs to *B* and *B* intersects with *A*, it follows that *b* also belongs to *A*. Based on the transitivity of preference, it can be concluded that any element *a* in *A* is preferred to *X*. Therefore, *a* is preferred to *b*, which implies that *b* is preferred to *X*.

Similarly, let's consider an arbitrary element a in A. Since a belongs to A and A intersects with B, it follows that a also belongs to B. By the transitivity of preference, it is known that any element b in B is preferred to Y. Therefore, b is preferred to a, which implies that a is preferred to Y.

Hence, it has been demonstrated that X is the choice set of group B $(C(B;\succcurlyeq))$ and Y is the choice set of group A $(C(A;\succcurlyeq))$.

This demonstrates the preference relationship between the elements in A and B. Further analysis of these preferences can be conducted using utility functions.

Utility functions assign a numerical ranking to every choice. In particular, if Y is a choice set of B, every element in Y must provide the maximum utility among the elements in B. This implies that decision-makers select alternatives based on their utility values, aiming to maximize their satisfaction or preference. However, it is important to note that utility functions alone may not capture the full complexity of human preferences. While utility functions provide a useful framework for analyzing decision-making, they have limitations. Different individuals may have varying preferences and utility functions may not fully capture all aspects of decision-making, such as social, cultural, or psychological factors.

As a result, it is almost always necessary to make additional assumptions that restrict preferences in various ways. These assumptions help simplify the analysis and allow for meaningful predictions. For example, assumptions like completeness, transitivity, monotonicity, and non-satiation are commonly used to establish a coherent framework for studying rational decision-making. These additional assumptions help address some of the complexities and inconsistencies that may arise when analyzing preferences. They provide a more tractable and manageable way to model decision-making processes. However, it is crucial to recognize that these assumptions may not capture all aspects of real-world preferences and that different contexts may require different sets of assumptions.

The first restrictions examined below are monotonicity and local non-satiation, which are used extensively in consumer theory. Roughly put, these imply that consumers will prefer to spend all their wealth or income on something, because “more is always at least as good as less and consumers are never satiated”. (Levin & Milgrom, 2004)

The next requirement is that consumer preferences exhibit convexity. Convexity plays a crucial role in the standard model of competitive economies because it enables the existence of market clearing prices. When consumer preferences are convex, it ensures that there are prices at which supply and demand equilibrate, resulting in a market-clearing outcome. On the other hand, if preferences are not convex, market-clearing prices may not exist, challenging the assumption that competitive market outcomes reflect actual market behavior. Convexity also plays a

significant role in discussions concerning the recoverability of consumer preferences based on observed choices within various budget sets. In this context, convexity is employed to demonstrate that certain prices can lead to different choices, thereby establishing the recoverability of distinct preferences from observable decision patterns.

Moreover, it is important to note that nearly all empirical research on consumer behavior heavily relies on the assumption of separability. This assumption allows researchers to analyze the impact of individual factors on consumer choices independently, assuming that consumer preferences and decision-making can be separated into distinct components. By assuming separability, researchers can isolate and examine the effects of specific variables on consumer behavior, contributing to a deeper understanding of the factors influencing consumer choices. To better understand this condition, it is worth it providing an example: under rationality, a person does not consider as linked two different types of goods, which can be going on vacation and shopping clothes. With these assumptions, it is sufficient to know the amount of money spent on vacation and the prices for travels in order to estimate the demand for holidays, without taking into account other factors. Last requirement is referred to as the “no wealth effects” condition, which enables us to achieve an efficient allocation of resources, even in the absence of knowledge regarding wealth distribution. (Levin & Milgrom, 2004)

Chapter II. Understanding human behavior: biases, limited information and preferences

II.1 Cognitive biases, limited information, and real decision-making processes

The prevailing assumption in most economic models is that individuals are rational actors who seek to maximize their expected utility. There is, however, as mentioned before, increasing evidence that some agents' utility depends on both their own payoff and the payoffs of others (Alexopoulos & Sapp, 2006). In practice, individuals may deviate from perfectly rational behavior due to factors such as cognitive biases, limited information, and other considerations that impact their decision-making processes. Understanding the impact of time-varying preferences, cognitive biases, and other factors on human behavior is essential for comprehending and potentially predicting it.

Let's delve further into the underlying reasons that contribute to these deviations from fully rational behavior. Numerous examples of cognitive biases can be observed. Confirmation bias is one of them. It is characterized by the tendency to look for and interpret information in a way that confirms one's pre-existing beliefs, while ignoring or downplaying information that contradicts such beliefs.

