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ESSAYS ON FREEDOM OF CHOICE AND CAPABILITIES

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Tese submetida ao Programa de Pós-Graduação em Economia da Faculdade de Ciências Econômicas da UFRGS, como quesito parcial para obtenção do título de Doutor em Economia, com ênfase em Economia Aplicada.

Orientador: Prof. Dr. Flavio Vasconcellos Comim

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RESUMO

A presente tese desenvolve três ensaios que abordam diferentes temas relacionados à liberdade de escolha. No primeiro ensaio, propomos uma regra para ranquear conjuntos de oportunidades conforme a liberdade de escolha que eles propiciam, e que leva consideração as meta-preferências dos indivíduos. Desenvolvendo um abordagem teórica, investigamos se, ao considerarmos indivíduos com múltiplos objetivos, algumas noções usuais acerca liberdade que foram propostas na literatura são modificadas. Os resultados mostram que a regra proposta viola o axioma da monotonicidade, e que indivíduos podem atribuir maior liberdade de escolha a conjuntos com menos opções. No segundo ensaio, propomos um experimento online baseado em análise conjunta para avaliar como a liberdade de escolha dos indivíduos é afetada pelas características dos menus que os agentes dispõem no momento de realizar escolhas. Estudamos o efeito de três bases informacionais propostas na literatura – a cardinalidade dos conjuntos, a diversidade das opções, e a qualidade dessas opções – e também investigamos se normas de comportamento social podem influenciar a liberdade de escolha dos agentes. Usando estimadores de diferenças em médias operacionalizados através de uma única regressão linear, os resultados sugerem que não apenas os elementos tradicionais como a cardinalidade, diversidade, e preferências, são fundamentais para entender liberdade de escolha, como também normas de comportamento social tem impacto significativo. Finalmente, no terceiro ensaio, investigamos como indivíduos realizam *trade-offs* entre diferentes dimensões de suas vidas quando consideram os seus potenciais para atingir melhores níveis de bem-estar. Realizando um novo experimento baseado em análise conjunta, estudamos seis dimensões da vida dos indivíduos que são considerados centrais pela abordagem das capacitações, e avaliamos como diferentes circunstâncias em cada uma dessas dimensões afeta a liberdade de bem-estar dos indivíduos. Os resultados mostram que as dimensões relacionadas à segurança doméstica e a boas acomodações são de grande relevância, e, portanto, os formuladores de políticas públicas podem encontrar espaço para o estabelecimento de prioridades. Usando um modelo hierárquico Bayesiano, também investigamos se a importância que os participantes dão às dimensões estudadas varia conforme o nível de bem-estar que eles reportaram no estudo, e também se varia conforme a situação de vida em cada uma dessas seis dimensões. Os resultados sugerem que indivíduos que indicam menor bem-estar atribuem menor importância para a dimensão da vida relativa ao amor dos familiares próximos se comparado a outros participantes com maior nível de bem-estar subjetivo. Também, os participantes que indicaram ter sofrido alguma forma de violência doméstica no passado veem de forma menos negativa a ausência de uma boa condição de segurança doméstica, se comparado aos indivíduos que nunca sofreram com esse tipo de violência.

Palavras-chave: Liberdade de escolha. Análise conjunta. Abordagem das capacitações.

ABSTRACT

This thesis presents three essays that approach different topics related to freedom of choice. In the first essay, we propose a rule to rank opportunity sets in terms of freedom of choice that considers information about individuals' meta-preferences. From a theoretical perspective, we investigate whether accounting for a person's multiple goals and objectives changes some common notions about freedom of choice that have been proposed by the literature. We show that our rule fails to respect the monotonicity axiom, and that individuals might experience greater freedom when some options are excluded from their initial opportunity sets. In the second essay, we propose an online conjoint experiment to evaluate how individuals' freedom of choice is affected by the characteristics of the menus they have at their disposal at the moment of choice. We study the effect of traditional informational basis used to evaluate freedom of choice – sets' cardinalities, the diversity, and the quality of their options – and also investigate whether social norms of behavior have some bearing on freedom. Using a difference-in-means estimator that is operationalized through a single linear regression, our results suggest that not only traditional elements such as cardinality, diversity, and preferences are key to understand freedom, but also that social norms of behavior have a significant impact. Finally, in our third essay, we investigate how trade-offs between capabilities take place when individuals consider their ability to achieve higher well-being. Using another conjoint experiment, we study six life domains that are considered as central by the capability approach, evaluating how varying the situation of individuals in each of these domains affect their well-being freedom. Our results show that being secure from domestic violence and enjoying a decent shelter have great relevance, and hence policymakers might find room for establishing priorities. Using a hierarchical Bayesian model, we also investigate whether the relative importance that people give to these life domains vary with participants' subjective well-being, and with participants' self-reported situations in each of the life domains studied. We find that subjects that reported lower well-being attached less importance to enjoying the love and care of their families as compared to those participants with higher subjective well-being. Moreover, respondents that reported to have suffered from some sort of domestic violence find less harmful the lack of a decent level of bodily security, as compared to those participants that have never suffered from such type of assault.

Keywords: Freedom of choice. Conjoint analysis. Capability approach.

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1 INTRODUCTION

The instrumental importance of freedom of choice – when freedom is seen as *means* to given ends – is widely recognized by traditional economic analysis, while its intrinsic importance – when freedom is an end in itself – is an aspect somewhat neglected (SEN, 1988). The usual ‘story’ depicts a consumer endowed with preferences that can be represented by a quasi-concave utility function, and whose choices are made with the goal in mind to maximize the value of this function. For this ‘utility-driven person’, whose multiple cares and objectives are perfectly described by an all-things-considered preference ordering, the only relevant information throughout the process is which of the feasible alternatives gives the highest utility level, with no specific importance attached to the *unchosen* options that she has faced, or to the process of choice. For instance, if an option x maximizes the agent’s utility, under a pure utilitarian perspective there cannot be any difference between choosing x from an opportunity set that only contains x , and a situation where x is chosen from a set with a large variety of options.

Nevertheless, even if x is considered the best option, it can be reasonably argued that something valuable is lost, and that opportunities are severely curtailed when choice is constrained to the singleton set $\{x\}$. In other words, the agent might also attach importance to what she *could have* chosen, or to the possibility of deciding differently, making the act of choosing x from a larger set more valuable than the same choice from a set that only offers a single alternative to the agent. This line of inquiry motivates what became known as the ‘Freedom of Choice literature’, that aims to address freedom of choice not only through its instrumental importance - i.e. people’s ability to choose freely for themselves, without constraints imposed by others - but by its intrinsic importance to decision-makers (GAERTNER; XU, 2011)

Among the exponents of this literature are names such as Prasanta Pattanaik, Yongsheng Xu, Amartya Sen, Wulf Gaertner, Clemens Puppe and many others that have largely contributed to Social Choice theory. Indeed, the freedom of choice literature tends to be a highly mathematical research field that draws heavily on social choice methodological tradition to establish its main results. This line of research has also a close connection with Amartya Sen’s and Martha Nussbaum’s ‘Capability approach’ to human development, which sees the expansion of people’s freedoms - broadly understood as the set of what one is able to do and to be - as the main objective of development policies. Therefore, the freedom of choice literature contributes largely to distinct realms of research, and might motivate both theoretical and empirical studies.

Within this literature, there is ample variation regarding what information should be considered to establish comparisons in terms of freedom of choice. One aspect that has been receiving attention relates to *preferences* among options and what role - if any - should they play. Amartya Sen favored the view that preference information cannot be disregarded, suggesting that any axiomatic structure intended to reflect judgments of freedom of choice should not only account for the number of alternatives - the quantitative aspect - but also encompass the qualitative in-

formation provided by preferences. For instance, if a person feels that all the options within a set A are outstanding, while all alternatives in a set B are terrible, this qualitative information should influence the way in which A and B are ranked in terms of freedom. Many authors followed this same reasoning and proposed rankings of opportunity sets in terms of freedom of choice where preferences are taken into account (SEN, 1991; PATTANAİK, XU, 1998; PUPPE, XU, 2010).

There are many aspects, however, that remain unexplored by this literature, and motivate this research. The first aspect refers to what Amartya Sen called ‘rankings of preference rankings’, or *meta-rankings*, in his insightful ‘Rational Fools’ paper (SEN, 1977). An analytical structure based on meta-rankings allows the expression of moral judgments, or, more generally, may be used to describe how distinct preference orderings - each motivated by some specific ‘rationale’ that represents a feature of the agent’s plural identities - reflect values and principles that a person has reasons to treasure during her life. Enriching the analytical structure so as to incorporate meta-preferences would make possible the tractability of a new range of elements, expanding the reach of the theoretical discussion of freedom, and bringing a new set of insights to our understanding of what elements can enhance freedom when it is seen as opportunities for choice.

Thus, in our first essay, we propose a preference-based rule to rank opportunity sets in terms of freedom of choice. In our framework, agents are endowed with preferences over alternatives, and preferences over distinct preference orderings that reflect their ‘multiple-selves,’ what denotes a situation in which information about meta-preferences is also relevant to freedom of choice comparisons. After we axiomatically characterize our rule, we study under which conditions this rule respects some desired properties such as the ‘Monotonicity axiom,’ where we show that – when a richer structure of preferences is considered – freedom may *decrease* when one option is added to the existing menu.

A second aspect that is worth noticing and motivates this thesis is the lack of empirical research in this field. So far, the majority of studies on freedom of choice concentrate in exploring the axioms, and which rankings can be constructed based on these axioms, but little has been done in designing experiments to test the theoretical predictions. In this sense, this research comes as an attempt to reduce this gap, and provide new evidence about the determinants of freedom of choice.

In our second essay, therefore, we propose an online conjoint experiment to evaluate what characteristics of an opportunity set makes it better evaluated in terms of freedom. In addition to three usual features of sets – cardinality, diversity of options, and the quality of possible alternatives considering agents’ preferences – we suggest that social norms of behavior also may play a significant role in peoples’ freedom to choose. Our hypothesis is that people might enjoy less freedom of choice when they find themselves in situations where a trade-off between choosing their best options, and doing what is regarded as more socially appropriate by others, occurs. Compared to a baseline set, our results suggest that sets with fewer options tend to receive less

support in terms of freedom, while the diversity of the alternatives does not necessarily enhance the freedom experienced by agents. Sets with low-quality options also provide less freedom than a baseline set with neither good nor bad options. Finally, our findings suggest that social norms of behavior may have a large influence on freedom of choice: on average, when other people rate an agents' best choice in a menu as very socially inappropriate, this set becomes 7.9 percentage points less likely to provide greater freedom than another set with a socially neutral best choice. Also, our findings suggest that women and men might respond differently to the factors that impact their freedom to choose, with women, for example, being more sensitive to the influence of social norms of behavior than men.

Finally, in our third essay, we explore the notion of *well-being freedom* (SEN, 2009), and its relation to the different life domains that are cherished by individuals. More specifically, we use an online conjoint experiment to evaluate what dimensions of life are more relevant to individuals when taking into consideration a perspective based on their ability to pursue their own well-being. We study six different areas of life that are related to the central capabilities list in Nussbaum (2000, 2011), and operationalized using the survey instrument developed in Anand et al. (2009). Our results suggest that being secure from domestic violence, and being able to enjoy adequate shelter, are two factors extremely valued by the participants in our experiment, and hence should receive some priority by policymakers that are unable to deliver a full set of capabilities to all citizens in every dimension of life. Furthermore, we also investigate whether the importance that people attach to these dimensions vary with their subjective well-being levels, and with their conditions in each of these life domains. Our results indicate that the results are robust to variations in these aspects in four of the six capabilities studied. In the dimension related to subjects' bodily integrity, participants that have experienced domestic violence at some point in life attached less importance to the absence of a decent level of domestic security, as compared to those that have always enjoyed a decent level of this capability. Also, improving the capability related to family love did not have a positive effect on respondents that reported low subjective well-being, while such improvement affected significantly high subjective well-being participants.

The complexity of the everyday challenges requires from academia not only the proposal of novel theoretical approaches, but also the employment of new methodologies that may be found outside the usual toolkit of economists. This research takes some steps in these directions, and also reinforces the idea that expanding research on freedom of choice, opportunities and human behavior may contribute vastly to a better understanding of what are individuals' priorities, which elements impose restrictions on the ability to choose, as well as shed some light on the human development debate.

2 MULTIPLE GOALS, META-PREFERENCES, AND FREEDOM OF CHOICE COMPARISONS

2.1 INTRODUCTION

The opportunity aspect of freedom has been forcefully defended by Sen (1991, 1993b, 2009) as a broader and more adequate informational basis for social welfare evaluations. More freedom, Sen argues, is associated with the expansion of people's *capability sets* - the set of all *functionings* (i.e., all 'doings' and 'beings' of an individual) - what enhances people's ability to promote whatever goals and objectives they have set to themselves. In this sense, expanding individuals freedoms becomes the primary means to the promotion of human development: an objective that draws heavily on the evaluative exercise of comparing different opportunity sets in terms of freedom of choice.

Many different rules have been proposed to tackle the issue of making freedom comparisons. If functionings - and not resources - are able to increase people's freedom of choice, these rules can be simply interpreted as a way to compare two sets of options A and B in terms of freedom given a particular manner of converting resources into functionings. To illustrate the existing approaches, suppose the following situation: Mary, the older of two sisters, receives two notes of \$50 from her parents and is instructed to think about giving some of this money to her younger sister, Jill. 'It is completely up to you,' says her mother. Assume further that Mary cannot exchange the \$50 notes into smaller ones, leaving her options $x =$ 'take all the money for herself', $y =$ 'give to Jill \$50', and $z =$ 'give to Jill \$100'. The set $A = \{x, y, z\}$ denotes Mary's *opportunity set* in this situation. Now, assume another situation where she receives the same instructions but, instead of receiving two notes of \$50, Mary receives only a \$100 note, leaving her with the opportunity set $B = \{x, z\}$. What scenario - A or B - offers to Mary larger *opportunity-freedom*?

The seminal paper of Pattanaik and Xu (1990), for instance, propose a rule where no information other than sets' cardinalities is necessary to make freedom comparisons. Under Pattanaik and Xu's cardinality rule, the underlying assumption is that each resource is converted automatically into a different functioning and is capable of expanding an agent's capability set. In Mary's example, the set that gives larger freedom of choice is therefore obvious: given that A has three options while B has only two, the set A provides more freedom of choice than B .

However, it is not difficult to conclude that the cardinality rule fails to accommodate a variety of situations where the quantitative aspect is not the only one that seemingly plays a part. For instance, the *diversity*, or *dissimilarity* among options and what effect they have on freedom appraisals have been a widely pursued line of inquiry by a large body of the literature, where the intuitive notion that expanding a set with an option that is similar to already available options should do little to the expansion of the decision maker's freedom has been addressed

(see, among others, PATTANAİK, XU, 2000; VAN HEES, 2004; PERAGINE, ROMERO-MEDINA, 2006; BERVOETS, GRAVEL, 2007; GUSTAFSSON, 2010).¹

In another branch of the critiques to the cardinal approach, Sen (1991, 1993b) argues that relying solely on cardinality information makes one fail to depict clearly the opportunity aspect of freedom. For instance, it is counterintuitive to attach the same freedom of choice to two sets only because they have the same cardinalities even acknowledging that one of these sets have much more desirable options than the other. Therefore, any axiomatic structure intended to reflect a freedom ranking should not only account for the number of alternatives, but also expand the informational basis with agent's *preferences* among these alternatives. For example, if Mary strictly prefers donating \$50 over any other option because, say, she has always shared her possessions equally with her sister and feels that this is what is the right thing to do, any freedom ranking should be sensible to the fact that B does not allow her choosing what is best. Enriching the model with information about preferences, therefore, changes the manner in which resources are being converted into functionings and also makes room for the idea that each functioning contributes differently to the freedom of choice.²

In general, incorporating notions of similarity or preferences has been the usual response to Pattanaik and Xu's pure cardinal approach (VAN HEES, 2004; DOWDING, VAN HEES, 2009), with few attempts to address jointly the two aspects (e.g., PERAGINE, ROMERO-MEDINA, 2006). In what concerns the approaches based on preferences, the question of *what* preferences should count has been discussed forcefully, where the 'reasonable preferences' argument of Jones and Sugden (1982), and further developed in Pattanaik and Xu (1998) and Romero-Medina (2001) has gained prominence. Basically, in order to assess whether an option is significant to increase freedom, one should examine the information given by those "preference orderings that a reasonable person in the agent's situation can possibly have" (PATTANAİK, XU, 1998, p. 180). Thus, what matters is not the set of preferences actually held by the individual, but a set of preference rankings that are regarded as 'reasonable' given the situation the agent finds herself in. To illustrate, adding an opportunity $d =$ 'burn all the money' to either A or B would do little to enhance Mary's freedom since this alternative is (presumably) unreasonable from the viewpoint of a reasonable agent.³

The argument based on reasonability allows the consideration of a broad range of preferences into the analysis. First, a particular ordering of alternatives may be reasonable even though the agent attaches zero probability to the possibility of effectively ranking alternatives

¹To illustrate this fragility, Pattanaik and Xu (1990) pointed out that their cardinality-based rule leads to consider sets such as {train, red car} and {blue car, red car} as equivalent in terms of freedom, regardless the fact that the former apparently gives the decision-maker more variety than the latter.

²Note that preferences in this example follow the broader sense of preferences driven not only by self-interested motivations, as discussed in Sen (1993b). This conceptualization of preferences is rooted in the distinction between 'tastes' and 'values' proposed in Arrow (1950).

³Clearly, one critique that may arise to this sort of conclusion is that is always possible to find a situation where even an option such as 'burning all the money' is reasonable (for instance, Mary may burn the money to protest against her parents) and therefore contributes positively to freedom. For this and other critiques to the reasonableness approach, see Van Hees and Wissenburg (1999).

in that way, departing from the approach focused on preference for flexibility or uncertainty regarding future tastes (see, among others, ARROW, 1995). In our example, based on the notion of reasonability, Mary can consider as reasonable the option of giving away all the money to her sister even though she has no plans to do it whatsoever. Second, the claim that alternatives increase freedom on the grounds of reasonability allows admitting that there may be a vast plurality of reasons that can be regarded so as to assess what preferences should count, what makes it an example of a *multi-preference* approach to freedom (PUPPE, XU, 2010).

Nonetheless, as pointed out in Jones and Sugden (1982), reasonability as the only required standard is incapable - or even do not intend to - rule out preference orderings upon which judgments of value can be made, such as moral judgments: the reasonableness criterion would, at most, exclude those rankings that are patently unjustifiable even using mild standards of reasonability. Moreover, Pattanaik and Xu (1998) do not specify which criteria is adequate to distinguish preference orderings into reasonable and unreasonable, or how reasonability acts as a screening device to ascertain which opportunities are relevant to the individual's goals and ends she aims to promote.

In this sense, the richer structure of *meta-preferences* proposed in Sen (1977) may be helpful to give a more robust response to how various distinct preference orderings should be considered. Sen (1977), in his strong critique of the narrow focus of standard decision theory, has advocated in favor of an analytical framework that incorporates the information given by meta-preferences to the analysis of what constitutes a rational and consistent choice pattern. The narrow structure of economic models, he argues, when attempts to synthesize a plurality of preferences into a unique complete, transitive and *all-things-considered* preference ordering, ends up impoverishing the analysis and neglecting essential aspects of the decision-making process such as the vast variety of principles, values, and reasons through which individuals can evaluate the same decision problem. An agent preoccupied solely with the rationality of her acts, relying exclusively on an all-things-considered preference and making no room to the plurality of principles that reflect her multiple goals is what Sen has defined as a 'rational fool.'

To illustrate, take the example of Sen (1977) based on morality. Suppose that preferences R_1 and R_2 reflect, respectively, rankings of alternatives based on personal welfare when sympathy is taken into account and when sympathy is disregarded, and a third preference ranking R_3 that describes actual choices made by the agent. By definition, these three rankings are reasonable since there are 'reasons' to adopt any of them as the criterion to make decisions. But assume further that this agent has a goal in mind of choosing the most moral actions because, say, the choice based on morality promotes the ends that she cherishes. In this case, one should expect that how these rankings compare to a hypothetical 'most moral' preference R_4 is an information of relevance to freedom comparisons. Pattanaik and Xu's (1998) preference-based rule makes room for the idea that an all-things-considered preference ordering may not suffice to account for the many *rationales* that can be appropriate to assess situations.⁴ However, when attaches

⁴Important to note, though, that nothing avert the individual from regarding only *one* preference ranking as rea-

equal relevance to each preference ordering regarded as reasonable, as if each could reflect with the same intensity one's goals and values, the individual depicted by Pattanaik and Xu's approach neglects information that might otherwise be important for an assertive comparison of sets in terms of the opportunity aspect of freedom.