An additional illustration of a cognitive bias is the availability heuristic. It involves judging the likelihood of an event based on the ease with which relevant examples come to mind, rather than relying on objective empirical frequencies. Another example is anchoring, namely the tendency to rely too heavily on the first piece of information encountered when deciding, even if it is not particularly relevant or accurate. Additionally, there are several other examples of biases to consider, such as overconfidence bias (i.e., the tendency to overestimate one's abilities or knowledge, leading to a false sense of confidence and potentially poor decision-making) or the framing effect (i.e., the tendency for people to make different decisions depending on how information is presented, even if the underlying information is the same). Lastly, another example worth mentioning is the hindsight bias. This is the tendency to believe, after an event has occurred, that one would have predicted or expected the outcome, even if it was unpredictable or unlikely.

Upon the introduction of certain biases, attention can be redirected towards the second defining aspect of real decision-making processes: limitation of information. This refers to situations where individuals possess incomplete or insufficient information to make informed decisions. This can occur for a variety of reasons, such as information being too costly or time-consuming to obtain, or because certain information is not publicly available. Limited information can lead

to several problems when it comes to decision-making. For example, individuals may rely on incomplete or imperfect information, leading to inaccurate or suboptimal decisions. Alternatively, individuals may become overly cautious or conservative in their decision-making due to uncertainty or a lack of confidence in the available information. In some cases, limited information can also create opportunities for information asymmetry, where one party has more information than another and can use this advantage to manipulate the outcome of a decision or transaction. In this regard, another fact must be taken into consideration: the *No Trade Theorem*. It asserts that under specific conditions (specifically, markets are in a state of efficient equilibrium, there are no noise traders or other non-rational factors influencing prices, the method through which traders obtain information is commonly known), even if certain traders possess private information, none of them will be able to capitalize on it and make profits. If a player in a transaction knows that the other party has better information, he can decide not to proceed to avoid being tricked.

II.2 Navigating uncertainty: scenario planning, risk analysis, and decision trees for effective decision-making

Effective decision-making in the face of limited information requires careful consideration of available evidence and a willingness to acknowledge uncertainty. By utilizing techniques such as scenario planning, risk analysis, and decision trees, individuals and organizations can effectively navigate complex decisions in the presence of limited information. Scenario planning is a strategic decision-making technique that involves envisioning and analyzing multiple plausible future scenarios to improve decision-making under uncertainty. It is particularly useful when individuals face complex and uncertain situations, as it helps individuals and organizations explore different futures and their potential implications. Risk analysis is a systematic process used in decision-making to identify, assess, and manage potential risks associated with different options or courses of action. It involves evaluating the likelihood and potential impact of uncertain events or outcomes to make more informed decisions under conditions of uncertainty. Decision trees are graphical tools used in decision analysis and decision-making processes to model and evaluate different choices and potential outcomes. They provide a systematic approach for assessing the possible consequences of decisions and identifying the most favorable course of action.

It is significant to acknowledge that not all individuals are alike and that they can vary in their decision-making processes and in the factors that influence them. This heterogeneity can originate from differences in personal values, beliefs, experiences, and cognitive processes. For

example, two individuals faced with the same decision may weigh the relevant factors differently and may come to different conclusions. An individual may be more risk-averse than the other or he may be more subject to social norms or more affected by past experiences. Individuals have distributional preferences, which refer to an individual's attitudes towards the distribution of resources or outcomes among a group of people. These preferences reflect how individuals value fairness, equality, or inequality in the distribution of goods, services, income, or opportunities.

Distributional preferences can vary along a spectrum from a preference for more equal distributions to a preference for more unequal distributions. These preferences are often characterized by the shape of the distribution curve that an individual prefers. For example, a person may have a preference for a more equal distribution of resources, such as income or wealth, among a group of people, which would be reflected in a distribution curve that is flatter and wider. Alternatively, someone may have a preference for a more unequal distribution, which would be reflected in a curve that is steeper and more concentrated at one end. Distributional preferences can be influenced by a range of factors, including personal values, beliefs, and experiences. They can also be shaped by social and cultural norms, as well as political and economic institutions. Understanding individuals' aggregate preferences is important for designing policies and programs that are responsive to their needs and preferences. Distributional preferences are often studied through experimental methods. In these studies, participants make choices that involve the allocation of resources or outcomes, and researchers analyze their choices to infer their distributional preferences. Distributional preferences are also relevant in social welfare economics, where social welfare functions are used to aggregate individual preferences into an overall measure of social well-being. Different social welfare functions can reflect different distributional preferences, such as utilitarianism (maximizing overall welfare regardless of distribution) or egalitarianism (prioritizing equal distribution). By incorporating distributional preferences into these functions, policymakers can ensure that the resulting policies align with the desired societal values. To promote mutual cooperation over individual interests, individuals engage in rational play and consider the broader implications of their actions. Rational play involves making decisions based on careful analysis, weighing potential outcomes, and maximizing overall benefits. This rational approach serves as a foundation for interpreting and addressing the basic needs of individuals and the larger society.

II.3 Understanding distributional preferences and decision-making heterogeneity

Understanding these preferences is essential in designing effective programs and interventions, especially in areas like healthcare. Policymakers who consider both distributional preferences and the heterogeneity in decision-making can develop targeted strategies to address disparities and ensure fairness, resulting in more impactful and inclusive policies that improve overall social well-being. Suppose a government is developing a healthcare program aimed at providing access to essential medical services. By understanding distributional preferences, policymakers can identify segments of the population that have different needs and preferences when it comes to healthcare. For instance, some individuals may prioritize affordability, while others may prioritize quality or accessibility.

Furthermore, individuals often employ various approaches to decision making. For instance, *maximin preferences* serve as a decision-making rule in which individuals select the option that maximizes the minimum potential outcome. This decision-making strategy entails considering the worst-case scenario for each available option and choosing the one that offers the most favorable outcome in that scenario, minimizing the risks associated with unfavorable outcomes. Consider the scenario where an individual is faced with a decision between two job offers. Job A presents a higher salary but carries a higher risk of potential layoffs, whereas Job B offers a lower salary but provides greater job security. In the case of the individual having maximin preferences, their decision would lean towards selecting Job B. This preference arises from Job B offering the most favorable outcome in the worst-case scenario, specifically if they were to face job loss.

In simple distribution experiments, participants may choose options that offer the highest level of security, ensuring a favorable outcome even in the worst-case scenario.

Maximin preferences are often used in situations where the consequences of making a poor decision are severe, or where the individual has limited information about the potential outcomes of each option. They are also sometimes used as a benchmark for evaluating the fairness of social policies or economic outcomes, as they prioritize minimizing the negative outcomes for the most vulnerable individuals in society.

By conducting simple distribution experiments and analyzing participants' choices, researchers can gain valuable insights into how inequality aversion, efficiency concerns, and maximin preferences influence decision-making. These experiments offer a controlled environment for studying the dynamics between these preferences, thereby shedding light on the complexities of individual behavior in distribution scenarios.

Furthermore, these experiments challenge traditional economic analyses that assume individuals to be solely self-interested. A substantial body of experimental evidence now demonstrates that many people exhibit social preferences, whereby their preferred choices are influenced by positive or negative concerns for the welfare of others and by how other players perceive them. The integration of these social preferences into the study of decision-making behavior contributes to a broader understanding of human behavior in economic contexts.
Additionally, the presence of third-party punishment acts as a regulating mechanism to discourage selfish behavior. If someone behaves in a self-centered manner, third parties can intervene and impose sanctions or penalties. Such punishment helps maintain social norms, reinforces cooperative behavior, and deters individuals from pursuing purely selfish interests. The objective is to foster a collective mindset that values mutual cooperation over individualistic pursuits. By embracing rational behavior, addressing basic needs, and implementing third-party punishment as a deterrent, individuals and societies can strive to establish a framework that prioritizes cooperation, social harmony, and the greater good.

II.4 Shaping behavior for cooperation and the greater good: from positive observation to normative action

When determining what actions to take, a transition occurs from a positive approach to a normative one. While the positive approach focused on observing and understanding the influence of various preferences on decision-making behavior, the normative approach emphasizes the desired outcomes and suggests ways to achieve them. It was previously highlighted how conducting distribution experiments and analyzing participants' choices can provide insights into the influence of inequality aversion, efficiency concerns, and maximin preferences on decision-making. This approach is valuable for understanding the complexities of individual behavior in distribution scenarios, without necessarily making judgments about whether the observed behavior is desirable or not.
On the other hand, the normative approach shifts the focus to suggesting actions and strategies that can lead to positive outcomes. This approach goes beyond mere observation and aims to guide individuals and societies in making choices that align with these values and lead to desirable outcomes. Through the transition to a normative approach, a more proactive stance is adopted, promoting specific actions and principles that contribute to cooperation, social harmony, and the greater good. It reflects a shift from studying and understanding behavior to actively working towards improving and shaping behavior in a positive direction.