Mary's dilemma, for instance, depicts a conflict between two distinct points of view whose choice prescriptions can be rationalized by *self-interested* and *other-regarding* preferences; a conflict that has been extensively studied by behavioral economists through the experiment known as the *dictator game* (see Forsythe et al., 1994, and for a review of results, see also Engel, 2011). Back to our example, if we assess her decision problem through these two viewpoints, we have no difficulty to come up with a set of reasonable preference orderings that leads to the conclusion that all options are equally reasonable and capable of enhancing freedom: choosing x is certainly a nice possibility when Mary thinks exclusively about her own well-being, while y (or z) emerge as best options when she takes into account her sister's situation. However, if individuals have 'preferences over preferences' based on how these reflect their plural identities, Mary may attach distinct importance to each principle driving these preference orderings, according to the extent that each reflects her plural interests and goals that she aims to promote. It could be the case that, even though she values the possibility of proposing an egalitarian allocation, Mary gives larger importance to her own well-being and enjoys larger freedom of choice when faces a menu that allows her choosing x even acknowledged that y and z are reasonable.

Regardless of what informational basis is used, a common feature of diversity-based or preference-based approaches is that freedom of choice cannot be decreased by the addition of new alternatives: a property commonly called as *monotonicity* (PUPPE, 1996; PUPPE, XU, 2010), or set dominance (SEN, 1991). In the framework proposed in Gravel (1994), for instance, comparisons in terms of freedom rely entirely on the notion of monotonicity. Sen (1991) argues that 'if a person has an enlarged set to choose from, then his freedom, in some sense, must be at least as large, if not larger, no matter what his preferences are and what he actually chooses from the respective sets' (SEN, 1991, p. 21).

Nevertheless, this conclusion may be deceptive when we consider an agent that pursuits multiple goals simultaneously. For instance, imagine the situation of an individual that must pick one fruit from a fruit basket with an apple (a_1) and a mango (m_1).⁵ To this agent, both fruits are enjoyable, but m_1 is regarded as tastier than a_1 . Further, assume that we can add either another mango (m_2) or apple (a_2) to the basket: if we desire to enhance the opportunity freedom of this agent, what fruit should we put into the basket?

One plausible response to this query relies on the information about similarity: both m_2

sonable. For example, when facing the menu 'living healthy' and 'living unhealthy,' one can have a hard time to rank the latter option above the former in any preference ordering based on reasonability standards. In this case, the set of all reasonable preference orderings over these two alternatives would be a singleton.

⁵This example is based on Sen (1993a) and his critique of the imposition of internal consistency conditions on choice functions.

and a_2 add little to the agent's freedom because they do not increase the diversity of options. We argue, however, that we must assess what goals and objectives this agent aims to promote. If this individual aims only to pick the fruit that is best for her, it is possible to reason that, while having apples is relevant when we take into account the intrinsic importance of freedom, having mangoes is fundamental to her opportunity freedom because this is the type of fruit that she likes the most. Therefore, when taking into consideration this specific situation, it can be argued that, in the less favorable scenario, expanding the set with m_2 or a_2 at least will not reduce this agent's opportunity freedom.

Suppose, however, that this decision-maker desires not only pick her most preferred fruit, but also do it in a way that she will not appear as a selfish person to others, being the latter objective her primary goal. One possible way of not appearing selfish to others in this decision problem is, *whenever possible*, leave the basket with at least two different types of fruits. In this case, constraining her choice to the set $\{m_1, a_1, a_2\}$ imposes to her a trade-off between these two goals: either she acts self-interestedly and chooses m_1 , abandoning her first goal, or she picks one apple and leave some diversity to the basket, but refrains from fulfilling her craving for mangoes. In any case, the opportunity freedom - seen as freedom to achieve multiple goals simultaneously - is impaired.

This scenario changes when she faces the reduced set $\{m_1, a_1\}$. Given that the objective of not appearing as a selfish person to others is stated taking into account the viability of leaving some diversity in the basket - the 'whenever possible' part - it does not apply when choice is constrained to the smaller set: since foregoing all fruits is not an option, the diversity of the fruit basket will be reduced *regardless of* what choice she makes. Thus, when the decision maker faces the smaller set $\{m_1, a_1\}$, the impossibility of leaving two types of fruits in the basket gives her the 'wobble-room' to behave in accordance with her self-interested preferences without worrying about appearing selfish to others. The opportunity aspect of freedom, therefore, may increase in the smaller set since it gives the individual a functioning previously unattainable, i.e. the opportunity to pursue actively one of her goals while remaining 'neutral' regarding the other, what is presumably preferable to the opportunity of achieving one goal *only if* intentionally abandoning the other altogether - the only possible configuration available when choice is constrained to $\{m_1, a_1, a_2\}$. Monotonicity, therefore, is violated in this case.⁶

In Mary's decision problem, a similar conclusion may arise. Assume that Mary's parents have always tried to stimulate that she and Jill should divide their belongings equally with one another, and Mary takes this principle quite seriously. However, at the same time, she treasures her own well-being and the ability to pursue her happiness without always taking note of how others are affected by her choices (although some priority is given to the egalitarian notions that her parents instilled in her and Jill). If her primary goal is associated with '*whenever possible*, sharing equally with Jill', and her secondary goal is 'pursuing my own interests', Mary can experience larger opportunity freedom when she receives only one \$100 bill instead of two bills

⁶See also Dowding and Van Hess (2009) for another example of monotonicity violation (the technology example).

of \$50, i.e., when she faces $\{x, z\}$ instead of $\{x, y, z\}$. As in the ‘mangoes and apples’ example, the larger menu imposes a trade-off between the two goals, while the smaller one allows Mary to behave self-interestedly without deliberately abandoning the egalitarian principle that she also values.

Therefore, in this essay, we elaborate further on the preference-based approach to freedom of choice rankings and propose a rule to rank opportunity sets in terms of freedom when the information of meta-preferences play a role. In our rule, agents have multiple goals and objectives that are related to their plural identities but employ only two of these to assess which options should count to freedom of choice. Each of the two identities, or rationales, is represented by a set of preference relations that, combined with the priority the agent gives to one over another and what relationship she has established with each principle, will constitute the informational basis of our framework. We draw on the *rational shortlist method* of Manzini and Mariotti (2007), and on *procedure β* of Houy and Tadenuma (2009) to construct a two-stage rule to identify, for any opportunity sets A and B , the set of relevant alternatives to freedom. The first stage uses the first identity (the first-best set of preferences) to eliminate inferior options *within* each set, while the second stage uses the second identity (the second-best set of preferences) to eliminate inferior alternatives among all shortlisted options in the first stage. Identified this set for any opportunity sets A and B , our rule ranks A over B if, and only if, the set of shortlisted options of A contains more alternatives that can increase freedom of choice than the set of shortlisted options of B .

The role of meta-preferences is twofold. First, preferences over sets of preference relations are used to discard reasonable but dominated rationales. In other words, among all possible reasonable identities, the individual chooses those two that reflect more adequately her understanding of the state of affairs and what ends she aims to promote in that choice situation. The fact that Mary is, for instance, ‘vegan’, may not be helpful to the problem that she faces even though it might reflect to a large extent the general principles that she takes interest. Second, preferences over the two selected rationales determine the order in which they are used to establish which options should count for freedom, i.e., given two distinct preference orderings R_1 and R_2 , if the agent ranks R_1 over R_2 , then R_1 ordering is used at the first stage, and R_2 at the second. The order, therefore, matters to compare opportunity sets. We show that this way of assessing alternatives describes an agent that uses choice prescriptions based on R_1 as a sort of ‘inviolable maxim’, but that does not necessarily differentiates a situation where she can directly promote her primary goal (e.g., Mary splits equally the \$ with her sister) from another where she simply is unable to violate it (e.g., Mary takes all the money for herself because she cannot exchange a \$100 note into two notes of \$50).

Thus, we depart from the reasonability approach of Jones and Sugden (1982), Pattanaik and Xu (1998) and Romero-Medina (2001) not only when different weights are given to reasonable preference relations, but also when some of the rankings elicited by reasonable preferences are not used by the agent because they are not useful to the problem in hand, or because they do

not reflect what the agent considers herself to be. Moreover, one key element in our approach is that the value of each option to freedom of choice not only depends on the menu this option originally belongs, but also on the other menu that is used in the comparison. This characteristic makes our rule heavily menu-dependent and, as we show, prone to intransitivity, and also leads to a tension between the *intrinsic* and the *opportunity* aspects of freedom of choice: given our focus on the latter and the fact that our rule may fail the monotonicity axiom, it can be argued that the former aspect is not properly depicted in our approach.

Our work, therefore, adds value to the literature by proposing a novel rule to rank opportunity sets in terms of freedom that account for the richer structure of meta-preferences. Even though the literature recognizes that many different reasonable points of view can motivate preference orderings and choices, the consequences of differences in the priorities that people give to these principles remained unexplored by the current freedom of choice approaches. Moreover, we also provide some new insights on the validity of the monotonicity axiom by arguing that, when a structure that makes room for different priorities is used, the monotonicity property might be violated and individuals may experience higher freedom when some options are excluded from their opportunity sets.

Apart from this introduction, this article has three more sections. Section 2.2 lay down the notation and axioms. Section Section 2.3 presents the properties of options that are considered to increase freedom of choice. Section 2.4 derives the rule to rank sets in terms of freedom of choice, and discusses the results. Section 2.5 concludes.

2.2 FRAMEWORK

Let X be the universal set of alternatives, assumed to be finite, and let $Z = 2^X - \emptyset$ be the set of all non-empty subsets of X . A binary relation on X is a set $R_k \subseteq X \times X$, with any pair $(x, y) \in R_k$ read as ‘ x is at least as good as y ’, and denote by \mathcal{R} the set of all reasonable binary relations on X . Any set R_k is assumed to reflect a different *rationale* (MANZINI, MARIOTTI, 2007), or identity part (BINDER, 2014) that compose this individual plurality of points of view. Furthermore, individuals have preferences over the rationales that compose their ‘plural-selves’, i.e., the agent’s meta-preferences, where we assume that, for all $i, j \in \{1, \dots, \#\mathcal{R}\}$, and all $R_i, R_j \in \mathcal{R}$, $i < j$ implies in R_i ranked over R_j according to the individual’s meta-preferences.

We do not assume that each R_k is necessarily *complete* (for all $x, y \in X$, $(x, y) \in R_k$ or $(y, x) \in R_k$). As observed in Binder (2014), a plurality of reasons often makes room to incompleteness, either result of the irrelevance of the principle to the comparison in question, or what might be seen as a refusal to rank alternatives when the agent is forced into a ‘Sophie’s choice’ situation.⁷ Nevertheless, we assume that R_k is *transitive* (for all $x, y, z \in X$, $(x, y) \in$

⁷Situations in which individuals are forced to choose between options that will inevitably inflict great damage to others or themselves, or where choosing the less of many evils becomes an extremely difficult decision, have become known as a ‘Sophie’s choice’ because of William Styron’s novel released in 1979 where, Sophie, a Polish refugee, while at Auschwitz had to decide which of her two children would be saved from the concentration camp,

R_k and $(y, z) \in R_k$ imply $(x, z) \in R_k$ for $k = 2, \dots, \#\mathcal{R}$. Note, therefore, that R_1 - the first and most important principle - is not necessarily transitive.

Moreover, R_i and R_j , for $i \neq j$, are not necessarily disjoint sets since the criterion used to construct R_i and R_j do not need to diverge in what relation any two alternatives have. In other words, for all $s, t \in X$, $[(s, t) \in R_i] \not\Rightarrow [(s, t) \notin R_j]$. To illustrate, imagine that R_i and R_j denote preferences elicited by the agent's 'football fan' and 'sports fan' identities, respectively, and three possible programs are being evaluated: $x =$ 'football match', $y =$ 'basketball game', and $z =$ 'ballet concert'. In this case, while her 'football fan' identity would have little to say about the ranking between y and z – such as the 'sports fan' part would have little to say about x and y ranking since this identity does not specify which of these two sports is preferred – both identities clearly agree that x must be ranked over z , and that z over x cannot hold. Hence, $(x, z) \in R_i$, and $(x, z) \in R_j$.

Following the notation used in Houy and Tadenuma (2009), for all $R_k \in \mathcal{R}$, let $P(R_k) = \{(s, t) \in R_k \mid (s, t) \in R_k \text{ and } (t, s) \notin R_k\}$, and, for all $S \in Z$, let $C_{R_k}(S) = \{s \in S \mid \forall t \in S, (t, s) \notin P(R_k)\}$, for $k \in \{1, \dots, \#\mathcal{R}\}$. Hence, $C_{R_k}(S)$ is the set of all non-dominated alternatives in S given R_k . A cycle of preference relations in $P(R_k)$ is a finite sequence $(x_n)_{n=1}^m$, for $m \in \mathbb{N}$ and $m \geq 2$, such that $(x_n, x_{n+1}) \in P(R_k)$, for all $n \in \{1, \dots, m-1\}$, and $(x_m, x_1) \in P(R_k)$. Moreover, denote by $\mathcal{C}_k(X)$ the set of all cycles in $X \times X$ for $P(R_k)$, and let $\mathcal{AC}_k(X) = \{x \in X \mid x \in (x_n)_{n=1}^m, \text{ for some } (x_n)_{n=1}^m \in \mathcal{C}_k(X)\}$. Any binary relation is *acyclic* if it does not lead to a cycle in X . Clearly, assuming that R_k is transitive, for $k \neq 1$, imply in R_k being acyclic as well.

Let us also state the following definitions that will be helpful to configure our rule.

Definition 1. *The choice of x fails with R_k in A if $x \in A$ and there is a $y \in A$, $y \neq x$, such that $(y, x) \in P(R_k)$.*

Moreover, when an alternative fails with R_1 in some set, we say that this option is *virtually unfeasible* in that set. The intuition behind this concept is that the first rationale eliminates all options that cannot increase freedom of choice because they have no intrinsic value to the individual's first - and most important - goal given the opportunity set they belong.

Definition 2. *For all $A, B \in Z$, and all alternatives $x \in A$ and $y \in B$ (with possibly $A = B$) we say that y promotes better in B than x in A if, and only if, one of these two cases occur:*

- a. x fails with R_1 in A and y does not fail with R_1 in B ; or
- b. neither x nor y fail with R_1 in A and B , respectively, and $(y, x) \in P(R_2)$.

In other words, given all options in A and B , if x is virtually unfeasible in A while y is not on B , this suffices to ascertain that y promotes better in B than x in A . However, this is a sufficient, but not necessary, condition: it can be the case that both x and y are not virtually unfeasible and which one would die (BINDER, 2014).

unfeasible. In this case, y promotes better in B (or also in A) than another x in A if y , besides being not dominated in R_1 within the set it belongs, R_2 -dominates x . The menu-dependence is evident in this scenario: take, for instance, two options $x \in A$ and $y \in B$, and assume that both do not fail within their sets considering R_1 . Therefore, x and y are acceptable choices in each choice framework. Assume further that choosing x in A and y in B does not fail R_2 , but the choice of y in B has the advantage that it is preferable to x : in this case, we may presume that the choice of y in B becomes more valuable than x in A for the sake of promoting the agent's multiple goals.

Definition 3. For all $S, T \in Z$, let $C_{R_i R_j}(S, T) = C_{R_j}(C_{R_i}(S) \cup C_{R_i}(T))$.

That is, $C_{R_j R_i}(S, T)$ is the set of all non-dominated alternatives given the R_j rationale, in the union of the R_i non-dominated alternatives in S and T .

Decision makers evaluate freedom of choice of opportunity sets in Z . Denote by \succsim a binary relation over Z , where, for any $S, T \in Z$, $S \succsim T$ means that “ S offers at least as much freedom of choice as the opportunity set T ”, with \succ and \sim denoting, respectively, [$S \succsim T$ and not($T \succsim S$)] and [$S \succsim T$ and ($T \succsim S$)]. Throughout this paper, we assume that, among all possible rationales that the agent can have, she will use only two of them to identify whether – given a comparison between two opportunity sets – one alternative can count to the freedom of choice. Denote by R_1 and R_2 these two identities, with $R_1, R_2 \in \mathcal{R}$. Based on the works of Puppe (1996), Pattanaik and Xu (1998) and Puppe and Xu (2010), we assume a related set of conditions that should be respected by our freedom of choice ranking.

Axiom SND (Simple Non-Dominance). For all $x, y \in X$, $C_{R_2}(\{x, y\}) = \{x, y\} \Leftrightarrow \{x\} \sim \{y\}$.

Axiom SND requires that any two alternatives that are not dominated using R_2 must provide the same freedom of choice to the agent when compared among each other as opportunity sets. The intuition is that a singleton set cannot fail with R_1 (or R_2 , for that matter) because it provides only one option that will be chosen irrespective of what the individual prefers.

Axiom EX (Expansion). For all $A, B \in Z$, and $x \in X - A$, if $C_{R_2 R_1}(A \cup \{x\}, B) = A \cup \{x\} \cup B$, then $A \succsim B \Leftrightarrow A \cup \{x\} \succ B$.

Axiom EX determines that, when adding an alternative x to a set A that offers at least as much freedom of choice as another set B , and provided that x is not R_1 -dominated by A , or R_2 -dominated by A 's and B 's R_1 non-dominated options, this enlarged set $A \cup \{x\}$ must now be strictly preferable than B in terms of freedom.

Axiom D (Dominance). For all $A, B \in Z$, if $C_{R_2 R_1}(A, B) \cap C_{R_1}(B) \neq \emptyset$, then $A \succ B$.

Axiom D requires that, if a set B has no options in $C_{R_2 R_1}(A, B)$, then it must be dominated by A provided that $C_{R_2 R_1}(A, B)$ is a non-empty set.

Axiom I (Indifference). For all $A, B \in Z$, if $C_{R_2 R_1}(A, B) \cap C_{R_1}(B) = \emptyset$, then $A \sim B$.

Axiom I, on the other hand, states that A and B must be indifferent in terms of freedom if $C_{R_2R_1}(A, B)$ is empty.

Axiom COM1 (Composition 1). For all $A, B, C, D \in Z$, such that $(A \cap C) = (B \cap D) = \emptyset$, and $C_{R_2R_1}(A \cup C, B \cup D) = A \cup B \cup C \cup D$, then $[A \succsim B \text{ and } C \succsim D \Leftrightarrow A \cup C \succsim B \cup D]$.

In order to see the intuition behind COM1 axiom, take four sets $A, B, C, D \in Z$, with $A \succsim B$ and $(B \cap D) = \emptyset$, but assume that A and C have all but one elements in common. If $C_{R_2R_1}(A \cup C, B \cup D) = A \cup B \cup C \cup D$, regardless the fact that $A \succsim B$ and $C \succsim D$, when adding C to A we are increasing by just one the number of options relevant to freedom of choice, while adding D to B might increase substantially the in $C_{R_2R_1}(A \cup C, B \cup D)$ to the point that it exceeds the share of $A \cup C$. Thus, to rule out this possibility, Axiom COM1 requires that $(A \cap C) = (B \cap D) = \emptyset$.

Axiom COM2 (Composition 2). For all $A, B, C, D \in Z$, such that $(A \cap C) = (B \cap D) = \emptyset$, and $C_{R_2R_1}(A \cup C, B \cup D) = A \cup B$, then $A \succsim B \Leftrightarrow A \cup C \succsim B \cup D$.

Axiom COM2, on the other hand, states that freedom comparisons cannot rely on ‘irrelevant’ alternatives. Thus, for any sets A and B where A is better ranked, this rank does not change when we add dominated options to both sets.

The following properties are desirable considering the intuition behind the freedom of choice approach. The first requires that for every sets A and B there will be at least one alternative within these sets that increase freedom of choice, i.e., that is non-dominated given the two stages of elimination. The second is the monotonicity property of Puppe and Xu (2010).

Condition NE (Non-Emptiness). For all $A, B \in Z$, $C_{R_2R_1}(A, B) \neq \emptyset$.

Condition M (Monotonicity). For all $A, B \in Z$, if $B \subseteq A$, then $A \succsim B$.

Our rule to compare sets in terms of freedom of choice is stated in the definition below.

Definition 4. For all $A, B \in Z$,

$$A \succsim^* B \Leftrightarrow \#[C_{R_1}(A) \cap C_{R_2R_1}(A, B)] \geq \#[C_{R_1}(B) \cap C_{R_2R_1}(A, B)] \quad (2.1)$$

2.3 PROPERTIES OF OPTIONS IN $C_{R_2R_1}(A, B)$

The following corollary will be helpful to evaluate what properties make options in the set $C_{R_2R_1}(A, B)$ suited for our analysis.

Corollary 1. For all $x \in C_{R_2R_1}(A, B)$, if x fail with R_1 for A , then x does not fail with R_1 for B .

Corollary 1 states that any option in $C_{R_2R_1}(A, B)$ cannot fail with the first rationale in both A and B simultaneously. Take a $x \in C_{R_2R_1}(A, B)$, where $x \notin (A \cap B)$. By Definition 1, it is obvious that x cannot fail in B if x does not belong to B , but it is also clear that x does not fail with R_1 in A otherwise it would be impossible to have $x \in C_{R_2R_1}(A, B)$. By the same token, if $x \in (A \cap B)$ and fails with R_1 in A and B , then $x \notin C_{R_2R_1}(A, B)$. Therefore, for at least one set, any $x \in C_{R_2R_1}(A, B)$ is not virtually unfeasible and can cope with the first goal that the individual has put to herself.

Nevertheless, alternatives in $C_{R_2R_1}(A, B)$ can fail with R_2 in both A and B . Lemma 1 denotes in what conditions this may occur.