This aligns with the principles of cooperation highlighted in the *Prisoners' Dilemma game*, often referred to as PD, a game that illustrates how reciprocity works. It is recognized that cooperation leads to mutually beneficial outcomes, and actively striving to improve and shape behavior in a positive direction can disrupt the cycle of defection. PD game is a cooperation dilemma in which purely selfish behavior leads to the defection of both players, even though cooperation would maximize their joint payoff. (Fehr & Camerer, 2007)

In the prisoners' dilemma game, two individuals are faced with a choice to either cooperate or defect. If both players choose to cooperate, they receive a moderate reward. However, if one player defects while the other cooperates, the defector receives a higher reward, leaving the co-operator with the lowest payoff. If both players defect, they both receive a suboptimal payoff. This game is a typical representation of the trade-off between individual self-interest and cooperation. From a purely self-interested perspective, the rational choice is to defect, as it maximizes individual gains regardless of the other player's choice. However, this leads to a suboptimal outcome for both players compared to cooperation. The dilemma arises because every member of the group benefits equally from the public good, regardless of their contribution. Furthermore, each player receives a lower individual benefit from the tokens they contribute compared to the tokens they keep. A player who is solely focused on their self-interest chooses not to contribute anything to the public good and instead takes advantage of the contributions made by others. As a result, in a group composed of purely selfish individuals, the public good is not provided, even though it would be mutually beneficial for the group. To overcome this dilemma, there is one tendency that can provide the solution: *strong reciprocity*. It refers to individuals' willingness to engage in cooperation, altruism, and punishment, even in situations where there is no immediate personal benefit or self-interest involved. By embracing rational play, individuals recognize that cooperation leads to the highest joint payoff. They understand that by cooperating, they can achieve better outcomes than by selfishly defecting. This recognition of the benefits of cooperation serves as a foundation for fostering mutual understanding and cooperation among individuals. Interpreting and addressing basic needs is crucial for fostering cooperation. When individuals' fundamental needs, such as food, shelter, and security, are met, they are more likely to engage in cooperative behavior.

Individuals are more likely to cooperate when their fundamental needs for security, fairness, and social connection are met. When these needs are fulfilled, individuals are motivated to engage in prosocial behavior and work towards the greater good. Strong reciprocity goes beyond the traditional economic assumption of self-interest and rationality and suggests that people are motivated by a sense of fairness, justice, and a desire to punish those who violate social norms.

Additionally, implementing third-party punishment as a deterrent can discourage non-cooperative behavior and promote cooperation. When there are consequences for defection, such as punishment or social disapproval, individuals are more likely to choose cooperation to avoid negative outcomes. This external enforcement mechanism acts as a deterrent and helps maintain social norms that prioritize cooperation. Research in experimental economics has shown that strong reciprocity plays a crucial role in sustaining cooperation and promoting social welfare. It helps to explain why individuals are often willing to contribute to public goods, participate in charitable activities, and engage in cooperative behavior even when it may not provide direct benefits to them. This behavior contradicts the traditional economic theory of homo economicus, which assumes that individuals act solely in their self-interest and seek to maximize their own material gains.

Strong reciprocity can also explain the emergence of social norms and institutions that promote cooperation. When individuals have a strong sense of fairness and a desire to punish non-cooperative behavior, they are more likely to enforce and abide by social norms that encourage cooperation and punish free riding.

Overall, strong reciprocity highlights the importance of intrinsic motivations and social preferences in economic decision-making. It recognizes that people are not purely self-interested, but rather have a natural inclination towards cooperation and fairness, which can significantly shape economic outcomes and interactions.

Coming back to the PD, it reflects the cooperation dilemma inherent in the provision of a public good, such as cooperative hunting or group defence, with only two individuals involved. More generally, a 'public good game' (PG) consists of an arbitrary number of players who are endowed with a certain number of tokens that they can either contribute to a project that is beneficial for the entire group (the public good) or keep for themselves. (Fehr and Camerer, 2007).

Through the examination of the dynamics of the PD and the PG, valuable insights are gained into the complexities of individual decision-making and the trade-off between self-interest and cooperation. Behavioral economics sheds light on the factors that influence choices made by individuals, such as cognitive biases, social preferences, and the impact of norms and institutions, as previously discussed.

Understanding these behavioral factors is crucial for devising strategies to overcome the cooperation dilemma and promote collective action. By embracing rational play, recognizing the benefits of cooperation, and fostering strong reciprocity, individuals can work together towards achieving optimal outcomes and realizing the potential of public goods. Additionally,

addressing individuals' basic needs and creating an environment that supports cooperation further enhances the likelihood of collective action.

The field of behavioral economics continues to expand the understanding of human behavior and decision-making, providing valuable insights for policymakers, organizations, and individuals seeking to promote cooperation, social harmony, and the greater good. Through ongoing research and application, the power of behavioral insights can be harnessed to design effective interventions, shape behavior, and build a more cooperative and prosperous society.

Chapter III. Behavioral economics: incorporating fairness, inequity aversion and distributional motives in decision-making

III.1 Exploring complexities in decision-making through game theory and experimental games

By considering the evidence from experimental games and other studies, a more comprehensive model of decision-making can be developed, which better captures the complexities observed in various scenarios. This extends beyond the traditional belief in economics that assumes agents have stable, well-defined preferences and make rational choices consistent with those preferences. (Thaler, 1988)

Game theory facilitates the derivation of logical consequences from reasoning, allowing for the identification of missing components, the inclusion of additional elements, and the assessment of whether the new elements bring us closer to modelling actual behavior. Psychological game theory incorporates the beliefs of players into their utility functions. In this context, game theory enables us to understand how individuals' psychological factors, such as their beliefs, influence their decision-making within a strategic environment. In the investment game, for instance, game theory can be employed to examine how players' beliefs about the market or their opponents' actions impact their utility functions, thus shaping their decision-making strategies. After highlighting the dilemma that arises in situations where individuals benefit equally from a public good, regardless of their contribution, taking advantage of the contributions made by others, argument can be extended further into experimental games like the ultimatum game or Bertrand games. Through those models, the traditional view can be challenged and, by incorporating the evidence from experimental games and other studies, a more comprehensive model can be developed. This model better captures the complexities of decision-making in various scenarios. One particular scenario that illustrates this is the ultimatum game. Multiple variations of this game exist (i.e. two players must agree on how to divide a pie of size 1, or a sum of money, usually $10, is given to the allocator to split between herself and the receiver. (Stanley & Tran, 1998) (Engelmann & Strobel, 2007))

Taking the version of the ultimatum game with the sum of money as an example, it's important to note that the respondent must specify a reply after receiving an offer in order to assess optimality. In this game, there are two subgame perfect Nash equilibria, which are situations where every participant in the game ends up responding excellently to each other's decisions. However, despite its simplicity, the ultimatum game exhibits certain regularities in participants' behavior. For instance, respondents almost never accept offers below 20% of the total amount

and tend to accept offers above 40%. Proponent offers between 40% and 50% are also commonly accepted.

The selfish rational decision model fails miserably in some studies; most famously, perhaps the *ultimatum game* by Güth, Schmittberger, and Schwarze (1982). In their study, 42 economics students have taken part: half were Allocators and the other half were Recipients. Allocators divided a stake between themselves and Recipients. Contrary to predictions, offers were not approaching zero and Recipients did not accept all positive offers. In a replication after a week, offers were still generous but less so. The actions of both Allocators and Recipients contradicted the theory. Recipients declining positive offers signaled non-monetary factors in their utility function, while Allocators' actions could be explained by fairness or fear of rejection. Further experiments supported both explanations. These findings align with the observations made by Thaler (1988), Kravitz and Gunto (1992), and Camerer and Thaler (1995), who also found inconsistencies between the ultimatum game outcomes and the orthodox conception of 'economic man.'

In contrast, other game scenarios (e.g., Bertrand games) have demonstrated better alignment with the selfish rational decision model, as observed by Engelmann and Strobel (2007).

This divergence in alignment underscores the importance of considering the specific game context and the impact it has on individual preferences and decision-making.

III.2 Beyond distribution: exploring the interplay of fairness, beliefs, and strategic behavior

The primary focus in most notable applications of reform has been on preferences regarding the distribution of payoffs within the game. This can be observed in prominent models such as the inequality aversion models proposed by Fehr and Schmidt (1999) and Bolton and Ockenfels (2000). These models, however, possess a peculiarity as they assume players are primarily concerned with the distribution of income, while their motivations and actions are influenced by a broader range of factors that go beyond just the distribution aspect.