Lemma 1. *Let $x \in C_{R_2R_1}(A, B)$ such that $x \in (A \cap B)$. If there is a $y \in A$ and $z \in B$ (with the possibility that $y = z$) such that $\{(y, x), (z, x)\} \subseteq P(R_2)$, then y fails with R_1 in A and z fails with R_1 in B .*

Proof. Assume, to the contrary, that y does not fail in A . Then, $y \in C_{R_1}(A) \cup C_{R_1}(B)$, so the fact that $(y, x) \in P(R_2)$ imply in $x \notin C_{R_2R_1}(A, B)$, what is a contradiction. Thus, y must fail in A and, by the same reasoning, z must fail in B with R_1 , completing the proof. \square

By Lemma 1, we have that alternatives in $C_{R_2R_1}(A, B)$ may fail with R_2 for A , or B , or both, only when we take into account virtually unfeasible alternatives, i.e., options that are R_1 -dominated. Intuitively, this agent believes that choosing a suboptimal alternative given R_2 is justifiable for the sake of not infringing R_1 .

Lemma 2. *For all $y \in (A \cup B - C_{R_2R_1}(A, B))$, there is an $x \in C_{R_2R_1}(A, B)$ such that x promotes better in A or B than y in A or B .*

Proof. If $y \in (A \cup B - C_{R_2R_1}(A, B))$, then it might be the case that y is virtually unfeasible in, say, A . Thus, by Definition 2, any option in $x \in C_{R_2R_1}(A, B)$ promotes better in A or B than y in A . Now, assume that y is not virtually unfeasible in A , and assume that none $x \in C_{R_2R_1}(A, B)$ promotes better than y . Therefore, $y \in C_{R_1}(A) \cup C_{R_1}(B)$, and no $x \in C_{R_2R_1}(A, B)$ is such that $(x, y) \in P(R_2)$. But if that is true, then $y \in C_{R_2R_1}(A, B)$, what is a contradiction. Therefore, there must exist a $x \in C_{R_2R_1}(A, B)$ that promotes better in A or B than y in A . \square

Example 1: Let $X = \{b, c, f, g, i, s\}$, $A = \{b, c, f\}$ and $B = \{c, g, i, s\}$, and assume that the first rationale elicits the set

$$P(R_1) = \{(b, c), (f, c), (g, c), (i, c), (s, c), (f, g)\}$$

what yields $C_{R_1}(A) = \{b, f\}$ and $C_{R_1}(B) = \{g, i, s\}$. Now, assume that the preference relations given by the second rationale are

$$P(R_2) = \{(c, b), (c, g), (g, s), (c, s), (s, f), (g, f)\}$$

Clearly, $C_{R_1}(A) \cup C_{R_1}(B) = \{b, f, g, i, s\}$, but

$$C_{R_2R_1}(\{b, f, g, i, s\}) = \{b, g, i\}$$

Why options c , f and s are not considered to improve opportunity freedom when we compare A and B ? Take first the option c : it is dominated in A and B given R_1 , so c is *virtually unfeasible* in both sets. Therefore, c is ruled out as an option that counts to the comparison of A and B in terms of freedom.

Given the shortlisted options, the individual follows to the second stage. Let us analyze $C_{R_1}(A) = \{b, f\}$. Note that neither b dominates f , nor f dominates b , meaning that, when having to make a choice in A , both options are perfectly acceptable since f does not fail with R_1 and R_2 , while b failure with R_2 is due to the presence of a virtually unfeasible option in A . However, our rule does not evaluate A in isolation: given the comparative exercise that makes options in A be assessed taking into account information brought by B , the agent realizes that f is dominated by g , and even though g is only feasible in B , the choice of g in B promotes better her goals and objectives than the choice of f in A . When analyzing $C_{R_1}(B) = \{g, i, s\}$ in the light of the second rationale, we have that s is dominated by g , meaning that s fails with R_2 in B .

Thus, for all $x \in C_{R_2R_1}(A, B)$:

- a. $x \in C_{R_2R_1}(A, B)$ does not fail with R_1 for A and B simultaneously.
- b. If x fails with R_2 in A because, say, there is a $y \in A$ such that $(y, x) \in P(R_2)$, then y fails with R_1 in A . So y is *virtually unfeasible*, what gives one the “wiggle room” to fail the second principle. This is the case of g in B : it fails with R_2 in B only because the *virtually unfeasible* option c .
- c. Take any $y \in (A \cup B - C_{R_2R_1}(A, B))$. Then, there is a $x \in C_{R_2R_1}(A, B)$ such that
 - (a) If $x \in A$ and $y \in A$, the choice of x in A promotes better than the choice of y in A . Since c is *virtually unfeasible*, by definition b , g and i must promote better than c in A .
 - (b) If $x \in A$ and $y \in B$, the choice of x in A promotes better than the choice of y in B . Take $f \in A$: clearly g promotes better in B than f promotes in A .

Example 2: Assume that an individual is deciding where she will spend her vacations. Options are b = ‘Buenos Aires’, p = ‘Paris’, r = ‘Rio de Janeiro’, s = ‘Santiago de Chile’, and

$t = \text{'Tokyo'}$. All opportunities are given in the set $X = \{b, p, r, s, t\}$. The set R_1 is motivated by ‘traveling to South America’, and R_2 is ‘go to a wine-tasting tour’. Let $A = \{b, p, s, t\}$, and $B = \{p, t\}$. In this scenario, we have $C_{R_1}(A) = \{b, s\}$, and $C_{R_1}(B) = \{p, t\}$. Note that, given that neither Paris nor Tokyo are South American cities, we cannot say that they are virtually unfeasible in the set B : however, Paris and Tokyo are virtually unfeasible in the set A since they are R_1 -dominated by b and s .

Going to the second stage, we have $C_{R_1}(A) \cup C_{R_1}(B) = \{b, p, s, t\}$. Suppose that $P(R_2) = \{(b, t), (p, t), (s, t), (b, r), (p, r), (s, r)\}$. In other words, this agent believes that in Rio and Tokyo she will not be able to take a wine-tasting tour. Thus, $C_{R_2R_1}(A, B) = \{b, p, s\}$. For this configuration of A and B , going to Paris promotes better than going to Tokyo in set B , and both Buenos Aires and Santiago promote better in A than Tokyo in B .

However, assume a different set of preferences given by $P(R_2) = \{(b, r), (p, r), (s, r)\}$. In this case, $C_{R_2R_1}(A, B) = \{b, p, s, t\}$ and, if freedom of choice is assessed through (4), we would have A indifferent to B . Nonetheless, this conclusion may be seen as counterintuitive within the idea of promoting distinct goals and if we take note that, in A , the decision maker can effectively choose an option that is *both* a south american city and has wine-tasting tours, while in B she just does not violate R_1 . This example highlights the fact that, regarding R_1 , the individual that ranks sets according to (4) is indifferent between promoting it directly or just not violating it deliberately. That is the importance of the *whenever possible* expression: our agent puts as her first principle only an objective that can be stated in relative, and not absolute terms. The first objective, therefore, is inviolable, as a ‘maxim’, and this suffices to our agent as if she dislikes behaving in a way that is in disagreement with what is expected given R_1 . As long as two different opportunity sets provide the same number of good alternatives that do not violate R_1 , it does not matter whether in one she has the possibility of actively accomplishing some situation in line with R_1 while in the other she simply does not violate it.

2.4 RESULTS

In this section, we present our results given the axioms proposed in Section 2.2. The following lemma will be helpful to state the proof of the main proposition.

Lemma 3. *If $s \in T \subset S$, $[s \in C_{R_k}(S)] \Rightarrow [s \in C_{R_k}(T)]$.*

Proof. Suppose $s \in T \subset S$, such that $s \in C_{R_k}(S)$, but $s \notin C_{R_k}(T)$. Thus, there is a $w \in T$ such that $(w, s) \in P(R_k)$. Since $T \subset S$, $w \in S$, and, consequently, $s \notin C_{R_k}(S)$, contradicting our first assumption. Therefore, $[s \in C_{R_k}(S)] \Rightarrow [s \in C_{R_k}(T)]$. \square

Proposition 1. \succsim satisfies Axioms SND, EX, D, I, COM1 and COM2 iff $\succsim = \succsim^*$

Proof. (This proof is based on a similar reasoning used in Pattanaik and Xu (1998)). We only prove sufficiency. Suppose $C_{R_1}(A) \cap C_{R_2R_1}(A, B) = \{\bar{a}_1, \dots, \bar{a}_m\}$, $C_{R_1}(B) \cap C_{R_2R_1}(A, B) =$

$\{\bar{b}_1, \dots, \bar{b}_n\}$. First, let $m = n > 0$. Then, $A, B \in Z$ are two sets such that $\#[C_{R_1}(A) \cap C_{R_2R_1}(A, B)] = \#[C_{R_1}(B) \cap C_{R_2R_1}(A, B)] = n$.

Since, for any $x \in X$, $C_{R_1}(\{x\}) = \{x\}$, it must hold that $C_{R_2R_1}(\{\bar{a}_1\}, \{\bar{b}_1\}) = C_{R_2}(\{\bar{a}_1, \bar{b}_1\})$. By Lemma 3, given $\{\bar{a}_1, \bar{b}_1\} \subset C_{R_2R_1}(A, B)$, we have $C_{R_2R_1}(\{\bar{a}_1\}, \{\bar{b}_1\}) = \{\bar{a}_1, \bar{b}_1\}$. Using Axiom SND,

$$\{\bar{a}_1\} \sim \{\bar{b}_1\} \quad (2.2)$$

In the same way,

$$\{\bar{a}_2\} \sim \{\bar{b}_2\} \quad (2.3)$$

Given that $(\bar{a}_1 \cap \bar{a}_2) = (\bar{b}_1 \cap \bar{b}_2) = \emptyset$, and $C_{R_2R_1}(\{\bar{a}_1, \bar{a}_2\}, \{\bar{b}_1, \bar{b}_2\}) = \{\bar{a}_1, \bar{a}_2, \bar{b}_1, \bar{b}_2\}$, by Axiom COM1,

$$\{\bar{a}_1, \bar{a}_2\} \sim \{\bar{b}_1, \bar{b}_2\} \quad (2.4)$$

Repeating the use of Axioms SND and COM1 for $\bar{a}_3, \bar{b}_3, \dots, \bar{a}_n, \bar{b}_n$, we achieve

$$\{\bar{a}_1, \dots, \bar{a}_n\} \sim \{\bar{b}_1, \dots, \bar{b}_n\} \quad (2.5)$$

Let $A = \{\{\bar{a}_1, \dots, \bar{a}_n\} \cup A'\}$ and $B = \{\{\bar{b}_1, \dots, \bar{b}_n\} \cup B'\}$. Clearly, $C_{R_2R_1}(\{\{\bar{a}_1, \dots, \bar{a}_n\} \cup A', \{\bar{b}_1, \dots, \bar{b}_n\} \cup B'\}) = C_{R_2R_1}(A, B)$. Thus, using Axiom COM2, we achieve

$$A \sim B \quad (2.6)$$

Now, assume that $C_{R_2R_1}(A, B) = \emptyset$. Clearly we have $C_{R_1}(A) \cap C_{R_2R_1}(A, B) = C_{R_1}(B) \cap C_{R_2R_1}(A, B) = \emptyset$. Therefore, $A, B \in Z$ are two sets such that $\#[C_{R_1}(A) \cap C_{R_2R_1}(A, B)] = \#[C_{R_1}(B) \cap C_{R_2R_1}(A, B)] = 0$. Using Axiom I, we have $A \sim B$.

Let us prove $\#[C_{R_1}(A) \cap C_{R_2R_1}(A, B)] > \#[C_{R_1}(B) \cap C_{R_2R_1}(A, B)] \Rightarrow A \succ B$. First, assume $n = 0$ and $C_{R_2R_1}(A, B) \neq \emptyset$, what imply in $m > 0$. Direct use of Axiom D implies $A \succ B$.

Now, assume $m > n > 0$. Take any $\bar{a}_i \in \{\bar{a}_{n+1}, \dots, \bar{a}_m\}$. Clearly, $\bar{a}_i \in C_{R_2R_1}(\{\bar{a}_1, \dots, \bar{a}_n\} \cup \{\bar{a}_i\} \cup \{\bar{b}_1, \dots, \bar{b}_n\})$. Using (2.5) and Axiom EX,

$$\{\bar{a}_1, \dots, \bar{a}_n\} \cup \{\bar{a}_i\} \succ \{\bar{b}_1, \dots, \bar{b}_n\} \quad (2.7)$$

Repeating this process for the $(m - n - 1)$ alternatives in $\{\bar{a}_{n+1}, \dots, \bar{a}_m\} - \{\bar{a}_i\}$, we have,

$$\{\bar{a}_1, \dots, \bar{a}_n\} \cup \{\bar{a}_{n+1}, \dots, \bar{a}_m\} \succ \{\bar{b}_1, \dots, \bar{b}_n\} \quad (2.8)$$

Now, let $A = \{\{\bar{a}_1, \dots, \bar{a}_n\} \cup \{\bar{a}_{n+1}, \dots, \bar{a}_m\} \cup A''\}$. Using A'', B' , (2.8) and Axiom COM2,

$$(\{\bar{a}_1, \dots, \bar{a}_n\} \cup \{\bar{a}_{n+1}, \dots, \bar{a}_m\}) \cup A'' \succ \{\bar{b}_1, \dots, \bar{b}_n\} \cup B' \quad (2.9)$$

and, finally,

$$A \succ B \tag{2.10}$$

and completes the proof. \square

It is important to remark that our rule does not repeat the same results that would be achieved using the rule based on reasonable preferences proposed in Pattanaik and Xu (1998). To make this distinction clear, let $X = \{x, y, a, w, z\}$, $A = \{x, w, z\}$, and $B = \{y, a\}$, and preferences

$$\begin{aligned} R_1 = \{ & (x, a), (x, y), (x, w) \\ & (y, a), (y, x), (y, w) \\ & (z, a), (z, x), (z, y), (z, w) \\ & (w, a), (w, x), (w, y), (w, z) \} \end{aligned}$$

and

$$\begin{aligned} R_2 = \{ & (x, a), (x, y), (x, z), (x, w) \\ & (y, a), (y, x), (y, z), (y, w) \\ & (a, x), (a, z), (a, w) \\ & (z, w) \\ & (w, z) \} \end{aligned}$$

Therefore, we have $P(R_1) = \{(x, a), (y, a), (w, a), (z, a), (z, x), (z, y)\}$ and $P(R_2) = \{(x, z), (x, w), (y, a), (y, z), (y, w), (a, z), (a, w)\}$. However, if we do not distinguish between R_1 and R_2 , and attribute the same weight to both sets, the set of interest to identify non-dominated alternatives would be $P(R_1 \cup R_2) = \{(y, a)\}$. Using one of the rules proposed in Pattanaik and Xu (1998) to compare sets A and B in terms of freedom of choice, we should identify all maximal elements in A that are not dominated by options of B , and all maximal elements of B not dominated by alternatives in A (denoted by $\max(A) - A^B$ and $\max(B) - B^A$, respectively), considering all reasonable preference relations. In this case, the only dominance relation that can be reached is between y and a : whenever option y is available, a is dominated by y , and clearly $a \notin \max(B)$. Thus,

$$\max(A) - A^B = \{x, w, z\} \tag{2.11}$$

and

$$\max(B) - B^A = \{y\} \tag{2.12}$$

Comparing the cardinalities of (2.11) and (2.12), one may conclude that, using Pattanaik and Xu (1998) rule, $A \succ B$. Now, let us apply our rule proposed in equation (2.1). In this case,

$C_{R_1}(A) = \{w, z\}$, $C_{R_1}(B) = \{y\}$, and $C_{R_2R_1}(A, B) = C_{R_2}(\{w, z, y\}) = \{y\}$. Hence,

$$C_{R_1}(A) \cap C_{R_2R_1}(A, B) = \emptyset$$

and

$$C_{R_1}(B) \cap C_{R_2R_1}(A, B) = \{y\}$$

Using our rule, we have $B \succ A$.

This difference has some important implications. As already stressed, the individual that ranks opportunity sets in line with our rule regards freedom to be dependent not only on preferences that could be reasonably adopted, but also on his judgments about how each of these preferences reflects his plural identity. Take, for instance, the *beheaded at dawn* example proposed in Sen (1993b): at first glance, one should expect the addition of such terrible alternative to the opportunity set to have no impact in the freedom enjoyed by the agent. Pattanaik and Xu (1998), however, make room for the possibility that even this undesirable option could eventually increase freedom: if ‘spending 50 years in a solitary cell’ was the only alternative at disposal, enlarging the set by ‘beheaded at dawn’ could increase freedom of choice since choosing to be beheaded, instead of spending a lifetime in prison, does not sound completely absurd anymore. Nonetheless, even casting no doubt on the reasonability of this choice in such a desperate situation, this agent can be strongly ‘pro-life irrespective of the circumstances’ with this dimension reflecting an important part of her plural identity. In such a scenario, offering an alternative as ‘beheaded at dawn’ would hardly improve her freedom since it fails to meet the demands imposed by this part of the agent’s identity.

We now investigate under which conditions $C_{R_2R_1}(A, B)$ satisfies Condition NE. This is particularly important for set comparisons since $C_{R_2R_1}(A, B)$ indicates which alternatives, given the exercise of comparing A and B , increase freedom. So, to say that $C_{R_2R_1}(A, B)$ can be empty amounts to say that there may be a situation where neither A nor B , when compared to each other, are able to provide this agent any minimal standard of freedom of choice, what is an apparently counterintuitive conclusion. The following corollary will be useful to state our results.

Corollary 2. *Let $j = 1, 2$. For all $A \in Z$, $C_{R_j}(A) \neq \emptyset$ if and only if $P(R_j)$ is acyclic,*

Clearly, one possible way to $C_{R_2R_1}(A, B)$ violate Condition NE is when $C_{R_1}(A) \cup C_{R_1}(B)$ is an empty set. To ensure that at least one alternative passes to the second round of elimination, we introduce the following properties that impose some domain restrictions to $P(R_1)$.

Condition 1. $\#\mathcal{C}_1(X) \leq 1$.

Condition 2. *For all $z \in (X - \mathcal{AC}_1(X))$, and for all $x \in \mathcal{AC}_1(X)$, $(x, z) \notin P(R_1)$.*

Condition 1 states that there is at most one sequence of options that is a cycle for $P(R_1)$. For instance, let $X = \{x, y, z, w\}$, and $P(R_1) = \{(x, y), (y, z), (z, w), (z, x), (w, x)\}$. In this

case, $P(R_1)$ violate Condition 1 since there are two cycles, denoted by sequences (x, y, z, w) , and (x, y, z) . Condition 2 proposes that any alternative within a cycle must be dominated by the options without cycles for preferences given by $P(R_1)$.

Lemma 4 shows that, under Conditions 1 and 2, the first round of elimination of inferior alternatives must result in a non-empty set.

Lemma 4. *For all $A, B \in Z$, with $A \neq B$, $(C_{R_1}(A) \cup C_{R_1}(B)) \neq \emptyset$ if and only if $P(R_1)$ satisfies Conditions 1 and 2.*

Proof. (Sufficiency). Suppose $\#\mathcal{C}_1(X) \leq 1$ (Condition 1), and, for all $z \in (X - \mathcal{AC}_1(X))$, and for all $x \in \mathcal{AC}_1(X)$, $(x, z) \notin P(R_1)$ (Condition 2). We must show that this imply in $(C_{R_1}(A) \cup C_{R_1}(B)) \neq \emptyset$, for all $A, B \in Z$, with $A \neq B$. When $\#\mathcal{C}_1(X) = 0$, $P(R_1)$ is acyclic and this suffices to both $C_{R_1}(A)$ and $C_{R_1}(B)$ be non-empty, culminating in the result. Now, let $\#\mathcal{C}_1(X) = 1$. Hence, there is only one cycle $(x_n)_{n=1}^m$ for $P(R_1)$, and let S_1 be the set of all alternatives in this cycle. Clearly, $C_{R_1}(S_1) = \emptyset$.

Assume, to the contrary, that both Conditions 1 and 2 are satisfied, but we may have $(C_{R_1}(A) \cup C_{R_1}(B)) = \emptyset$, with $A \neq B$. It is obvious that $C_{R_1}(A) = C_{R_1}(B) = \emptyset$. By Corollary 1, and using the fact that $\#\mathcal{C}_1(X) = 1$, S_1 must lie within A and B , and we can rewrite both sets as $A = S_1 \cup V$ and $B = S_1 \cup U$, with V, U any (not necessarily non-empty) subsets of X . Let $V = U = \emptyset$. So, $C_{R_1}(A) = C_{R_1}(B) = \emptyset$, but $A = B$, contradicting the assumption that $A \neq B$. Hence, we must have $V \neq \emptyset$, and/or $U \neq \emptyset$. Let $V \neq \emptyset$. Thus, there is at least one alternative $z \in A$ such that $z \notin S_1$. Using Condition 1, we know that there is no cycle in V , and, by Condition 2, z is non-dominated by any $x \in S_1$. Thus, we must have $C_{R_1}(A) \neq \emptyset$, implying in $(C_{R_1}(A) \cup C_{R_1}(B)) \neq \emptyset$, which contradicts our initial assumption, and completes the sufficiency part of the proof.