While Fehr & Schmidt and Bolton & Ockenfels models concentrate on distributional concerns, it is important to note that strategic games involve additional factors such as beliefs, strategic behavior, and reciprocity, which have substantial influence. Other alternative models, such as those introduced by Rabin (1993) and Dufwenberg and Kirchsteiger (2004), explicitly incorporate concerns for reciprocity. Despite the advantage of tractability gained by focusing solely on distributional concerns, these alternative models offer a more comprehensive approach by considering the interplay between distribution, beliefs, strategic behavior, and reciprocity in decision-making processes. (Engelmann & Strobel, 2007) This discussion

challenges the traditional economic paradigm by recognizing empirical anomalies that are difficult to rationalize within its framework. It highlights the importance of incorporating a broader range of factors and assumptions to better explain and understand real-world economic behavior.

These regularities in participants' behavior highlight the influence of distributional motives. In the ultimatum game and other purely distributional games, it becomes evident that a wide range of distributional motives, including maximin preferences, efficiency concerns, inequality aversion, and competitiveness, influence the choices made by participants. Interestingly, "participants tend to be more willing to accept an unequal distribution if the game is embedded in a fair random procedure that ensures all subjects have an equal opportunity to end up as the high-income individual". (Engelmann & Strobel, 2007)

These insights align with Thaler's (1988) suggestion that allocators in the ultimatum game may have a taste for fairness or be motivated to avoid the rejection of their offers. The notion of 'fairness' enters into the decision-making process of both the allocator and the receiver, and it plays a crucial role in the acceptance or rejection of offers (Camerer & Thaler, 1995). This further emphasizes the link between participants' fairness considerations and their decision-making outcomes in distributional games.

Taken together, these studies shed light on the complex interplay between fairness, distributional motives, and decision-making in game scenarios. They demonstrate that participants' responses are not solely driven by self-interest but are influenced by their perceptions of fairness, procedural considerations, and the motives underlying the game structure. Understanding these dynamics is crucial for comprehending the factors that shape decision-making behaviors in scenarios involving distributional concerns.

III.3 Exploring the Fehr and Schmidt model: understanding inequality aversion

Among the models proposed to explain these phenomena, the most cited and influential model is the one developed by Fehr and Schmidt. By recognizing the impact of distributional motives, procedural fairness, and the contributions of influential models like Fehr and Schmidt's, a deeper understanding of decision-making dynamics can be gained and the factors that shape participants' choices in diverse game scenarios.

In the simplest two-players version of this model, the utility that agent i derives from outcome x is represented by the equation (Nunnari & Pozzi, 2022)

$$U_i(x) = x_i - \alpha_i\{x_j - x_i, 0\} - \beta_i\{x_i - x_j\}, \qquad j \neq i$$

This equation consists of three terms that represent different aspects of individual preferences. The first term in the equation represents the utility derived from one's own outcome or situation (x_i). It reflects the inherent satisfaction or value an agent places on their own payoff. FS's social utility can be calculated directly from payoffs without first requiring a specification of some nonlinear utility function. Yet, its predictions are consistent with the main empirical findings in many games and other applications. (Rohde, 2009)

The second term quantifies the disutility experienced when falling behind in pairwise comparisons, indicating sensitivity to disadvantageous inequality. It captures the impact of differences in payoff ($x_j - x_i$) between agent i and the agent (j) and reflects the aversion to being at a relative disadvantage.

Conversely, the third term quantifies the disutility experienced when being ahead in pairwise comparisons, indicating sensitivity to advantageous inequality. It captures the impact of differences in payoff ($x_i - x_j$) between agent i and the agent (j) and reflects the aversion to benefiting from a relative advantage.

Together, these terms in the equation capture the complex interplay between individual preferences, inequality aversion, and fairness considerations. The agent's level of satisfaction is not solely determined by their own individual payoff, x_i, but is also influenced by how it compares to the other agent's payoff, x_j. This phenomenon, known as disutility aversion, highlights the importance of fairness and inequality to agents.

It is important to note that the payoffs perceived by players in this model are not limited to monetary ones. While players may still behave strategically, there are additional factors at play that enter the utility function and impact their decision-making. These factors can include social preferences, reciprocity, or other non-monetary considerations. By incorporating these elements, the model captures a broader range of influences on individual behavior and preferences.

The differences in payoff between the agents play a crucial role in shaping their perception of fairness and inequality. When the distribution is perceived as unfair, these differences not only impact the individual satisfaction of agent i but also evoke a sense of disutility. This sense of disutility arises from the concept of inequity aversion, which is embodied by the model. Agents' concerns about fairness and inequality stem from their inherent drive to strive for a more equitable distribution of outcomes. They seek to mitigate the disutility associated with discrepancies in payoffs and address the underlying feelings of envy and guilt. By aiming for a

fairer distribution, agents attempt to alleviate the dissatisfaction caused by inequity and promote a sense of harmony and balance in the allocation of resources.