(Necessity). Assume that, for all $A, B \in Z$, with $A \neq B$, we have $(C_{R_1}(A) \cup C_{R_1}(B)) \neq \emptyset$. We must show that Conditions 1 and 2 hold. First, assume, to the contrary, that Condition 1 does not hold. Hence, there can be more than one cycle in X for $P(R_1)$, and let $\#\mathcal{C}_1(X) = q > 1 \in \mathbb{N}$, with $S_1, \dots, S_q \in Z$ denoting the alternatives within these q distinct cycles.⁸ Making $A = S_i$ and $B = S_j$, for any $i, j \in \{1, \dots, q\}$, and $i \neq j$, by Corollary 2 we have $C_{R_1}(A) = C_{R_1}(B) = \emptyset$, leading to a contradiction. Thus, $[(C_{R_1}(A) \cup C_{R_1}(B)) \neq \emptyset] \Rightarrow \#\mathcal{C}_1(X) \leq 1$.

Now, assume that Condition 2 does not hold, but for all $A, B \in Z$, with $A \neq B$, we have $(C_{R_1}(A) \cup C_{R_1}(B)) \neq \emptyset$. Therefore, there is a $z \in (X - \mathcal{AC}(X))$ and a $x \in \mathcal{AC}(X)$, with $(x, z) \in P(R_1)$. Without loss of generality, let $S_1, S_2 \in Z$ denote two sets of alternatives within a cyclical sequence (S_1 and S_2 may be equal), with $x \in S_1$. Let $A = S_1 \cup \{z\}$, and $B = S_2$. Clearly, $z \notin C_{R_1}(A)$, and $(C_{R_1}(A) \cup C_{R_1}(B)) = \emptyset$, which is a contradiction. So, $[(C_{R_1}(A) \cup C_{R_1}(B)) \neq \emptyset] \Rightarrow [\text{For all } z \in (X - \mathcal{AC}_1(X)), \text{ and for all } x \in \mathcal{AC}_1(X), (x, z) \notin P(R_1)]$, and completes the necessity part of the proof.

⁸Note that S_1 may be a subset of S_2 , i.e., S_1 alternatives constitute a *subcycle* of S_2 , and so on. Also, $\mathcal{AC}_1(X) = S_1 \cup \dots \cup S_q$.

□

Hence, any pair $(A, B) \in Z \times Z$ is able to offer some alternatives to the second stage of freedom of choice assessment only when the existence of cycles in preferences elicited by the first rationale is limited to only one sequence of alternatives. Also, any option outside this cycle must dominate ‘within-cycle’ options. Though it weakens the necessity of acyclicity for $P(R_1)$, the existence of cycles can be managed only under specific situations. For instance, suppose that there is a cycle in preferences over $\{\text{car}, \text{minivan}, \text{bus}\}$, and the only remaining alternative is ‘executive jet’. Assuming that R_1 denotes the individual preferences when the social status of alternatives during a thousand miles trip is taken into account, it seems undeniable that a luxurious executive jet would win any other alternative by a landslide. In this case, any set composed by $\{\text{car}, \text{minivan}, \text{bus}, \text{executive jet}\}$ would succeed to provide candidates to the second round appraisal. Nevertheless, the same conclusion would hardly be maintained if ‘executive jet’ were substituted by ‘bicycle’: in this scenario, any alternative that composes the cycle apparently provides higher social status, making ‘bicycle’ a dominated option.

Given Lemmas 3 and 4, together with our assumption that R_2 is transitive we ensure that $C_{R_2R_1}(A, B)$ is non-empty. However, allowing R_2 to be intransitive, Proposition 2 states under which conditions $C_{R_2R_1}(A, B)$ will satisfy Condition NE.

Proposition 2. *Assume that R_2 does not satisfies transitivity. For all $A, B \in Z$, with $A \neq B$, $C_{R_2R_1}(A, B)$ satisfies Condition NE if and only if $(C_{R_1}(A) \cup C_{R_1}(B)) \neq \emptyset$, and, for every cycle $(x_n)_{n=1}^n$ for $P(R_2)$, there is an alternative $x \in \mathcal{AC}_2(X)$ such that $x \notin (C_{R_1}(A) \cup C_{R_1}(B))$.*

Proof. (Sufficiency). Assume that $C_{R_2R_1}(A, B)$ satisfies Axiom NE. Clearly, either $C_{R_1}(A)$ and/or $C_{R_1}(B)$ are non-empty. Now, assume there is a cycle for $P(R_2)$, and denote alternatives in this cycle by S . Letting $C_{R_1}(A) \cup C_{R_1}(B) = S$, it is clear that $C_{R_2}(S) = \emptyset$, contradicting our first assumption. Hence, there is at least one alternative $x \in S$ such that $x \notin (C_{R_1}(A) \cup C_{R_1}(B))$ for this cycle, what completes the sufficiency part of the proof.

(Necessity). It is immediate to see that $[(C_{R_1}(A) \cup C_{R_1}(B)) = \emptyset] \Rightarrow [C_{R_2R_1}(A, B) = \emptyset]$, and, thus, we must have a non-empty set in $(C_{R_1}(A) \cup C_{R_1}(B))$. Now, assume that, for every cycle $(x_n)_{n=1}^n$ for $P(R_2)$, there is an alternative $x \in \mathcal{AC}_2(X)$ such that $x \notin (C_{R_1}(A) \cup C_{R_1}(B))$, and denote the set of alternatives in the j -th cycle on X by S_j . If this condition holds, $(C_{R_1}(A) \cup C_{R_1}(B)) \neq S_j$, for all $j \in \{1, \dots, q\}$. Thus, by Corollary 1, $C_{R_2}(C_{R_1}(A) \cup C_{R_1}(B)) \neq \emptyset$, and completes the necessity part of the proof.

□

Also, it is worth noting that the lexicographic procedure β (HOUY, TADENUMA, 2009) with two ‘elimination stages’, when applied separately to each set in order to construct a set of relevant alternatives to freedom, will not necessarily yield the set $C_{R_2R_1}(A, B)$. This strategy generates, in turn, the set $C_{R_2R_1}(A) \cup C_{R_2R_1}(B)$. Recall that, regarding the set $C_{R_2R_1}(A, B)$,

the binary relation R_2 is used in the *union* of the R_1 's maximal elements of A and B , implying that, whenever an alternative in one set R_2 -dominates an option in the other set, this inferior alternative will be discarded. This will not occur when R_2 is applied separately unless this dominance relation had its counterpart within the same set given R_2 .

Finally, Lemma 5 shows that our rule fails to respect monotonicity.

Lemma 5. *If $\succsim = \succsim^*$, then \succsim fails to respect Condition M.*

Proof. Let $A = \{x, y, z\}$, $B = \{x, z\}$ and preferences be given by $R_1 = \{(y, x), (y, z), (x, z), (z, x)\}$ and $R_2 = \{(x, y), (y, z), (x, z)\}$. Thus, $B \subset A$, and we have $C_{R_1}(A) = \{y\}$, $C_{R_1}(B) = \{x, z\}$ and $C_{R_2 R_1}(A, B) = \{x\}$. If \succsim is given by (4), then $C_{R_1}(A) \cap C_{R_2 R_1}(A, B) = \emptyset$, and $C_{R_1}(B) \cap C_{R_2 R_1}(A, B) = \{x\}$, implying in $B \succ A$, what violates monotonicity. \square

Therefore, in our framework, it is plausible to experience larger freedom of choice in a proper subset of some given opportunity set. Note that the individual that ranks opportunity sets in terms of freedom according to (4) has multiple goals that she aims to accommodate, and freedom of choice comparisons are assessed in terms of what relationship between these goals each set being compared provides to her. As Mary's example illustrates, when Mary faces a reduced opportunity set without the egalitarian allocation, she is given a wiggle-room to choose to be selfish without contradicting the egalitarian notions that she values: a functioning that she does not possess when having to choose the same selfish option in the larger set.

Our rule also fails to respect transitivity, what we illustrate by the following example. Let $A = \{x, y\}$, $B = \{w, z\}$ and $C = \{a, h\}$, and preferences be described by the following set of binary relations

$$R_1 = \{(x, y), (y, x), (w, z), (z, w), (a, h), (h, a)\}$$

and

$$R_2 = \{(x, w), (z, a), (h, y)\}$$

So, $P(R_1) = \emptyset$, and $P(R_2) = R_2$. Therefore, $C_{R_2 R_1}(A, B) = C_{R_2}(\{x, y, w, z\}) = \{x, y, z\}$, which implies in

$$C_{R_1}(A) \cap C_{R_2 R_1}(A, B) = \{x, y\}$$

and

$$C_{R_1}(B) \cap C_{R_2 R_1}(A, B) = \{z\}$$

Thus, $A \succ B$. Comparing sets B and C , we have $C_{R_2 R_1}(B, C) = C_{R_2}(\{w, z, a, h\}) = \{w, z, a\}$, resulting in

$$C_{R_1}(B) \cap C_{R_2 R_1}(B, C) = \{w, z\}$$

and

$$C_{R_1}(C) \cap C_{R_2 R_1}(B, C) = \{a\}$$

resulting in $B \succ C$. Now, when we compare sets A and C , one should expect that, if transitivity holds, $A \succ C$ would obtain. However, $C_{R_2 R_1}(A, C) = C_{R_2}(\{x, y, a, h\}) = \{x, a, h\}$, so

$$C_{R_1}(A) \cap C_{R_2 R_1}(A, C) = \{x\}$$

and

$$C_{R_1}(C) \cap C_{R_2 R_1}(A, C) = \{a, h\}$$

and, finally, $C \succ A$, violating transitivity.

2.5 CONCLUDING REMARKS

In this paper, we proposed an axiomatic characterization of a preference-based rule that orders opportunity sets in terms of freedom of choice. Our approach also relies on the idea of ‘reasonable preferences’ as the primary input to these set comparisons, but deviates from the standard approach when allows distinct degrees of importance to each preference ordering, what would denote the existence of meta-preferences. Particularly, we assume that two *rationales* motivate the ranking over preference rankings.

Comparisons are made observing a two-stage rule: first, options are evaluated according to the first rationale, that gives priority to a set of preference relations, where dominated alternatives within each set are discarded as feasible choices; and then, the set of preferences determined by the second rationale is used to exclude dominated alternatives within the short-list constructed in the first stage. Dominance relations in this second step of the procedure are assessed between all alternatives that passed the first round of elimination and not only among options within the same set. In this scenario, one opportunity set provides more freedom of choice if it has more options among all non-dominated alternatives given the first and second steps.

Some elements of this rule may be explored by future research. We restrained comparison to a situation where only two rationales are used, and meta-preferences are expressed according to the stage each preference ordering enters. However, one can allow a greater number of rationales, what would also imply in a greater number of rounds of elimination if followed the same line of reasoning where the better-ranked preference goes on the first stage, the second better on the second stage, and so on. Moreover, whether conformity between the order of preferences and stages is an adequate manner to express the influence of meta-preferences in the comparisons also deserves further elaboration, investigating how sensible to changes in this reasoning our results are.

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3 SOCIAL APPROPRIATENESS AND FREEDOM OF CHOICE: A CONJOINT EXPERIMENT

3.1 INTRODUCTION

Comparisons of opportunity sets - i.e., *menus* of options - in terms of freedom to choose have received increasing attention since the cardinality rule proposed in Pattanaik and Xu (1990). In their theoretical framework, the freedom provided by one menu of options is taken to be proportional to the number of options in that same menu: more options - regardless of their characteristics - always enhance the freedom of choice of the decision-maker. Other approaches that take into account information about the diversity of options (PATTANAİK, XU, 2000; PERAGINE, ROMERO-MEDINA, 2006; BERVOETS, GRAVEL, 2007), or individuals' preferences among option (SEN, 1991; GRAVEL, 1994; PATTANAİK, XU, 1998), have also been proposed in the past decades, bringing a new range of informational basis for freedom assessments.¹

Nevertheless, people often face trade-offs between choosing what is best given their objectives and what is the socially approved action: a trade-off that has been extensively studied by experimental economists using games such as the 'dictator game' (see, among others, DANA; WEBER; KUANG, 2007; ANDREONI; BERNHEIM, 2009; KRUPKA; WEBER, 2013). The presence of such trade-off, however, might affect how people evaluate their opportunities for choice when taking into consideration the broader concept of 'comprehensive outcomes' (when the context and the process of choice matters), instead of 'culmination outcomes' (when only the final outcome matters) (see SEN, 2009). In this sense, when opportunities change, the freedom of choice provided by those opportunities might change as well. Comparing two choice situations in which the person ended up with the same outcomes, but that differed in terms of whether the dilemma between doing what one would like to do or doing what other people would like one to do took place at the moment of choice, it is not unreasonable to imagine this individual experiencing more freedom of choice in the case where such dilemma did not occur. Therefore, not only information about the number of alternatives, whether they happen to be enjoyable, or how diverse options are might be useful to understand freedom of choice, but also aspects related to social norms of behavior and the trade-offs they impose to decision makers may have some bearing in the freedom that people enjoy when making decisions.

In this essay, we address this question and propose an online experiment to evaluate how individuals' decisions based on freedom of choice vary with sets' characteristics, among which we include the social appropriateness rating of agents' best choices as a measure for social norms of behavior. We hypothesize that, when one's best choice receives a low rating in the social appropriateness scale, this individual faces a trade-off between choosing what he or she

¹For a survey of the different approaches, see Dowding and Van Hess (2009) and the discussion in the previous chapter.

effectively would like to choose and acting in conformity with the norm of behavior. The variety of different informational basis used by the theoretical formulations highlights the uncontroversial fact that comparisons in terms of freedom of choice are multidimensional evaluative exercises, what makes a conjoint experimental design appropriate since it allows dealing with situations in which various characteristics of objects are compared simultaneously (GREEN; KRIEGER; WIND, 2001). Conjoint experiments have recently become a popular method in social sciences to study individuals' preferences about a variety of issues such as immigration (HAINMUELLER; HOPKINS; YAMAMOTO, 2014; DUCH et al., 2018), political preferences (FRANCHINO; ZUCCHINI, 2015; HORIUCHI; SMITH; YAMAMOTO, 2018), and environmental policies (BECHTEL; SCHEVE, 2013).

In our experiment, participants compared hypothetical menus of options described in terms of five main characteristics: size, diversity, quality (considering agents' preferences), how socially appropriate one's best choice in the menu is considered by others, and how socially appropriate this best choice is considered in the decision maker's opinion. Then, in each comparison, respondents had to state which of the two menus described would provide larger freedom of choice, and also rate the hypothetical menus on a 1-7 freedom scale. We follow the relatively novel methodological approach proposed in Hainmueller, Hopkins and Yamamoto (2014) to evaluate conjoint experimental data, and estimate the Average Marginal Component Effects of the five attributes studied – a causal quantity that denotes whether a menu is regarded to provide more (or less) freedom to choose when some characteristic (e.g., size) is equal to a particular value (e.g., 4 options), compared to a situation in which this attribute is equal to an arbitrary baseline value (e.g., 3 options).

Our results show that variations in all of the five attributes studied had some influence in the decisions made by participants. Respondents tended to attribute less freedom of choice to menus with two alternatives, in comparisons with a similar menu with an additional option: however, adding a fourth option did not necessarily enhanced the freedom of choice provided by a formerly three-option set. Thus, our findings support the notion that a set cardinality is indeed relevant, but freedom might not strictly increase with more options. The diversity of options played an unclear role in our experiment. Menus whose options were labeled as very similar to each other, and menus where alternatives were classified as "somewhat diverse", tended to receive similar ratings, even though the former type of set was chosen less frequently when participants were forced to choose which set would give them more freedom. On the other hand, sets whose options were classified as very diverse were not chosen more frequently than sets with somewhat diverse alternatives, although they received better ratings in terms of freedom.

The larger effects were found in the dimension that refers to the quality – relative to participants' preferences – of the menus. Any set described as having options that do not match with the decision maker's preferences and tastes was chosen much less frequently and received much lower ratings if compared to another set in which options were neutral in relation to agents' pref-

erences. Freedom of choice, therefore, demands options that reflect at least to minimum level what individuals' effectively enjoy.

Finally, our results suggest that social norms of behavior might indeed play a part in peoples' freedom assessments. Participants were less willing to choose sets in which others – or themselves – hypothetically rated their best options as socially inappropriate. In the same manner, the ratings received by these sets were on average smaller than the ratings received by sets in which social norms of behavior would not apply. Therefore, people find less freedom to choose in situations where choosing what is best demands violating some social norm of behavior. We argue that this result has implications to the design of policies intended to expand peoples' opportunities for choice since the influence of social norms of behavior might offset an increase in freedom brought by the expansion of opportunity sets. Furthermore, we find evidence that the effect of sets' features on freedom differs from female to male respondents, with men being more affected by the cardinality and the quality of the menus, and women being more susceptible to the influence of the social appropriateness of their decisions.

Our essay, therefore, adds value not only by empirically evaluating what factors are more relevant to freedom of choice – an exercise that has merit given the scarcity of empirical studies in the literature – but also in employing a relatively new statistical approach to the analysis of conjoint experiments that has not been fully explored by researchers in social sciences. We also contribute to the freedom of choice literature by evaluating a new aspect that relates to the potential influence of social norms of behavior on the freedom to choose, what might open new avenues for future research in this field. Thus, we argue that this essay might contribute both in theoretical and methodological aspects for the research agenda on freedom.

The paper proceeds as follows. Section 3.2 presents and analyzes results of experiments aimed at studying the influence of social preferences and social norms in individuals' behavior and discusses their potential connections with approaches to freedom of choice. Section 3.3 discusses the origins and recent evolution of conjoint experiments; presents our experimental design, and describes our estimation strategy. Section 3.4 presents the results and discusses some potential implications of our findings when considering policy prescriptions. Finally, Section 3.5 concludes.

3.2 SOCIAL NORMS, BEHAVIOR AND FREEDOM

A common assumption in economic theory is that individuals are self-interested, and act to maximize their welfare. There is, however, a myriad of examples of behavior patterns that are ill-explained by pure self-interested motivations (SEN, 1993b; FEHR; GÄCHTNER, 2000; FEHR; FISCHBACHER, 2002; CAMERER, 2003).

One possible explanation for deviations from self-interest lies in assuming that agents have multiple preference orderings, each one motivated by distinct rationales that embrace many goals other than the maximization of welfare. The possibility of preference orderings that do

not fully reflect selfish behavior was noted by Arrow (1950) in his seminal contribution to social choice theory when he distinguishes between a person's tastes (that determines an individual's self-centered preferences) and *values* (that determines an individual's other-regarding preferences). Sen (1977) also discussed more profoundly the possibility of multiple preference orderings, incorporating the notion of meta-rankings, i.e., when people have preferences over preference orderings, which makes room, for example, for rankings of options based on moral principles or the individual's ethical standards.

More recently, the study of individuals' social preferences i.e., the preferences that arise when subjects take into account the well-being of other people that are affected by their actions (FEHR; FISCHBACHER, 2002), has gained popularity among researchers in experimental economics, and many designs have been proposed to investigate the motivations that underlie non-selfish behavior. In trust games, for example, experimenters explore notions of social preferences motivated by trustworthiness and reciprocity, while ultimatum games are usually employed to test ideas about fairness and inequality aversion (for a summary of games and their interpretations based on social preferences, see LEVITT; LIST, 2007).² Another widely used experimental design to study social preferences is the dictator game. In the original design as proposed in Forsythe et al. (1994), an individual, the dictator, unilaterally decides how to split a certain sum of money between her and a second person, the receiver. If the behavior is purely self-interested, one should expect the dictator taking all the money for herself and leaving nothing to the other participant. However, revising 129 papers that have used dictator games during 1992 and 2009, Engel (2011) shows that dictators on average give 28.35% of the initial endowment to receivers, contradicting what would be predicted by standard game theory.

The influence of social norms of behavior, usually interpreted as jointly recognized actions that represent how people ought to behave in certain situations (FEHR; GÄCHTNER, 2000), provides an alternative explanation for pro-social behavior, and have also been investigated using economic experiments. Fair behavior may not result from a genuine concern with another person's well-being, but instead it might be caused by the influence of social norms that prescribe what is the socially appropriate action to be taken (for a study that aims to sort out the effects of social preferences and social norms, see GÄCHTNER; NOSENZO; SEFTON, 2013). The theoretical literature on choice functions also acknowledges that norms of behavior can help to explain the rationale behind decision patterns that might initially appear irrational, with some attempts to expand the usual framework of decision theory in order to incorporate the

²In a trust game, there are two individuals, where the first one decides how much, from a specific initial endowment, will be passed to the second one, that - after all amount passed is increased by some factor greater than one - decides whether returns some share to the first mover, and the size of this share. Typical findings appoint to the size of repayment in the second stage being positively related to the amount passed by the first mover, indicating that individuals are more likely to act 'nicely' when the other has acted 'nicely' as well.

In an ultimatum game, one individual (proposer) receives an endowment and has to decide how much of this value will be passed to a second individual (receiver), which then has to decide whether she accepts or rejects the offer. If the offer is accepted, both participants receive the payoffs as determined by the proposer. However, if the receiver rejects, both earn nothing. Levitt and List (2007) note that offers below 20% of the initial endowment are normally rejected.

effects of norms (SEN, 1993a; BOSSERT; SUZUMURA, 2009, 2011).

An extensive branch of the experimental literature uses dictator games to understand how social norms affect individuals' behavior and under what conditions agents are more willing to abide by these norms (ENGEL, 2011).³ One reason for the popularity of dictator games is that, given the non-strategic characteristic of the game (as compared to an ultimatum game), the '50-50' split emerges as a natural candidate for what is socially acceptable and, therefore, as a social norm of behavior. Krupka and Weber (2013) investigated whether sharing equally the initial endowment indeed has a positive appealing status, and to what extent dictators' behavior is influenced by what is considered socially adequate. In order to elicit social norms of behavior, the authors ask individuals to rate the degree of social appropriateness of every possible action that a dictator can take using a scale that varies between '1 - Very socially inappropriate' to '4 - Very socially appropriate'.⁴⁵ They proposed two distinct experimental designs: in the first experiment, dictators received money and were allowed to *give* part of it to the receiver, while in the second experiment the endowment was initially split equally between both players, but dictators were allowed to *take* money from receivers (a 'bully' dictator game). The authors found that, in both designs, implementing equal payoffs was rated as a very socially appropriate action, while acting selfishly and leaving the receiver with nothing was considered as the most socially inappropriate action that a dictator could take.

As suggested by the authors, a possible explanation for norm compliance is that individuals' derive utility from acting in accordance with norms. Thus, dictators could be acting as utility maximizers even when opting to share their wealth equally since taking a socially appropriate action increases their well-being. A similar result is found in Andreoni and Bernheim (2009). The authors proposed an experiment to identify whether people act fairly (in the egalitarian sense) motivated not by altruistic, or fairness-based motivations, but by their interest of being *perceived* as fair. Their findings corroborate the hypothesis that, whenever the ability to be perceived as fair by others is greater, it becomes more likely to observe a behavior pattern following egalitarianism.

A concern with social image, therefore, is a relevant factor and suggests that obedience to what the social norm prescribes - such as a '50-50' split in a dictator game - is contingent to other factors embedded in the decision context. For instance, Bicchieri and Xiao (2009) showed that norm compliance is deeply affected by what is called as *empirical expectation*, i.e., what people expect others, in the same situation, would do. Devising an experiment based on a dictator game, the authors found a significant effect of empirical expectations on the action taken by dictators, meaning that acting fairly or unfairly depends, to a large extent, on how the

³See Elster (1989) for a discussion about the influence of norms on behavior.

⁴Krupka and Weber's (2013) method for eliciting social norms has also been employed in other contexts such as the evaluation of peer effects using gift games (see GÄCHTNER; NOSENZO; SEFTON, 2013).

⁵One potential concern with the norm-elicitation method proposed in Krupka and Weber (2013) is the roles of participants may bias judgments based on social appropriateness. For instance, dictators could rate unequal allocations less socially inappropriate to justify their own actions. However, Erkut et al. (2015) the norm-elicitation is fairly consistent to potential biases associated with the role (dictator or recipient) of respondents.

agent thinks others will act.⁶ Thus, when other people are not abiding by the expected rules of behavior, individuals are more prone to deviate from pro-social behavior.

The lack of transparency between actions and outcomes also affects norms efficacy in shaping behavior. For example, Bartling, Engl and Weber (2014) show that when dictators receive the chance to remain ignorant about the consequences of their choices to others they become less willing to abide by social norms and implement equal allocations. Also, uninterested third parties that can punish dictators become more lenient with unfair (but ignorant) dictators. As observed by the authors, these findings help to explain why ignorance about the harmful consequences of one's actions is a widely used explanation in real-life cases, such as corporate or political scandals.

Similarly, Dana, Weber and Kuang (2007) found that when is the receiver that remains uncertain about actions and outcomes, dictators less frequently choose the equal division and the average share passed to the receiver reduces substantially. Therefore, making the relationship between actions and outcomes unclear allows self-interested behavior without the potential consequences of acting selfishly, signaling that that fair behavior may be a mere result of influences such as social norms of behavior that prescribe some actions while discouraging others, and not necessarily a genuine interest in acting fairly. According to the authors, in situations similar to dictator games “people may feel compelled to give in some situations— even though they prefer the own-payoff-maximizing outcome—because they do not want to appear selfish, either to themselves or to others.” (DANA; WEBER; KUANG,2007, p.2)

The regularity of experimental findings, therefore, bring compelling evidence for the hypothesis that social norms of behavior play an important role in decisions, and also on the freedom that the people experience while making these decisions. Individuals apparently choose particular options in some situations that do not reflect what they would like to do, and choices often change towards what would be expected taking into consideration a purely self-centered individual when the influence of norms of behavior is softened.

Still, the existing approaches to freedom do not take into account these effects (see the discussion in the previous chapter). In a framework based solely on cardinality, such as the one proposed in the seminal paper of Pattanaik and Xu (1990), more options inevitably increase freedom irrespective what relationship can be established between the new options and the old one. Nevertheless, it can be argued that the context of choice changes with the addition of new options, which also changes the applicability of social norms of behavior. For instance, imagine a student that has found a bill of \$100 lying on the floor of an empty classroom that she has just entered, and suppose that possible decisions given this situation are x = ‘take the money for herself’, y = ‘try to find the original owner of the money’, and z = ‘leave the money where it is’. Choosing x when she could have chosen y could be understood as a violation of socially

⁶Bicchieri and Xiao (2009) also investigate the effect *normative expectations*, which is associated with the belief that others expect one to conform to a given norm. The effect of normative expectations, however, was not significant in their study.

appropriate behavior, but if y is unfeasible for any reason, it becomes unclear why opting for x could be seen as a deviation from any social norm.

Similarly, conclusions drawn by diversity-based approaches to freedom of choice (PATTANAİK, XU, 2000; PERAGINE, ROMERO-MEDINA, 2006; BERVOETS, GRAVEL, 2007) may also be altered when the influence of social norms of behavior are taken into consideration. For instance, imagine someone picking a fruit from a fruit basket with one apple and two mangoes. If this person enjoys apples, but thinks (or is afraid that others will think) that is inappropriate to ‘eat the last apple in the basket and leave others with no choice but to eat a mango’, then it could be reasonably argued that adding a new apple to the basket will indeed enhance one’s freedom. The new apple, in this case, makes the norm not applicable. In such a situation, the idea that adding a new option that is similar to the best options in a menu does not enhance freedom becomes less compelling.

Pattanaik and Xu’s (1998) idea that an option increases freedom only if it is supported by a reasonable set of preferences also becomes less appealing with the presence of social norms. Consider, for instance, the situation of someone that is invited to donate for charity by colleagues. For this potential donor, a menu given by {‘donate’, ‘do not donate’} intuitively provides larger freedom (both options are reasonable) than when one is constrained to choose from {‘do not donate’} because, say, the institution only accepts donations above a certain threshold far superior to one’s willingness to donate. However, it is plausible to assume that this person may feel compelled to donate when such threshold does not exist since refusing to do a charitable act – even if only donating a small value – could be considered as socially inappropriate by her colleagues. In this case, the person may experience larger freedom when the threshold exists because the unavailability of the ‘donate’ option gives her the wiggle-room to choose what she prefers.⁷

In summary, the existing approaches to freedom of choice assume a context-independent choice situation where social norms of behavior do not take part. Both the theoretical and experimental literature shows that behavioral prescriptions based on what is socially acceptable play an essential part in individuals’ decisions. Therefore, they might play a significant role in freedom appraisals as well.

3.3 EXPERIMENTAL DESIGN AND METHODOLOGY

In this section, we review some applications of conjoint experiments and describe our experimental design, sample, and methodological approach.

⁷Dictator games have also been used to explore the motivations behind charitable giving, where the game is set between a participant in the role of the dictator, and a charitable organization as the receiver (see, among others, VAN RIJN; BARHAM; SUNDARAM-STUKEL, 2017).

3.3.1 Conjoint experiments

Conjoint surveys are widely used to understand agents' preferences. Its origins date back to Luce and Tukey (1964), and since then it has been primarily applied by marketers to gather information about features of products that are more valued by potential customers (CHAPMAN, FEIT, 2015).⁸ One significant advantage of conjoint experiments is that they allow evaluating the influence of many treatments simultaneously, which makes them more cost-effective in comparison to other survey experiments where treatments are given one at a time (GREEN; KRIEGER; WIND, 2001; HAINMUELLER; HOPKINS; YAMAMOTO, 2014). In a typical conjoint survey, respondents face many tasks in which they are invited to evaluate options that differ in terms of *attributes* (or *dimensions*). Each attribute, in turn, have *levels* (or *values*). For example, studying the market of digital cameras, Allenby et al. (2014) ran a conjoint experiment in which alternatives of cameras had seven attributes such as 'brand' (whose levels are Canon, Sony, Nikon, and Panasonic), and pixels (whose levels are 10 or 16 mega-pixels). After presented the options, each participant is asked which of the alternatives is her or his most preferred one. Respondents usually complete various decision tasks during a conjoint experiment; a number that might be as large as the total number of possible combinations of the levels of the attributes used in the study (HORIUCHI; SMITH; YAMAMOTO, 2018).

More recently, conjoint experiments started to gain popularity among researchers in fields other than marketing. Given that this methodology allows taking into consideration multiple characteristics of alternatives simultaneously, political scientists found it to be suited for analyzing which of candidates' features in an election make them more attractive to voters. For example, Hainmueller, Hopkins and Yamamoto (2014) studied what would be the most valued attributes of candidates in a Presidential election in the United States, and found that serving in the military, or studying in the most recognized universities are among the elements that might increase the support of a candidate amongst voters. Similar studies have been carried out in the contexts of Italy (FRANCHINO; ZUCCHINI, 2015), and Japan (HORIUCHI; SMITH; YAMAMOTO, 2018). Conjoint experiments have also been used to investigate whether voters dislike candidates from the working class (CARNES; LUPU, 2015).

Individuals' preferences about immigration have also been studied using conjoint experiments. In the study of Hainmueller, Hopkins and Yamamoto (2014), they also investigated which characteristics of potential applicants for admission in the United States would increase or decrease their chances of being accepted if their cases were judged by the general public. They found, for example, that males tend to receive less support than female applicants, and that applicants' citizenship matters: Iraqi or Somalian applicants are less likely to be accepted than similar individuals from countries such as German or France. Duch et al. (2018) also use a conjoint experiment to study immigration, but to respond what countries would attract more high-skilled British emigrants after the curtailment of their freedom of movement in Eu-

⁸For an overview of the first thirty years of use of conjoint experiments, see Green, Krieger and Wind (2001).

rope that is likely to occur after the United Kingdom leaves the European Union: their results support the notion that economics matters, but countries whose political ambiance favors an anti-immigration rhetoric are less attractive to these high-skilled emigrants.

The level of support that alternative designs of public policies find among citizens has also been studied through conjoint experiments. For example, Wright, Levy and Citrin (2016) evaluated the public attitude toward immigration policies, while Bechtel and Scheve (2013) investigated the level of support that alternative global climate agreements would receive by individuals from France, Germany, the United Kingdom, and the United States, and find that any agreement that imposes substantial costs to households, or that involves just a small number of countries, receives very low support by the public.

Therefore, conjoint experiments might be a useful tool to evaluate individuals preferences on a wide range of subjects. In this sense, given the multidimensional nature of the exercise of comparing opportunity sets in terms of freedom of choice, we argue that the conjoint design becomes an appropriate alternative for assessing which attributes matter most for respondents when they are invited to evaluate their freedom to choose.

3.3.2 Our experimental design and sample

During November of 2018, we recruited a total of 151 subjects in five waves to participate in the experiment using the online platform *Prolific Academic*, which is a crowdworking platform for online subject recruitment focused on academic research.⁹ We restricted the recruitment to those individuals that alleged fluency in English, and excluded from the pool of possible participants all of those that have participated in previous sessions of the experiment. Upon completion of the survey, each participant was paid an amount between £0.50 and £0.60, with surveys taking approximately 7.4 minutes to be completed. The experiment was designed using *oTree*, an open-source, web-based platform that is coded in Python, and that allows researchers not only run interactive experiments in the laboratory, the field, or online, but also conduct non-interactive experiments such as surveys.¹⁰ Furthermore, any device that has a web browser – such as a desktop computer or smartphone – can run an experiment designed in *oTree* (CHEN, SCHONGER; WICKENS, 2016), what allows great flexibility for users.

Before entering in the conjoint experiment, each subject responded four simple questions intended to make participants used to the meaning of attributes and values that were going to be used in the conjoint phase (see Figure 3.3a). Then, the respondents faced six decision tasks. In each task, participants saw a table with information about two hypothetical menus - labeled as *A* and *B* - and asked which one would give more *freedom to choose* if they had to select an alternative from one of them. Respondents were also asked to rank menus on a scale from 1 to 7, with the former indicating ‘very little’ and the later ‘very large’ freedom to choose (see

⁹See <https://www.prolific.ac/>. For a more detailed discussion about this platform, see Pallan and Schitter (2018) and Peer et al. (2017).

¹⁰See <https://www.otree.org/>

Figure 3.4a). Thus, this design allowed us to conduct both a *choice-based* and *rating-based* conjoint analysis (HAINMUELLER; HOPKINS; YAMAMOTO, 2014).

Each menu description contained information about the number of options (“2 options”, “3 options”, “4 options”); the diversity of options (“Very similar”, “Somewhat diverse”, “Very diverse”); and how the sets’ options were rated on a scale from “1 - Very bad” to “5 - Very good”. We also included the information about how the hypothetical best option of the agent in that menu was rated in a social appropriateness scale that also varied between “1 - Very socially inappropriate” to “5 - Very socially appropriate”. Thus, to evaluate the degree of social appropriateness decisions we used a similar scale as in Krupka and Weber (2013), with the difference that our scale also presented a ‘3 - Neutral’ rating. Our hypothesis is that the lower is the rating that the participant’s best choice receives, the stronger is the trade-off between choosing what is best and what is socially adequate that he or she faces in that menu. Nevertheless, as noted in Bicchieri and Xiao (2009), a person may not share with others the same set of values, so we also added another dimension that reflects what would be the social appropriateness rating the participant would give to his or her best choice.¹¹

Figure 3.1 – Example of a conjoint table seen by participants during the experiment

	Menu A	Menu B
Size	2 options	3 options
Diversity	Very similar	Very similar
Social Appropriateness (other people's rating)	3 - Neutral	1 - Very socially inappropriate
Preferences	4 - Good	4 - Good
Social Appropriateness (your rating)	2 - Somewhat socially inappropriate	2 - Somewhat socially inappropriate

(a) Source: Elaborated by the author.

Therefore, there are five different attributes that inform participants. In all rounds, the attributes’ values were determined randomly using the list in Table 3.2. The order of attributes in the table that presented the information to individuals was also randomized across participants to avoid priming and order bias and fixed across rounds to ease the cognitive burden of respondents. After the six rounds¹², subjects answered a set of control questions.

¹¹For example, in a dictator game, while someone might recognize that the best action would keep all the initial endowment for himself or herself, and at the same time evaluate this action as extremely socially inappropriate (as people usually do, as the results in (Krupka and Weber, 2013) show), another person might find this action not insulting at all in that particular context, even though acknowledging that, for others, it might be.

¹²Even though empirical evidence shows that the level of survey satisficing remains low for a much higher number of tasks in conjoint experiments (see Bansak, Hainmueller, Hopkins and Yamamoto (2018)), we decided to set a small number of tasks for respondents in order to maintain the experiment relatively short and simple.

It is important to remark that our design asks participants to make decisions based on what they consider as freedom of choice, and no assumption about which particular notion motivate decisions is being made. Thus, the *positive* and *negative* aspects as discussed in Berlin (1969), or the *instrumental* and *intrinsic* importance of freedom are some of the underlying criteria that might be playing a role in participants' choices. Although the plurality of reasons that motivate respondents in our study could be seen as an issue, it also allows indirectly testing whether the notion of freedom as intrinsically important is sound to respondents: if it is not, we should expect variations in sets' attributes having no effect at all on freedom of choice since that sets are supposed to be equal in terms of instrumental freedom.

Table 3.1 – Descriptive statistics of participants

Statistic	N	Mean	St. Dev.	Min	Max
Participants	137				
Female		0.584			
Age		29.65	9.55	18	69
Education					
High school degree		0.270			
Bachelor's degree		0.409			
Master's degree		0.117			
Doctorate degree		0.029			
Other*		0.175			
Nationality					
United Kingdom		0.380			
United States		0.234			
Other**		0.387			

Notes: * 'Associate's degree' and 'Some high school'.

** Portugal, Poland, Canada, Hungary, Germany, Spain, Australia, Mexico, the Netherlands, among others.

Source: Elaborated by the author.

Moreover, respondents are making decisions based on descriptions of generic menus, and not on specific menus. For simplicity, however, throughout this paper, we use the term 'set' to depict this collection of characteristics, but making this distinction clear when necessary. Also, on the screen of each of the six decision tasks we describe many different choice situations in order to illustrate the imaginative exercise. Without controlling explicitly for the choice situation, the experimental design allows participants to imagine themselves in various distinct circumstances, so our results should be interpreted as averages across different choice situations and cannot be particularized. Nevertheless, it can be reasonably argued that attributes' influences on freedom vary according to the choice circumstance. For example, the diversity of a set may play a diminished role when someone imagines herself choosing an apartment since individuals normally narrow down options to those that fulfill certain criteria (two bedrooms, near to work, etc.), so adding a highly discrepant option to the list (e.g., five bedrooms, away from work) would be irrelevant for the purpose in mind. However, diversity may be relevant

when the choice is a destination on holidays. Similarly, the influence of social appropriateness ratings vary from case to case: wearing a white dress to go to someone else’s wedding might be regarded as a very socially inadequate choice by some people, while the social appropriateness rating of one’s choice may be completely irrelevant when one is choosing what to wear to sleep.

Our final subject pool consisted of 137 subjects (see Table 3.1 for a summary of the profile of respondents). To recall, in each decision task participants not only had to choose which, among the menus *A* and *B*, would provide larger freedom, but also rate these menus on a 1-7 freedom scale (see Figure 3.4a) with 7 being the highest rating. Thus, the way in which participants respond to these two questions together can provide some information about the attention level of respondents during the experiment. It is logical to expect that attentive and inattentive participants differ in terms of how many ‘mistakes’ – e.g., choosing set *A* but giving a higher rating to *B* – they make. Thus, we excluded from our sample all individuals that, in at least three out of six decision tasks, have made such incongruent decisions. In the final sample female participants (58.4%) slightly outnumbered males, with the majority of participants from the United Kingdom (38.0%) and the United States (23.4%).

Table 3.2 – Attributes and values used in the conjoint experiment

Attribute	Description	Values
Size	The total number of feasible alternatives available in the menu.	2 options 3 options (B) 4 options
Diversity	How you judge that options in the menu differ from each other in terms of their general characteristics.	Very similar Somewhat diverse (B) Very diverse
Preferences	On a scale from 1 (Options are very BAD) to 5 (Options are very GOOD), how you rate the options in the menu according to your preferences and tastes.	1 - Very bad 2 - Bad 3 - Neither good nor bad (B) 4 - Good 5 - Very good
Social Appropriateness (others’ ratings)	On a scale from 1 (Very socially INAPPROPRIATE) to 5 (Very socially APPROPRIATE), how socially appropriate OTHER PEOPLE think it is to choose the option that you think is best for you in that menu.	1 - Very socially inappropriate 2 - Somewhat socially inappropriate 3 - Neutral (B) 4 - Somewhat socially appropriate 5 - Very socially appropriate
Social Appropriateness (your rating)	On a scale from 1 (Very socially INAPPROPRIATE) to 5 (Very socially APPROPRIATE), how socially appropriate YOU think it is to choose the option that you think is best for you in that menu.	1 - Very socially inappropriate 2 - Somewhat socially inappropriate 3 - Neutral (B) 4 - Somewhat socially appropriate 5 - Very socially appropriate

Notes: (B) = Baseline value.

Source: Elaborated by the author.

3.3.3 Estimation strategy

First, let us recall the traditional terminology of conjoint experiments and make clear how they are used in our study. The objects that have been compared by respondents – sets, or sets descriptions – have *attributes*, while attributes have *values*. For example, while cardinality is an attribute, ‘2 options’, ‘3 options’ and ‘4 options’ are the values this attribute can assume during the experiment (see Table 3.2). Each attribute has a *baseline value*, that was arbitrarily defined (e.g., ‘3 options’ for the cardinality attribute).

Usual statistical approaches to conjoint data most often rely on some sort of behavioral model for respondents’ decision-making process. The conditional logit model has become a popular approach given its consistency with the random-utility model (McFADDEN, 1974), in which the utility of an alternative is assumed to be derived from the observed attributes’ levels and other unobserved characteristics (HAUBER et al., 2016). Nonetheless, when assuming that participants decide as if they are utility maximizers – and that their utilities are represented by a random-utility model – researchers introduce an assumption that is hardly justifiable from a theoretical point of view (HORIUCHI; SMITH; YAMAMOTO, 2018). Furthermore, our interest lies in evaluating freedom of choice, not individuals’ utilities: thus, the usage of a conditional logit model would also demand the construction of a theoretical model for freedom of choice that is based on the random-utility model, what is an exercise that may indeed have some merit but that goes beyond the scope of this essay.