The parameter α in the model represents feelings of envy, while β represents feelings of guilt. Consequently, discrepancies in payoffs elicit feelings of dissatisfaction and disutility for agent i.

Additionally, this straightforward framework has the ability to encompass various forms of preferences related to how individuals consider others. (i.e. If $\alpha < 0$ and $\beta < 0$, it represents a model of seeking inequality. When $\alpha < 0$ and $\beta = 0$, it represents a model of altruistic preferences. On the other hand, if $\alpha > 0$ and $\beta < 0$, it captures a model of spiteful preferences. Lastly, if $\alpha < 0$ and $\beta > 0$, it captures a model where efficiency concerns hold importance).

The Fehr and Schmidt model operates on the assumption that $\alpha > 0$ and $\beta > 0$, making this a model of inequality aversion: fixing her own payoff, xi, player i's utility is maximized when xj = xi (Nunnari & Pozzi, 2022). Furthermore, an additional assumption is made, stating that $\alpha \geq \beta$. This assumption indicates that the negative impact of disadvantageous inequality is greater than the positive impact of advantageous inequality. (experiencing disadvantageous inequality is more harmful or has more negative consequences compared to encountering advantageous inequality.) This assumption is derived from previous research in behavioral and experimental economics. Lastly, FS imposes a constraint on β, ensuring that it is smaller than 1. This constraint is put in place to prevent an unrealistic scenario where agents with $\beta > 1$ would be willing to spend or sacrifice their own resources to reduce the positive difference between their allocation and the allocation of others. If this situation happens, it can lead to unusual and counterintuitive behavior. Some of the consequences could be loss of economic efficiency, distorted incentives, resource misallocation and unintended consequences. To offer additional elucidation, the loss of economic efficiency arises when individuals are inclined to utilize their own resources in an attempt to reduce the disparity between their own allocation and that of others. This behavior can lead to an inefficient allocation of resources. This behavior goes against the principle of maximizing overall welfare and can lead to suboptimal outcomes. Distorted incentives arise when the prevailing motivations or rewards encourage behaviors that deviate from rational decision-making or optimal outcomes. By allowing agents to burn money or expend resources to reduce favorable gaps, the incentive structure becomes distorted. Agents may engage in wasteful or irrational behaviors that prioritize equality over economic productivity and rational decision-making. In the examination of the explanation for resource misallocation, an exploration is conducted into the factors that contribute to the inefficient distribution or utilization of resources. Spending resources to reduce advantageous inequality can divert valuable resources away from productive uses. Instead of investing or utilizing

resources efficiently, they are used to artificially equalize outcomes, potentially hindering growth and development. As previously mentioned, unintended consequences can also emerge as a result of the aforementioned factors. Allowing agents to spend resources to minimize positive differences can create a vicious cycle. As one agent reduces the gap, another agent may respond in kind, leading to a never-ending competition of resource depletion without any tangible benefits or improvements. (Nunnari & Pozzi, 2022)

Meta-analysis, which is "the statistical analysis of a large collection of results from individual studies for the purpose of integrating the findings" (Glass, 1976), provides a powerful framework to test and explore statistical hypotheses, such as those related to other-regarding preferences. This straightforward framework has the ability to encompass various forms of preferences, including seeking inequality, altruism, spitefulness, and efficiency concerns, by examining the values of α and β. Meta-analysis distinguishes itself from narrative reviews by providing a quantitative analysis of research findings rather than a descriptive overview. While narrative reviews focus on presenting the historical trajectory and key findings in the literature, meta-analysis involves systematically combining and analyzing data from multiple studies to derive meaningful conclusions and assess the overall effect size or relationship between variables. The process involves the selection of studies based on specific inclusion criteria. The information gathered from these studies is then encoded and summarized to explore both consistencies and discrepancies among them. There are three key questions that need to be addressed in the study at hand: firstly, considering the existing body of knowledge, what is the most reliable estimate for α and β? Secondly, how do α and β values vary depending on various factors such as the experimental task and the subject population? Lastly, are there indications of selective reporting or publication bias?