In this sense, the statistical approach of Hainmueller, Hopkins and Yamamoto (2014) is of some interest since it does not impose any restriction about how respondents are reaching their decisions. As the authors argue, in their approach participants of a conjoint experiment “might be maximizing utility; they might be boundedly rational; they might use weighted adding, lexicographic, or satisficing decision strategies; or they might make choices according to another model” (HAINMUELLER; HOPKINS; YAMAMOTO, 2014, p.3). Thus, even though we ask participants which menu provides *more* freedom in their opinions, we are not assuming any specific functional form for the decision rule in which their conclusions are based.

Besides, the authors argue that it is unclear how estimates achieved using the conditional logit model relate to well-defined causal quantities. For example, the coefficients of levels estimated through usual logistic regressions are usually called as ‘part-worths’ in marketing applications, which do not have a clear-cut interpretation and are on an unfamiliar scale (CHAPMAN, FEIT, 2015). Thus, the new approach to conjoint data proposed by Hainmueller, Hopkins and Yamamoto (2014) is advantageous in comparison to the usual methodologies based on logistic regressions both in terms of flexibility and in terms of interpretation of its results.

Our interest lies in estimating what is the marginal effect on freedom of choice, i.e., on respondents choices based on freedom, of a change in the value of attribute l from its baseline level to any other feasible level d . Formally, let i , j and k be, respectively, the indexes for the N participants, J profiles (sets) in each task, and K decision tasks that each respondent faces.

There are L attributes indexed by l , each one with D_l values. In our experiment, $N = 137$, $J = 2$, $K = 6$, $L = 5$, with D_1 (cardinality) and D_2 (diversity) equal to 3, and $D_3 = D_4 = D_5 = 5$. The L -dimensional column vector $T_{ijk} = [T_{ijk1}, \dots, T_{ijkL}]$ is the j th profile (set description) presented to respondent i in her k th decision task, i.e., the *treatment* given to the participant in that specific task. Also, denote by \mathbf{T}_{ik} the set of all values that for the $J = 2$ profiles that respondent i faces in task k , where t denotes a realized value of \mathbf{T}_{ik} , and $\bar{\mathbf{T}}_i$ the set of all $JK = 12$ profiles that participant i sees during the experiment.

The quantity of interest in this case is the Average Marginal Component Effect (AMCE) of the component l when it assumes the value t_1 as compared to the baseline value t_0 , which is defined by Hainmueller, Hopkins and Yamamoto (2014) as

$$\begin{aligned} \bar{\pi}_l(t_1, t_0, p(\mathbf{t})) &= \sum_{(t, \mathbf{t})} E \left[Y_i(t_1, t, \mathbf{t}) - Y_i(t_0, t, \mathbf{t}) \mid (T_{ijk[-l]}, \mathbf{T}_{i[-j]k}) \in \tilde{\mathcal{T}} \right] \\ &\times p \left[T_{ijk[-l]} = t, \mathbf{T}_{i[-j]k} = t \mid (T_{ijk[-l]}, \mathbf{T}_{i[-j]k}) \in \tilde{\mathcal{T}} \right] \end{aligned} \quad (3.1)$$

where $p(\cdot)$ is the joint distribution of attributes other than l , and $Y_i(\cdot)$ is the potential outcome for the subject i as a function of the treatment i received, and $\tilde{\mathcal{T}}$ is the set of all possible combinations of attributes. In the choice-based analysis, $Y_i(\cdot)$ assumes either 0 or 1, while in the rating-based analysis $Y_i(\cdot)$ varies between 0 and 1 representing the rescaled freedom rating. Clearly, only one potential outcome is realized (the fundamental problem of causal inference), and so (3.1) cannot be estimated directly. Our design implements a completely independent randomization of attributes. In other words, we do not restrict the values an attribute can assume based on values of other attributes. Thus, $\tilde{\mathcal{T}}$ contains $3^2 \times 5^3 = 1.125$ possible combinations of attributes that can be drawn with the same probability in each task that respondents face. In this case, together with additional assumptions¹³, Hainmueller, Hopkins and Yamamoto (2014) show that AMCEs can be written as

$$\hat{\pi}_l(t_1, t_0, p(\mathbf{t})) = \sum_{(t, \mathbf{t})} \{ E[Y_{ijk} \mid T_{ijkl} = t_1, T_{ijk[-l]} = t, \mathbf{T}_{i[-j]k}] \quad (3.2)$$

$$- E[Y_{ijk} \mid T_{ijk} = t_0, T_{ijk[-l]} = t, \mathbf{T}_{i[-j]k}] \} \quad (3.3)$$

$$\times p \left(T_{ijk[-l]} = t, \mathbf{T}_{i[-j]k} = t \mid (T_{ijk[-l]}, \mathbf{T}_{i[-j]k}) \in \tilde{\mathcal{T}} \right) \quad (3.4)$$

which can be estimated from observable data. The authors also show that a simple difference-in-means estimator is an unbiased estimator for AMCEs. More precisely, denote by n_1 and n_0 the number of profiles of sets in which $T_{ijkl} = t_1$ and $T_{ijkl} = t_0$ (the baseline value), respectively.

¹³The authors assume that: a) respondents' decisions in the task k are not affected by their choices in other tasks (No carryover effect); b) the order in which a profile (set description) appears to respondents does not matter (No profile-order effects); c) attributes are randomly generated (Randomization of profiles). For a formal discussion, see Hainmueller, Hopkins and Yamamoto (2014).

Also, let Y_{ijk} be a variable that, in the choice-based analysis, $Y_{ijk} = 1$ if the profile j was chosen in the decision task k by individual i , and $Y_{ijk} = 0$ otherwise; while in the rating-based analysis Y_{ijk} vary between 0 to 1 representing the rescaled freedom rating. The difference-in-means estimator is

$$\hat{\pi}_l(t_1, t_0, p(\mathbf{t})) = \frac{\sum_{i=1}^N \sum_{j=1}^J \sum_{k=1}^K Y_{ijk} I(T_{ijkl} = t_1)}{n_1} - \frac{\sum_{i=1}^N \sum_{j=1}^J \sum_{k=1}^K Y_{ijk} I(T_{ijkl} = t_0)}{n_0} \quad (3.5)$$

where $I(T_{ijkl} = t_d)$ is equal to 1 when $T_{ijkl} = t_d$, and 0 otherwise. Nevertheless, the authors show the AMCEs can also be conveniently estimated by regressing the observed choices on the set of dummy variables for values of attributes, excluded the ones defined as the baseline values. Therefore, we fit the linear model

$$Y_{ijk} = \beta_0 + \sum_{l=1}^5 \sum_{d=2}^{D_l} \beta_{ld} X_{ldijk} + \epsilon_{ijk} \quad (3.6)$$

to our data, where X_{ldijk} is the dummy variable for the d th value of attribute l with $d = 1$ denoting the baseline value in each attribute. The estimated coefficients $\hat{\beta}_{ld}$ are interpreted as estimates for the AMCEs when attribute l assumes the value d . In a choice-based analysis, $\hat{\beta}_{ld}$ represents the average effect on the probability of a set being ranked higher when an attribute l is equal to d compared to a situation in which l is equal to the baseline value. In the rating-based analysis, the AMCEs can be read as the expected change in the rating of a set when attribute l assume the value d . Simple Ordinary Least Squares estimates of the parameters in (3.6) yield unbiased, fully nonparametric, and consistent estimates of AMCEs.

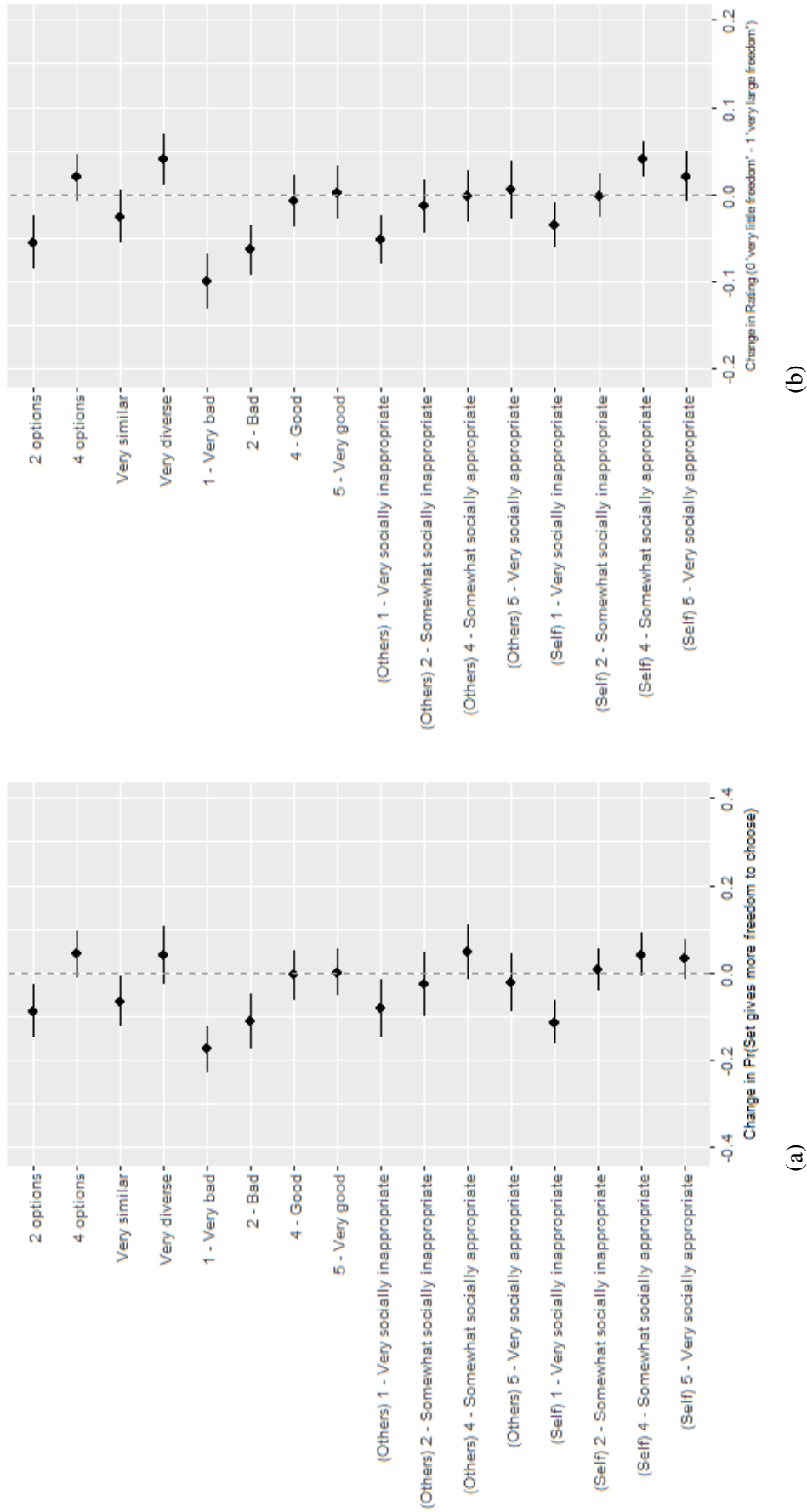
3.4 RESULTS

In this section, we present our results, and discuss its implications to the current theoretical approaches to freedom of choice, as well as suggest some implications to public policies.

3.4.1 Results: Pooled sample

Table 3.3 presents estimates for AMCEs for the choice-based and rating-based analysis, and Figure 3.2a presents the AMCEs estimated for each level of the attributes in the choice-based and rating-based problems along with 95% confidence intervals with standard errors clustered by participant. To recall, estimates must be interpreted considering the arbitrarily chosen baseline values. Our results show that a set with only two options instead of three (the baseline value) is about 8.5 percentage points ($p = 0.0004$) less likely to be chosen in a binary comparison based on freedom of choice. A negative and significant effect also emerges in the rating-based analysis: on average, sets with only two options receive ratings 0.053 ($p = 0.0003$) points

Figure 3.2 – AMCEs (OLS estimates)



(c) Notes: At left, the effects of attributes on the probability of being ranked higher. At right, the effect on the rating (rescaled to vary from 0 to 1). Points represent the estimated AMCE, while the bars represent 95% confidence intervals constructed with standard errors clustered by participant. Source: Elaborated by the author.

lower than sets with three alternatives. Adding a fourth option to menus, however, had a positive and significant effect at the 5 percent level only on the rating-based analysis (0.021, $p = 0.042$), although the magnitude of the coefficient is larger, in module, for the ‘two options’ value.

The signs of the coefficients for diversity are as would be expected by the theoretical literature (PATTANAIAK, XU, 2000; PERAGINE, ROMERO-MEDINA, 2006; BERVOETS, GRAVEL, 2007), although not significant except for sets with very diverse alternatives in the rating-based analysis (0.042, $p = 0.0013$), and low diversity in the binary choice analysis (-0.062, $p = 0.0108$). The fact that the diversity attribute played a diminished role in freedom assessments is somewhat surprising giving that a large share of theoretical approaches to freedom of choice relies on information about diversity as the main informational basis to freedom comparisons.

With respect to preferences, sets with ‘very bad’ options presented significantly lower ratings as compared to a baseline menu with ‘neither good nor bad’ choices (-0.098, $p = 0.0000$). The choice-based analysis shows a similar pattern: very bad alternatives reduces the probability that a set will provide larger freedom than another with the baseline value in about 17.2 percentage points ($p = 0.0000$). Similarly, a set whose alternatives are rated as ‘bad’ had negative and significant coefficients in both choice and rating analysis - 0.109 ($p = 0.0006$) and 0.062 ($p = 0.0000$), respectively -. Surprisingly, the effect of ‘good’ or ‘very good’ options is not statistically different from the baseline value; a result that contradicts what would be expected by the theoretical literature (SEN, 1991; GRAVEL, 1994).

Finally, we found significant negative coefficients for ‘very socially inappropriate’ best choices irrespective of whether participants were told that the social appropriateness was given by themselves or by other people. Thus, we find evidence that trade-offs between choosing what is best in one’s opinion, and choosing what others believe is socially acceptable, indeed might influence peoples’ freedom to choose. For example, a set where one’s best action is described as very socially inappropriate by other individuals is 7.9 percentage points ($p = 0.0045$) less likely to provide more freedom to choose as compared to a set with a neutral best option. When participants are told that the ratings based on the social appropriateness of their best choices are given by themselves, the effect is even larger: 11 percentage points ($p = 0.0009$). On the other hand, in the freedom-rating model, others’ opinions have a slightly larger negative effect (0.051, $p = 0.0013$) than self-opinion for the value ‘very socially appropriate’. A positive evaluation of the best option in terms of social appropriateness had positive and significant effect only when the evaluation is said to be made by the individual, and solely in the freedom rating: a set in which the best choice is ‘somewhat socially appropriate’ received ratings, on average, 0.042 ($p = 0.0021$) larger than an opportunity set with a neutral best choice.

3.4.2 Heterogeneous effects: Gender

Gender heterogeneity in social preferences has been a matter of study by experimentalists (see, among others, ECKEL; GROSSMAN, 1998; ANDREONI; VESTERNLUND, 2001;

Table 3.3 – AMCEs (OLS estimates)

	Choice	Rating
Cardinality		
2 options	-0.085*** (0.024)	-0.053*** (0.015)
4 options	0.046 (0.025)	0.021* (0.011)
Diversity		
Very similar	-0.062* (0.024)	-0.024 (0.013)
Very diverse	0.044 (0.026)	0.042** (0.013)
Preferences		
1 - Very bad	-0.172*** (0.034)	-0.098*** (0.017)
2 - Bad	-0.109*** (0.032)	-0.062*** (0.015)
4 - Good	-0.002 (0.037)	-0.006 (0.015)
5 - Very good	0.004 (0.034)	0.004 (0.014)
Social Appropriateness (Others)		
1 - Very socially inappropriate	-0.079** (0.028)	-0.051** (0.016)
2 - Somewhat socially inappropriate	-0.024 (0.029)	-0.012 (0.015)
4 - Somewhat socially appropriate	0.050 (0.032)	-0.001 (0.015)
5 - Very socially appropriate	-0.020 (0.027)	0.007 (0.016)
Social Appropriateness (Self)		
1 - Very socially inappropriate	-0.110*** (0.033)	-0.033* (0.015)
2 - Somewhat socially inappropriate	0.009 (0.029)	0.0002 (0.015)
4 - Somewhat socially appropriate	0.045 (0.027)	0.042** (0.014)
5 - Very socially appropriate	0.035 (0.031)	0.022 (0.016)
Constant	0.597*** (0.040)	0.620*** (0.019)
<i>N</i>	1,644	1,644
<i>R</i> ²	0.059	0.101
Adjusted <i>R</i> ²	0.050	0.092
Log Likelihood		
Akaike Inf. Crit.		
Residual Std. Error (df = 1627)	0.488	0.200
F Statistic (df = 16; 1627)	6.367***	11.385***

Notes:***Significant at the 0.1 percent level.

**Significant at the 1 percent level.

*Significant at the 5 percent level.

Standard errors corrected for within-respondent clustering.

Source: Elaborated by the author using the software *R*.

VISSER; ROELOFTS, 2011, and, for a review of results, see CROSON; GNEEZY, 2009), where findings generally point to women being more altruistic than men. Research from psychology also finds differences between women and men regarding their sensitivity to social cues that suggest appropriate behaviors (CROSON; GNEEZY, 2009). Therefore, heterogeneity in choices based on freedom of choice may also arise.

We run additional regressions to evaluate whether results vary with respondents' gender. Table 3.4 shows the results, where it is possible to note that there is an important difference regarding gender-specific average effects. For instance, when analyzing the effect of others' assessment about ones' best choice, our results show that the negative effect of a 'very socially inappropriate' decision is much larger for female respondents if compared to male participants: on average, a set with this characteristic is 12 percentage points ($p = 0.0002$) less likely to be chosen by a female respondent as the one that provides more freedom than a menu with a socially neutral best choice. The same effect for males was estimated in negative 1.3 percentage point ($p = 0.7958$), which was not statistically different from the baseline effect. Similarly, having one's best choice labeled by others as very socially inappropriate made female participants give ratings 0.089 ($p = 0.0000$) smaller as compared to a set with the baseline value. Male respondents' freedom of choice, on the other hand, seemed more sensible to smaller and low-quality sets: the average marginal effect of values '2 options' and '1 - Very bad options' is roughly twice larger (in module) for male participants.

3.4.3 Discussion and policy implications

As previously mentioned, in our experimental design decisions are made taking into account descriptions of sets, and not sets of options. For example, instead of deciding whether $A = \{\text{apple, orange, mango}\}$ or $B = \{\text{grapes, strawberry}\}$ gives more freedom, participants are told generic descriptions of two opportunity sets, (e.g., '3 options, very diverse, ...' vs. '2 options, somewhat diverse, ...'). This design choice may be considered as a possible drawback of our experiment because it does not fully reflect real-life situations, where individuals have to make their choices facing *real* sets of alternatives instead of generic descriptions of these sets. Moreover, we cannot make strong claims about the external validity of our results since our sample is not representative. Additional research is needed to tackle these issues properly.

Nonetheless, observed the potential limitations of our findings, they still shed some light in what information is relevant for comparisons in terms of freedom of choice, and can give a contribution to policies intended to expand peoples' freedoms. First, our results point to the fact that cardinality is important to freedom, but the intuitively appealing idea that freedom always enhances as long the number of options is expanded has little support in our estimates. This casts doubt on the validity of any strict monotonicity axiom to characterize any binary relation that compares sets in terms of freedom. Furthermore, it could also signal a sort of loss aversion, i.e., losing an option affects more significantly freedom to choose than adding a new option to opportunity sets (for a discussion, see KAHNEMAN; TVERSKY, 1979).

The diversity aspect of freedom played a minor role in influencing participants' decisions. As previously mentioned, since our design does not control for specific choice situations, these conclusions can be modified when considering particular contexts. On the other hand, the lack of quality had a large and significant effect on our analysis. Individuals tend to experience much lower freedom to choose when options fall below a neutral threshold in which possible choices are rated as neither good nor bad. Nevertheless, given that opportunity sets with high-quality alternatives do not necessarily provide larger freedom, our results suggest that the account of Pattanaik and Xu (1998), where freedom of choice is based on the mild requirement of existing *reasonable alternatives* for choice (and not necessarily highly valued options) might have some relevance. Yet, this fact has some critical implications in the realm of human development as the expansion of peoples' freedoms and the design of policies to achieve this purpose. If expanded opportunity sets do not embrace opportunities which reflect – at least in a basic level – peoples' preferences, tastes, or what they believe to be reasonable choices, freedom to choose may well remain unchanged.

Furthermore, the fact that social norms of behavior – seen as the social appropriateness of one's choices – and the underlying trade-off that they impose to agents significantly affected freedom in our results is another factor that should be accounted for when designing policies intended to foster peoples' opportunity freedom. This results could, for instance, defy common notions about outcomes of 'hard' and 'soft' interventions on individuals' freedom of choice, i.e., policies that restrict choices as opposed to policies that preserve individuals' choice sets but aim to influence their decisions towards some desired direction (ARAD; RUBINSTEIN, 2017). Take, for instance, the polemic prohibition of the use of the *niqab* (the full-face veil used by some Muslim women) in public in some European countries. For many, the prohibition is seen as a patent violation of the opportunity aspect of freedom since it constrains the women's choices to the set $B = \{\text{do not wear}\}$, and gives them no power to decide whatsoever. However, refraining from wearing the niqab when wearing it is an option can be rated as an extremely inappropriate choice by other people from the same religious community, making 'do not wear' *virtually unfeasible* when 'wear' is available (see the discussion about the violation of the monotonicity axiom in the previous chapter). The counterintuitive conclusion that the opportunity aspect of freedom of choice can be enhanced when an opportunity is excluded from a set is not ruled out in our analysis, and can open an interesting avenue for future research.

Our findings suggest that the freedom of choice of women and men may respond differently to variations in the characteristics of sets. The cardinality of the menus and the quality of options are elements that had a more significant bearing in male respondents' freedom, while female participants seemed more sensitive to the social appropriateness ratings of her choices. Hence, our results are in line with other findings in the psychology literature, as noted in Croson and Gneezy (2009), which suggest that women behavior is affected more strongly by what others' believe that is the appropriate behavior. Failing to take note of this sort of heterogeneity when designing gender-specific policies can lead to poor results in terms of expansion of freedoms.

Table 3.4 – Model breakout by gender: AMCEs (OLS estimates)

	Choice		Rating	
	<i>Female</i>	<i>Male</i>	<i>Female</i>	<i>Male</i>
Cardinality				
2 options	-0.059* (0.029)	-0.112** (0.041)	-0.024 (0.018)	-0.096*** (0.025)
4 options	0.027 (0.032)	0.082* (0.039)	0.027 (0.014)	0.014 (0.016)
Diversity				
Very similar	-0.045 (0.028)	-0.085 (0.045)	-0.009 (0.015)	-0.045* (0.022)
Very diverse	0.012 (0.028)	0.096 (0.049)	0.033* (0.017)	0.064** (0.021)
Preferences				
1 - Very bad	-0.131** (0.044)	-0.232*** (0.054)	-0.104*** (0.020)	-0.088** (0.030)
2 - Bad	-0.110** (0.039)	-0.121* (0.050)	-0.042 (0.021)	-0.092*** (0.021)
4 - Good	0.038 (0.050)	-0.055 (0.056)	-0.002 (0.021)	-0.011 (0.022)
5 - Very good	0.043 (0.042)	-0.046 (0.054)	0.003 (0.019)	0.013 (0.023)
Social Appropriateness (Others)				
1 - Very socially inappropriate	-0.120*** (0.033)	-0.013 (0.050)	-0.089*** (0.021)	0.007 (0.023)
2 - Somewhat socially inappropriate	-0.052 (0.034)	0.011 (0.051)	-0.037* (0.019)	0.023 (0.022)
4 - Somewhat socially appropriate	0.013 (0.042)	0.105* (0.050)	-0.027 (0.019)	0.041 (0.024)
5 - Very socially appropriate	-0.028 (0.035)	-0.018 (0.045)	-0.001 (0.020)	0.014 (0.026)
Social Appropriateness (Self)				
1 - Very socially inappropriate	-0.111* (0.045)	-0.096* (0.048)	-0.031 (0.018)	-0.032 (0.026)
2 - Somewhat socially inappropriate	0.028 (0.039)	-0.012 (0.041)	-0.003 (0.021)	0.019 (0.023)
4 - Somewhat socially appropriate	-0.001 (0.035)	0.111* (0.045)	0.032 (0.017)	0.057* (0.022)
5 - Very socially appropriate	0.053 (0.038)	0.014 (0.055)	0.023 (0.021)	0.026 (0.025)
Constant	0.599*** (0.055)	0.584*** (0.055)	0.626*** (0.027)	0.604*** (0.027)
<i>N</i>	960	684	960	684
Log Likelihood	-671.400	-464.200	213.400	125.800
Akaike Inf. Crit.	1,377.000	962.400	-392.900	-217.700

Notes: *** Significant at the 0.1 percent level.

** Significant at the 1 percent level.

* Significant at the 5 percent level.

Standard errors corrected for within-respondent clustering.

Source: Elaborated by the author using the software *R*.

3.5 CONCLUDING REMARKS

In this paper, we studied the effect of different characteristics of opportunity sets in freedom of choice comparisons using an online conjoint experiment. We employ a relatively new approach to evaluate the results of conjoint experiments which is based on estimating the average marginal component effects, interpreted as the average effect of each characteristic of a set on the probability of a set being ranked better - or receiving a higher rating - in terms of freedom.

We studied three sorts of information that were used as inputs to freedom appraisals by previous theoretical approaches: cardinality, diversity of options, the quality of alternatives considering agents' preferences and tastes. In addition, we suggested that social norms of behavior might also affect peoples' freedom to choose since norms frequently impose to individuals a trade-off between choosing what they effectively have interest in doing or what is more socially acceptable to other people.

Our main results can be summarized as follows. Compared to a baseline set with three options, a smaller set with two alternatives tend to receive less support in freedom comparisons, but expanding the number of options to four does not necessarily increase freedom to choose. In this sense, cardinality plays an important role, although it may not be as central as suggested by the cardinality-based rule in Pattanaik and Xu (1990). A similar conclusion arises about the effect of diversity on freedom – which has a key role in the many theoretical approaches to freedom of choice (see, among others PATTANAİK, XU, 2000; PERAGINE, ROMERO-MEDINA, 2006; BERVOETS, GRAVEL, 2007): low diversity had a negative and significant effect only in the choice-based analysis, while high diversity affects the freedom rating positively.

Third, having bad options significantly reduces agents' freedom to choose as compared to a set with options rated as neither good nor bad, but positive qualitative characteristics did not increased individuals freedom. This conclusion supports the notion proposed in Pattanaik and Xu (1998) that freedom of choice demands alternatives that can be *reasonably chosen*, and not necessarily the best available options. Finally, when an agent's best choice in a set is rated as socially inappropriate (by herself or others), the probability that this set will be chosen in a binary comparison in terms of freedom with another set where the best choice is neutral in a social appropriateness scale reduces significantly. Similarly, sets with socially inappropriate options receive lower ratings based on freedom to choose. Thus, we find evidence to support the idea that trade-offs between one's self-interest and social norms prescriptions affect peoples' freedom to choose. Moreover, we also find evidence that the effect of social norms is greater for women as compared to men.

Although our results should be interpreted with caution, we argue that our experimental design contributes to the discussion about what factors influence freedom to choose, what role social norms have on freedom appraisals, and also opens new possibilities of research. Future studies can include new attributes and values in their experimental designs and rely less on natural language. Also, using representative samples is certainly a matter of general interest

that can be helpful to draw more precise policy prescriptions.

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3.7 APPENDIX

Figure 3.3 – Screenshot of the testing phase of the experiment

Before we start, please answer the following questions:

Imagine you are evaluating different modes of transport that you could use to travel between two cities. How diverse do you think that options *{blue car, red car}* are?

- Very diverse
- Somewhat diverse
- Very similar

Imagine that you are planning what to do on a Saturday night. You have to choose one option from the set *{stay at home, go out with friends, watch a movie}*. On a scale from 1 (Options are very bad) to 5 (Options are very good), please rate the set of options that you have.

- 1 - Very bad
- 2 - Bad
- 3 - Neither good nor bad
- 4 - Good
- 5 - Very good

Imagine that you are going to a very formal wedding party, but you would enjoy greatly wear a more casual look. On a scale from 1 (Very socially inappropriate) to 5 (Very socially appropriate), please rate how socially appropriate YOU think it would be to wear a casual outfit in this situation.

- 1 - Very socially inappropriate
- 2 - Somewhat socially inappropriate
- 3 - Neutral
- 4 - Somewhat socially appropriate
- 5 - Very socially appropriate

Imagine the same situation as in the last question. In your opinion, on a scale from 1 (Very socially inappropriate) to 5 (Very socially appropriate), how OTHER PEOPLE would rate the decision of wearing a casual outfit in a formal wedding?

- 1 - Very socially inappropriate
- 2 - Somewhat socially inappropriate
- 3 - Neutral
- 4 - Somewhat socially appropriate
- 5 - Very socially appropriate

Next

(a) Source: Elaborated by the author.

Figure 3.4 – Screenshot of the conjoint phase of the experiment

Round 1

INSTRUCTIONS (these instructions are the same in all rounds):

A *menu of options* is a list of possible choices in a decision problem. For example, a menu can represent a list of types of meal when you are at a restaurant (ex: Menu = {vegetarian, vegan, low fat, high fat}); modes of transport that you could use to travel between two cities (ex: Menu = {car, train, bike}); actions that you could take when asked to donate to a charitable organization (ex: Menu = {do not donate, donate \$10}); hypothetical lifestyle choices (ex: Menu = {earn a lot of money, prioritize my well-being, live healthy}); things that you could do on a saturday night (ex: Menu = {go out with friends, watch a movie, go to the church, study}).

Imagine that you are comparing two distinct menus according to four characteristics:

Size: the total number of feasible alternatives available in the menu.

Diversity: how you judge that options in the menu differ from each other in terms of their general characteristics.

Social Appropriateness (your rating): On a scale from 1 (Very socially INAPPROPRIATE) to 5 (Very socially APPROPRIATE), how socially appropriate **YOU** think it is to choose the option that you think is best for you in that menu.

Social Appropriateness (other people's rating): On a scale from 1 (Very socially INAPPROPRIATE) to 5 (Very socially APPROPRIATE), how socially appropriate **OTHER PEOPLE** think it is to choose the option that you think is best for you in that menu.

Preferences: On a scale from 1 (Options are very BAD) to 5 (Options are very GOOD), how you rate the options in the menu according to your preferences and tastes.

Now, please carefully review the description of menus A and B below (the information in this table will change in each round).

TABLE 1 - The table below compares the menus in terms of the four characteristics.

	Menu A	Menu B
Diversity	Somewhat diverse	Very diverse
Preferences	3 - Neither good nor bad	3 - Neither good nor bad
Social Appropriateness (your rating)	5 - Very socially appropriate	4 - Somewhat socially appropriate
Size	2 options	4 options
Social Appropriateness (other people's rating)	4 - Somewhat socially appropriate	3 - Neutral

Think about your **freedom of choice** in each of the above menus.

If you had to choose only **one** option from one of the possible menus above, which menu of options would give you more **freedom to choose**?

- A
- B

On a scale from 1 to 7, where 1 indicates that the menu gives you very little freedom to choose and 7 indicates that it gives you very large freedom to choose, how would you rate Menus A and B?

1 = the menu gives you **very little** freedom to choose
 7 = the menu gives you **very large** freedom to choose

Menu A	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
Menu B	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7

Next

4 ASSESSING THE RELATIVE IMPORTANCE OF DIFFERENT LIFE DOMAINS FOR WELL-BEING FREEDOM

4.1 INTRODUCTION

The *capability* (or *capabilities*) approach for human development has gained prominence in the past two decades as a more adequate framework for welfare evaluations. The perspective centers its attention on individuals *capability sets*, which are understood as the combinations of all *functionings*, i.e., doings and beings of an individual. A capability set also characterizes a person's freedom to pursue whatever objectives she has set for herself, among which the pursuit of well-being is included (see SEN, 1985, 2009).

The shift of focus from a utilitarian or resource-based perspective to a broader view based on freedom make room for appropriately taking note of the multiple dimensions of human life that are relevant for people. The capability approach, as Sen (2009) notes, is “inescapably concerned with a plurality of different features of our lives and concerns” (SEN, 2009, p. 233). In this sense, the list of capabilities proposed in Nussbaum (2000, 2011) that describes very broadly ten capabilities that every individual should possess in levels above a certain threshold in order to live a dignified life, has become a starting point for the construction of a comprehensive list of life domains utterly important to human beings.

Although Nussbaum (2011) focuses on the notion of human dignity to construct her list, and criticizes the usefulness of Sen's (2009) distinction between *well-being* freedom (the person's freedom to pursue her own well-being) and *agency* freedom (the person's freedom to strive for any goals she has reasons to adopt), it can be reasonably argued that her account reflects to a large extent domains of life that are also relevant from these two perspectives. Considering the importance that the expansion of freedoms – especially well-being freedom – has in guiding state policies that address the lives of adult citizens (SEN, 2009), Nussbaum's (2011) account undoubtedly contributes to a better understanding of which domains of peoples' lives governments should prioritize.

The difficulty in the operationalization of the capability perspective, however, has raised a question about the usage of the capability perspective as the theoretical underpinning of the human development agenda (SUDGEN, 1993; SRNIVASAN, 1994). Some recent efforts have been made in order to tackle this issue, especially in what concern the measurement of capabilities (see, among others, KRISHNAKUMAR, 2007; KRISHNAKUMAR; BALLON, 2008; ANAND; SANTOS; SMITH, 2008; ANAND et al., 2009; BURCHARDT; VIZARD, 2011, and, for a review of different approaches, see ROBAYINS, 2006; CHIAPPERO-MARTINETTI, 2009), but there still room for enhancing operationalization not only in terms of capability measurement, but also in proposing adequate methods for the task of establishing priorities among the vast, heterogeneous, and essential life dimensions that the approach takes note.

Nussbaum's (2000; 2011) account, for example, leaves unanswered the question of which, among the central capabilities, governmental action should take place more urgently when becomes unfeasible to get people above a minimum threshold in all these life domains. One possible approach to give more precise guidance for policymakers would be investigating how people would make trade-offs between life dimensions, even if only in a hypothetical level. For example, imagine an agent engaged in a mental exercise about his or her willingness to forgo a decent housing condition in order to become able to meet her friends and family more often: obviously this exercise may never take place in reality, but the response to it might indicate which of these two different life domains has greater importance to the decision maker.

Nevertheless, since Nussbaum's list is intended to reflect fundamental entitlements necessary for a life based on dignity, it must be robust to preferences that people happen to have in order to overcome the issues brought by adaptive preferences (NUSSBAUM, 2003). The effect of opportunity deprivation on individuals' preferences was first addressed by Elster (1983), and the capability approach takes into consideration this phenomenon as an important issue for well-being assessment (see NUSSBAUM, 2001). The idea of adaptation is based on the notion that prevalent deprivation alters the preferences that would naturally emerge in a less hostile environment and make individuals attach less importance to the alternatives options that are, apparently, out of reach. Thus, her account leaves no room for governments to expand peoples' capabilities in a specific direction in order to offset a possible lack of an appropriate level in another (NUSSBAUM, 2011).¹

On the other hand, we argue that the exercise of investigating how trade-offs between capabilities take place can provide insights for policymakers in a world with scarce resources often insufficient to make individuals enjoy a decent situation in every aspect of life. In this sense, shifting from the focus on peoples' dignity towards peoples' well-being freedom can be helpful to identify trade-offs and pinpoint areas that demand priority. Anand et al. (2009) contributes to the discussion of what capabilities are more central from a well-being perspective by developing a survey instrument to gather information about the ten central capabilities suggested in Nussbaum (2000, 2011) at the individual level, and verifying to what extent these life domains are covariates of individuals' subjective well-being. Carrying out a survey with more than sixty questions - each one generating one capability indicator - they find evidence of seventeen of these indicators as having statistically significant effects on the life satisfaction reported by respondents. Given that the overall life satisfaction can be a relevant part of one's well-being, Anand et al.'s (2009) results can help to understand what different features of peoples' lives have a greater correlation with subjective well-being, and give some guidance about how to set 'priorities among priorities'. However, by making the reported level of satisfaction a function of individuals' capabilities, the authors' analysis is more in line with the notion of well-being *achievement*, and not necessarily well-being *freedom* (see SEN, 2009), and it says little about

¹Situations in which individuals are forced to choose between the 'less of two evils' are labeled by Nussbaum (2011) as 'tragic choices'.

how individuals would make trade-offs between these various life domains. In this sense, an experimental design in which individuals are forced to choose between non-commensurable objects, each one with particular advantages and disadvantages, may give us a better notion of peoples' priorities in terms of what life dimensions play a more significant role from a well-being perspective.

Therefore, our general objective in this essay is to shed new light into this discussion. Our first question is: *What life domains are more important to individuals when they are asked to think about their potential to achieve higher well-being?* We build upon Anand et al.'s (2009) results and methodological approach to elicit indicators of capabilities at the individual level and conduct an online conjoint experiment with a non-representative sample of respondents to address the issue of how trade-offs between life dimensions take place from a subjective well-being freedom perspective. Conjoint analysis is an application of randomized factorial design and has been gaining increasing popularity in fields such as marketing and, more recently, political sciences (HAINMUELLER; HOPKINS; YAMAMOTO, 2014; HAINMUELLER; HOPKINS, 2015; HORIUCHI; SMITH; YAMAMOTO, 2018).²

In our design, participants make choices between hypothetical 'life situations' that vary in terms of levels of six indicators that represent six different capabilities: adequate shelter (being able to have adequate shelter), domestic security (being able to be secure against domestic violence), family love (being able to love those who love and care for us), useful role (being able to in critical reflection about the planning of one's life), social interaction (being able to engage in various forms of social interaction), equal basis (being able to seek employment on an equal basis with others). Each indicator reflects one particular feature of six of the central capabilities in Nussbaum's (2011) list, namely: bodily health, bodily integrity, emotions, practical reason, affiliation, and control over one's environment. Our quantities of interest are the overall Average Marginal Component Effects (AMCEs) (HAINMUELLER; HOPKINS; YAMAMOTO, 2014) that gives us a sense of which of the six dimensions of peoples' lives used in our study are more important for individuals' subjective well-being freedom.³ Since we confine our analysis to capabilities based on Nussbaum's (2011) list - which is a shortlist of many domains of life which are crucial for a decent life - our study can be seen as an approach for the task of setting priorities among priorities - an exercise of that can be of great usefulness for policymakers.

Then, we assess the robustness of our results and address the question of whether AMCEs interact with some characteristics of respondents. Using a hierarchical Bayesian model to estimate group-specific AMCEs, we first ask: *Does the subjective well-being level of respondents affects the relative importance they give to capabilities?* It is well-documented that not only particular types of behaviors may induce a state of happiness (WARNER; VROMAN, 2011), but people with high and low self-reported levels of satisfaction with life tend to present significant differences in terms of general behavior (ROBINSON; MARTIN, 2008). People that

²In Section 3.3.1 we discuss in more detail the recent popularization of conjoint experiments in social sciences.

³See the discussion about this methodology in Section 3.3.3.

report high well-being also contribute more to social capital and tend to believe more easily that most people are fair and helpful than individuals with low levels of self-reported well-being (GUVEN, 2011). Life satisfaction also is an important input to production by increasing labor productivity (DIMARIA; PERONI; SARRACINO, 2019). Thus, variations in the subjective well-being cause - and are caused by - differences in behavior, what in turn might also affect the way in which people assess the relative importance of life dimensions.

We also study a second potential source of heterogeneity in weights based on respondents' self-reported situation in the six domains utilized in our study, and that gives a sense of their capability sets in each of these six dimensions. In other words, our question is: *Do people that fall below a threshold level in a certain life domain value this dimension differently from others that report a good situation in that same dimension?* Our interest lies in verifying whether we find evidence of 'adaptive preferences for capabilities.' In our context, a sign of adaptation would be people giving less importance to an area of life in which their achievements are more restricted, as compared to subjects that report a better situation in that same life domain.

Whether results vary with respondents' reported levels of well-being, or with respondents' situation in the areas of life studied here, is a matter of practical importance in terms of the usefulness of results for policymakers given the inherent malleability of these measures. If the relative importance indeed depends on this type of background information, then priorities estimated through conjoint experiments – which rely solely on individuals' stated preferences – that do not control for these sources of heterogeneity might be an unreliable source of insights for public policies.

Our results indicate that variations in all six indicators used in our study affected respondents' choice patterns. In other words, participants were not neutral to variations in their hypothetical life situations in all six dimensions used in our study. However, our results also show that some capability indicators had a greater impact than others in respondents' decisions. Thus, based on the way in which individuals make trade-offs, the results indicate that there is still room for establishing priorities among the six life domains studied in this essay, where we highlight the large negative effect on individuals' well-being potential of failing to achieve a decent level in adequate shelter and domestic security capability indicators – and thus the great importance that these dimensions have in respondents' lives.

Besides, our findings suggest that, on average, low subjective well-being respondents attached less importance for becoming easier to experience the love and support of the immediate family, in comparison to the high subjective well-being group. Also, the effect of falling below a threshold level that secures the agent from domestic assault is less severe for individuals that reported to have suffered domestic violence in the past, which indicates the possibility of adaptation to the unfavorable circumstance in such life dimension. Still, the fact that the only statistical differences between groups are found in the proxies that represent the family love and domestic security capabilities suggest that results are reasonably robust to variations in these two background characteristics, and that results achieved through the methodological

approach proposed in this essay might provide reliable guidance about what areas of life people prioritize.