To understand how to estimate α and β in the best way possible, hypothesis testing has to be performed, using a multi-level random-effects model and a Bayesian hierarchical model. The results indicate a statistically significant difference, supporting the notion that individuals exhibit aversion to inequality. Upon reflecting on the findings, the evidence strongly suggests a widespread tendency towards inequality aversion. Notably, the findings demonstrate a high degree of heterogeneity. (Also used to see if there have been biases during the studies, but the difference is once again statistically significant).

III.4 The trade-off between equality and efficiency

When agents strive to narrow the gap between their allocation and that of others, their actions come with an *opportunity cost*—a cost representing the value they forego by choosing one

option over another. In this context, it means that the resources they utilize to address inequality could have been alternatively allocated to other productive activities, which might have yielded greater overall welfare or economic output. Therefore, the loss of economic efficiency arises not only from the inefficient allocation of resources but also from the missed opportunities to generate more value or attain superior outcomes.

Furthermore, there exists another consequence associated with the pursuit of greater equality, which relates to the role of market mechanisms and the significance of voluntary transactions in fostering economic efficiency. In a well-functioning market, resources are allocated based on the preferences and choices of individuals. When agents are granted the freedom to exchange goods and services voluntarily, it results in a more efficient allocation of resources guided by the principle of comparative advantage. However, when agents prioritize equalizing outcomes at the expense of productive allocation, they may disrupt these market mechanisms, leading to distortions and suboptimal results.

By diverting resources towards equalization rather than their most productive uses, agents risk interfering with the natural flow of market forces, potentially hindering economic growth and innovation. In doing so, they compromise the long-term prosperity and advancement of societies. It is therefore essential to strike a delicate balance between pursuing equality and fostering economic efficiency. Policies and interventions aimed at reducing inequality should be crafted with careful consideration, ensuring they do not impede the market's ability to allocate resources effectively. By promoting equal access to education, healthcare, and opportunities, societies can enhance overall welfare while minimizing any negative impact on economic efficiency. Achieving sustainable and inclusive development requires acknowledging and navigating the intricate relationship between equality and efficiency.

Limitations and future research development

The contribution of this research serves as a valuable starting point for the study of behavioral economics, shedding light on concepts such as emotions and their relevance to economic decisions. However, it is important to acknowledge that the current research has several limitations that should be addressed in future studies. For instance, certain elements that could have been relevant to the research question were excluded, and alternative models beyond those utilized in this study were not thoroughly reported.

The field of economics offers a wide range of models proposed and utilized by researchers, and it is crucial to consider and incorporate these various models in future research development. Exploring different theoretical frameworks and incorporating additional variables or factors into the analysis could provide a more comprehensive understanding of the phenomena under investigation.

Furthermore, it is essential to acknowledge the methodological considerations of the research. Factors such as the reliance on self-reported data or a limited sample size should be recognized as potential limitations that may have influenced the findings. Future studies should aim to replicate and expand upon the current research across different contexts, populations, or experimental designs to enhance the generalizability of the findings.

The econometric analysis in relation to the Fehr and Schmidt model was not fully reported in this study due to space constraints.

Conclusions

This thesis has explored and analyzed various models in economics to contribute to the discourse on equity and fairness in economic systems. Throughout the exploration conducted, it has been recognized that traditional theories of economic growth and efficiency fall short in ensuring an equitable distribution of benefits. The study of equity models has emerged as an alternative perspective through which the intricate dynamics among economic development, social justice, and individual and community well-being can be comprehended. It has become evident that achieving a fair society necessitates not only efficient economic outcomes but also the equitable allocation of resources and opportunities.

Furthermore, the investigation into behavioral economics has illuminated the manner in which individuals perceive and value the emotions and concerns of others. Empirical evidence consistently demonstrates that most individuals exhibit a natural inclination to abstain from actions that knowingly harm others. This understanding has enhanced the comprehension of the origins and repercussions of inequality, offering valuable insights into the intricacies of human behavior.

Additionally, the exploration of inequity aversion, with a particular focus on the ultimatum game, has deepened the comprehension of why individuals frequently reject circumstances characterized by significant disparities between the proponent and the receiver. This concept has provided profound insights into the significance of fairness and the aversion to unequal outcomes.

Ultimately, this thesis underscores the importance of equity models in tackling the challenges posed by inequality, social justice, and economic well-being. It emphasizes the imperative for economic theorists and policymakers to consider both efficient economic outcomes and the equitable distribution of resources and opportunities. By incorporating insights from behavioral economics and comprehending the dynamics of inequity aversion, efforts can be made to progress toward the establishment of a fairer and more equitable society.

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