Collecting information about peoples' life priorities has been listed as one fundamental practice to be adopted by national statistics agencies in order to enrich the quality-of-life debate (STIGLITZ; SEN; FITOUSSI, 2009). Hence, our work adds value by presenting a novel methodological approach to the question of what, and in what intensity, distinct dimensions of life – which are related to different capabilities – are cherished by individuals, and whether these findings are robust to variations in two background characteristics of subjects: subjective well-being and respondents' situation in distinct areas of their lives. To our knowledge, this work is the first application of a conjoint experiment to deal with the issue of assessing peoples' priorities among plural and non-commensurable life domains. Furthermore, we also contribute to the operationalization of the capability approach and suggest that even among life domains that are central to life, empirical research can contribute to finding room for establishing priorities and hence guiding policymakers toward the more urgent needs of individuals.

This article is structured as follows. Section 4.2 describes our experimental design and sample. Section 4.3 presents the methodological approach. Section 4.4 presents and discusses the results. Finally, Section 4.5 discusses possible avenues for future research and concludes.

4.2 OUR EXPERIMENTAL DESIGN AND SAMPLE

The experiments were conducted online and implemented on *oTree*, a web-based platform to run experiments (CHEN, SCHONGER; WICKENS, 2016).⁴ We conducted seven sessions, with a total of 263 individuals. Subjects were recruited using the *Prolific.ac* crowdsourcing platform during January of 2019, from a pool of approximately 40,000 subjects that reported to be fluent in English, and that did not take part any of the previous sessions of the experiment. All subjects consented to participate and indicated to be 18 or older and, upon completion of the experiment, each respondent received £0.85.

Our experimental design consisted of two stages. In the first stage, participants were asked to respond to a short version of the survey developed in Anand et al. (2009), which intends to operationalize Nussbaum's (2000, 2011) central capabilities list at the individual level. In total, the survey consisted of seventeen questions, each one reflecting a particular characteristic of one of the following capabilities in Nussbaum's list: bodily health, bodily integrity, emotions, practical reason, affiliation and control over one's environment (henceforth, COOE) - plus a question about the respondent's overall level of life satisfaction. These seventeen questions reflect the capabilities that Anand et al. (2009) found to have a stronger statistical link with subjective well-being. The order of the questions was determined at random, except the last one which was the subjective well-being question for all respondents (see Tables 4.7a-4.9a).

In the second stage - the conjoint phase - each participant faced six rounds of decisions. In

⁴See <https://www.otree.org/>. For a more detailed discussion, we also refer to Section 3.3.2.

each round, the participant was asked to evaluate two different profiles of responses, labeled as Situation *A* and Situation *B*, for six of the questions of the survey he or she has just taken as if he or she was the author of those responses (see Table 4.1a). We reduced the range of possible answers in the questions of the conjoint phase, as compared to the same questions in the survey phase, leaving $2^3 \times 3^2 \times 4 = 288$ possible profiles of answers. Then, we asked respondents in what situation they think they would be capable of reaching a higher level of well-being (see Figures 4.3 for screenshots of the conjoint phase), and to rate the two profiles in terms of potential to achieve well-being on a 1-7 Likert scale. The order of questions in the table was randomized across participants but fixed across the decision tasks each participant faced. After completing the second stage, participants responded to a set of control questions.

There are some aspects in our approach that are worth clarifying at the outset. First, we confined our analysis to the seventeen questions – or capabilities – in Anand et al. (2009) that had a stronger link with subjective well-being. However, their original survey consists of more than sixty questions that spanned all ten Nussbaum’s central capabilities. Sixty attributes in a conjoint study is far more than the number of attributes used in other experiments, and hence an initial filter deemed necessary for practical purposes.⁵ Nonetheless, a seventeen-dimensions conjoint study would still make comparisons between profiles extremely burdensome to participants, and make meaningful evaluations virtually impossible. Thus, we had to establish additional criteria to achieve a final list that is both feasible from the standpoint of the experimental design and meaningful in its content. The fact that the seventeen questions represent particular features of just *six* of the dimensions proposed in Nussbaum’s list served as the basis for our option to make the conjoint study with six questions, each one reflecting a particular characteristic of one of Nussbaum’s comprehensive capabilities. Finally, we narrowed down which ones would be used based on what questions that – to our understanding – could together describe a more comprehensive picture of one’s life situation.

Second, we limited the range of values of the conjoint experiment (i.e., possible answers) that some of the attributes (i.e., questions) could assume in the conjoint phase, compared to the original range of responses allowed for these questions in Anand et al.’s (2009) survey – and also in the survey that participants took in the first stage of our experiment. For example, while respondents could give answers in a 1-7 Likert scale for the question about family love (see Table 4.8a), responses for that same question in the conjoint phase could only assume the values ‘Difficult’, ‘Neither difficult nor easy’, and ‘Easy’, which stills allows great variability without increasing unnecessarily the complexity of the econometric model.

Third, it is important to stress the fact that Nussbaum (2000, 2011) describes the ten capabilities on her list very broadly, each one embracing various elements that are, to a large extent, interconnected, but still quite heterogeneous. One example comes from the bodily integrity domain, which covers at the same time security from violent assault and opportunities for sexual

⁵For example, the number of attributes used in Hainmueller, Hopkins and Yamamoto (2014) and Horiuchi, Smith and Yamamoto (2018), vary between eight and nine depending on the experiment.

Table 4.1 – Levels of attributes used in the conjoint stage

Capability	Description (NUSSBAUM, 2011)	Variable	Question (ANAND et al., 2009)	Possible answers
Adequate shelter	Being able to have adequate shelter	Shelter	Is your current accommodation adequate or inadequate for your current needs?	1. Adequate (B) 2. Inadequate
Domestic security	Being able to be secure against domestic violence	Past domestic assault	Have you ever been victim of domestic violence?	1. Yes 2. No (B)
Family love	Being able to love those who love and care for us	Family love	At present how easy do you find to enjoy the love, care, and support of your family?	1. Difficult 2. Neither easy nor difficult (B) 3. Easy
Useful role	Being able to engage in critical reflection about the planning of one's life	Useful role	Outside of work, have you recently felt that you were playing a useful part in things?	1. Much less than usual 2. Less than usual 3. Same as usual (B) 4. More so than usual
Social interaction	Being able to engage in various forms of social interaction	Takes holidays	Do you normally have at least a week's (seven days) annual holiday away from home?	1. No, but I would like to 2. No, because I do not want to 3. Yes (B)
Equal basis	Being able to seek employment on an equal basis with others	Past discrimination	When seeking employment in the past, have you ever been victim of discrimination because of your race, sexual orientation, gender, religion, age?	1. Yes 2. No (B)

(a) Notes: B = baseline values. Source: Elaborated by the author.

satisfaction. In this sense, our effort to make the design more straightforward and palatable to participants by picking solely one question per dimension comes at the cost of reflecting less accurately the full extent of the capabilities that Nussbaum is referring to in her works. In the same manner, by confining our analysis to the set of statistically significant variables used in Anand et al. (2009), we also refrained from arbitrarily choosing questions that could – at least intuitively – be considered as more precise indicators of capabilities described by Nussbaum (2000, 2011). This strategy might also imply in a better description of individuals' *resources* instead of their capabilities in some of the dimensions, as could be argued about asking individuals if they take holidays to represent the 'social interaction' capability. Nevertheless, although acknowledging that indicators in Anand et al. (2009) and in our study reflect only to a limited extent individuals capabilities sets, we argue that they are still useful to depict various life domains important for individuals and investigate how trade-offs occur. Furthermore, the exercise of comparing 'too broad' and abstract dimensions of life is of little usefulness to a policymaker that has to decide between policies with particular purposes: thus, narrowing the scope of the comparative exercise can make policy prescriptions more precise and effectively steer governments toward the fulfillment of peoples' priorities.

Fourth, among the many different characterizations that can be given to a person's capability, our interest lies in exploring *well-being freedom*. In this sense, our approach also differs from the one taken in Anand et al. (2009). To recall, the authors' model the reported level of life satisfaction of respondents as a function of the indicators that represent their capabilities. As previously mentioned, their dependent variable reflects the notion of well-being *achievement*, and not necessarily well-being *freedom* (see SEN, 2009). Thus, to make our analysis more in line with the idea of well-being freedom, we opted to ask respondents using the term *ability to reach* a higher well-being level, and not in which situation they would effectively enjoy higher well-being.

Fifth, instead of randomizing the order of stages, we opted to set the survey before the conjoint stage for three main reasons. First, the survey stage invites participants to evaluate their own lives and draws attention to the topic of well-being and to what dimensions matter most. Making individuals reflect before deciding is a relatively common practice in experiments, and affects results (see, among others, KRUPKA; WEBER, 2009; CAPPELEN et al., 2011). We also opted to run a 17-questions survey based on our initial shortlist of questions in Anand et al. (2009) (instead of 6-questions survey based on the questions used in the conjoint phase) in order to instigate a more comprehensive assessment of individuals subjective well-being. Second, by responding the survey before the conjoint experiment, participants become familiarized with the items to be compared in conjoint analysis, what increases awareness about the meaning of each dimension in the conjoint phase and minimize the risk that not every attribute has been adequately taken into account during the decision process. Finally, collecting background information first is important from the standpoint of the econometric methodology: since our interest lies in how our quantity of interest - the Average Marginal Component Effects - interacts

Table 4.2 – Descriptive statistics of participants

Statistic	N	Mean	St. Dev.	Min	Max
Participants	243				
Female		0.502			
Age		28.93	9.92	18	69
Education					
High school degree		0.395			
Bachelor's degree		0.329			
Master's degree		0.139			
Doctorate degree		0.008			
Other*		0.127			
Nationality					
United Kingdom		0.362			
United States		0.160			
Portugal		0.062			
Poland		0.053			
Italy		0.049			
Canada		0.037			
Other**		0.247			

Notes:* 'Associate's degree' and 'Some high school'.

** Hungary, Germany, Spain, Australia, Mexico, Netherlands, among others.

Source: Elaborated by the author.

with some respondents characteristics (i.e., participants' life circumstances in the dimensions studied, and participants' subjective well-being), Hainmueller, Hopkins and Yamamoto (2014) argues that it is important to have a design that ensures that respondents characteristics are not affected by the treatments, i.e., the profiles of answers participants see during the conjoint phase. One way to contour this potential issue, the authors suggest, is precisely by collecting respondents characteristics before the conjoint phase of the experiment.

We discarded the information of respondents that took less than 4 minutes to complete the entire experiment, or that gave fewer points to the chosen set in at least three of the decision tasks, leaving us with a total of 243 respondents. On average, participants took approximately 9.5 minutes to complete all stages of the experiment. Table 4.2 presents some demographic information about our final sample of participants. The number of men and women are roughly the same, and the average age was 28.9 years old. The vast majority of participants are from western and developed countries, especially from the United Kingdom and the United States - both countries account for 52% of the participants' nationalities -, and educated: approximately 47% with a Bachelor's, Master's or a Doctorate degree. Therefore, in general terms we can consider our sample as 'WEIRD' - the acronym for '*Western, Educated, Industrialized, Rich and Democratic*' (HENRICH; HEINE; NOREZAYAN, 2010), what limits the external validity of our findings. On the other hand, experimental studies rely largely on this sort of participant

to make inferences about the internal validity of some theoretical postulates. Moreover, using a ‘WEIRD’ sample of participants makes comparisons easier between ours and other experimental protocols, as well as facilitates replication in order to corroborate or refute our results.

4.3 METHODS

Let α_i^j be a dummy variable equal to 1 if respondent i has been classified as ‘Low’ in the capability indicator j , and 0 if classified in the group ‘High’, and let γ_i be a binary variable such that $\gamma_i = 1$ if respondent i reported a ‘Low’ overall life satisfaction, and 0 otherwise. Since each respondent faces six choice tasks, and in each task, she has to compare two profiles of answers, every respondent sees a total of twelve different combinations of answers to the conjoint questionnaire and thus generates a total of twelve observations. Let X_i^j be a $12 \times (D_j + 1)$ matrix where columns denote all the D_j possible values that the attribute j can assume, excluded the baseline value, plus a vector of ones for the intercept, and rows represent the twelve values for dimension j that respondent $i = 1 \dots, m$. has seen throughout the experiment.⁶

Our quantities of interest are the Average Marginal Component Effects (HAINMUELLER; HOPKINS; YAMAMOTO, 2014) of the values in each of the six dimensions of life used in our study. Under a complete random experimental design – in which the hypothetical situation of participants in each dimension is determined at random – Hainmueller, Hopkins and Yamamoto (2014) show that the AMCEs have a straightforward causal interpretation. In our study, the AMCEs of a particular value (answer) k that an attribute (capability indicator/question) j can assume can be understood as the average effect on the probability that a respondent will choose a profile of answers in which the value of j is k as the one that allows reaching a higher well-being, compared to a profile of answers in which the value of j is equal to an arbitrarily defined baseline value. The authors show that AMCEs of the values of a dimension j can be conveniently estimated by a difference-in-means estimator, and operationalized by regressing $Y = [y_1, \dots, y_m]'$ on $X^j = [X_1^j \dots X_m^j]'$ (see the discussion in the previous chapter).⁷

Baseline values in our study intend to represent either neutral situations (such as the baseline for the family love capability indicator) or situations in which the individual enjoys a decent level of the capability. In this sense, we can establish a connection between these baseline values

⁶For example, imagine a simplified case with only two choice tasks, and a participant i that faces a comparison between profiles with values ‘Difficult’ and ‘Easy’ in the first task, and ‘Difficult’ and ‘Neither difficult nor easy’ in the second, for the question that represents the family love capability. Further, assume that she chooses the profiles with ‘Easy’ and ‘Neither difficult nor easy’ in each comparison. Then, the variables for this participant can be coded as

$$y_i = \begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \quad X_i^j = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix} \quad (4.1)$$

where the second and third columns denote, respectively, the values ‘Difficult’ and ‘Easy’.

⁷Alternatively, Hainmueller, Hopkins and Yamamoto (2014) show that the AMCEs of values of all dimensions can be estimated together by regressing Y on X^1, X^2, \dots, X^J . Both methods yield, in expectation, the same results.

and the threshold levels in NUSSBAUM's (2011) account. Following this line of reasoning, the AMCEs indicate what effect falling below (or being raised above) threshold levels in these capabilities have in individuals' subjective well-being freedom.

Nevertheless, our aim is not only to evaluate the average effects, but also assess whether estimates vary with the self-reported situation of respondents in all six dimensions, and with their levels of satisfaction with life. As Hainmueller, Hopkins and Yamamoto (2014) suggest, a possible strategy is run standard linear regressions in each different strata of our sample, and then compare the estimates. Although this approach can be easily implemented, it comes with a cost in terms of statistical power. Alternatively, Horiuchi, Smith and Yamamoto (2018) take a *hierarchical Bayes* approach to model the variability of the AMCEs in their conjoint study to investigate heterogeneities in political preferences in Japan. Hierarchical Bayes models are suited for situations in which researchers have a large number of subjects, but few observations per participants (LEEFLANG et al., 2017).

Formally, following the hierarchical Bayesian linear model described in Rossi, Allenby and McCulloch (2005), for each individual i and dimension j we fit the model

$$y_i = X_i^j \beta_i^j + \epsilon_i^j \quad (4.2)$$

where β_i^j is a $D_j \times 1$ vector that denotes the individual-specific AMCEs for the values of dimension j , and $\epsilon_i^j \sim \text{iid } N(0, \sigma_i^2 I_{n_i})$. Equation (4.2) denotes our 'Level 1' model, which relates individuals' choices to covariates that represent what combinations of responses participants have seen during the experiment. We assume that coefficients have a common prior distribution

$$\beta_i^j = \Delta_j' z_i^j + \eta_i \quad (4.3)$$

with $\eta_i \sim \text{iid } N(0, V_\beta)$, and $\Delta_j' = [\delta_0^j \quad \delta_1^j]$. The vector z_i^j is equal to $z_i^j = [1 \quad \alpha_i^j]'$ when evaluating heterogeneities due to the different situations that respondents find themselves in the dimensions of life used in our study, and $z_i^j = [1 \quad \gamma_i]'$ when studying the effect of subjective well-being on the AMCEs. The equation (4.3) denotes our 'Level 2' model, that links participants' AMCEs together through assuming a common prior distribution whose mean vary with participants' groups (i.e., Low or High).

Following Rossi, Allenby and McCulloch (2005) and assuming that error variances are independent of each other, we can use the natural conjugate prior $\sigma_i^2 \sim IG(\nu_i/2, \nu_i s_{0i}^2/2)$, where IG denotes the inverse gamma distribution. Using the relationship between the inverse gamma and the inverse of a chi-squared random variable, we can express the prior of σ_i^2 as

$$\sigma_i^2 \sim \frac{\nu_i s_{0i}^2}{\chi_{\nu_i}^2} \quad (4.4)$$

where s_{0i} and ν_i denote, respectively, the scale parameter for the regression and the degrees of freedom for the regression error variance prior. Additionally, the prior of the covariance matrix

of β is

$$V_\beta \sim IW(\nu, V)$$

where IW denote the Inverse-Wishart distribution. The parameters ν and V are, respectively, the degrees of freedom and a scale location matrix for V_β . Also, the prior of Δ is set to

$$\text{vec}(\Delta)|V_\beta \sim N(\text{vec}(\bar{\Delta}), V_\beta \otimes A^{-1})$$

which are the natural conjugate priors for our ‘Level 2’ model.

In sum, for each capability indicator, we calculate individual-specific AMCEs and model these coefficients as functions of participants groups in that specific life dimension. The estimates for group-specific AMCEs will be the posterior means of the respondents’ AMCEs conditional on their groups, while the overall AMCEs will be the unconditional means. We fit the models using a Gibbs sampler implemented in *R* with the package *bayesm*. For each regression, we run one chain with 100,000 iterations (20,000 burn-in draws). The prior settings are $v_i = 1$, $s_{0i}^2 = \text{var}(y_i)$, $\nu_j = D_j + 1$, $V = I_{D_j}$, $\bar{\Delta} = 0$ and $A = 10^{-5} \times I_2$, where I_{D_j} denotes the identity matrix of dimension D_j . These parameters characterize proper but very diffuse priors to our model (see ROSSI; ALLENBY; McCULLOCH, 2005) Also, the chain is thinned by storing the draw from every 10th iteration, leaving a total of 8,000 simulation draws. Trace plots show evidence of converge of chains to true posteriors (see Figures 4.4a, 4.4b, 4.5a, 4.5b). We calculate the posterior means of group-specific AMCEs along with 95% credible intervals based on the quantiles for the posterior means from the 8,000 iterations.

4.4 RESULTS

In this section, we describe and discuss the main results of our experiment.

4.4.1 Groups

Based on individuals’ responses in the first part of the experiment, for each dimension $j = 1, \dots, 6$, and for the subjective well-being dimension, we separated individuals into two groups, labeled as ‘Low’ (L) and ‘High’ (H). Tables 4.7a-4.9a (third column) presents which responses characterizes a type L or H participant.

Table 4.3 shows the distribution of participants per group, and the gender composition of each group. First, it is readily noticeable that type H participants are more numerous than type L respondents in all six dimensions. The size of ‘Low’ groups ranges from 13% (adequate shelter) to 40% (subjective well-being) of the participants. This results – although expected given the nature of our pool of participants – implies in higher uncertainty about the average marginal component effects specific of L groups as compared to H .⁸

⁸We could have partially overcome this issue by establishing additional screening criteria during the recruitment process in order to reach a more balanced sample: however, we opted to adopt the same screening criteria in all

Table 4.3 – Distribution of groups per dimension and gender

Capability	Low			High		
	F_{Lj}/L_j	M_{Lj}/L_j	L_j/T	F_{Hj}/H_j	M_{Hj}/H_j	H_j/T
Adequate shelter	.44	.56	.13	.51	.49	.87
Domestic security	.59	.41	.16	.49	.51	.84
Family love	.45	.55	.22	.51	.49	.78
Useful role	.50	.50	.26	.50	.50	.74
Social interaction	.54	.46	.39	.47	.53	.61
Equal basis	.71	.29	.16	.49	.54	.84
SWB	.46	.54	.40	.53	.47	.60

Notes: L_j, H_j = number of respondents classified as Low/High in dimension j ;

F_{kj}, M_{kj} = number of female/male respondents classified as k in dimension j ;

T = total of participants.

Source: Elaborated by the authors.

Gender composition is reasonably balanced in both L and H groups across all life domains except domestic security and equal basis. In what concern the former, 59% of respondents that indicated having suffered from any form of domestic violence in the past are female. Women outnumber men even more significantly in the latter, with female participants accounting for 71% of individuals that reported to have suffered from some form of discrimination when seeking a job in the past.

4.4.2 Overall AMCEs

First, we analyze the overall AMCEs without differentiating participants by group. We run six regressions - one per capability indicator - to estimate the effects of attributes values, i.e., the effect of different answers, on the probability that a life situation will allow respondents achieve a higher level of well-being.

Table 4.4 shows the difference-in-means estimates calculated through linear regressions using ordinary least squares, and the first columns of Tables 4.5 and 4.6 presents the estimates for the pooled AMCEs using the hierarchical Bayesian models that account for heterogeneities. Note that estimates are quite similar irrespective of the method chosen to estimate the effects of all levels in all except adequate shelter and domestic security dimensions, where estimates are larger (in module) in the Bayesian models. In any case, conclusions about trade-offs remain unaltered regardless of what model is used.

Except for the coefficient of the value ‘More so than usual’ in the useful role capability, which describes a situation in which the participant frequently feels that he or she plays a useful part in things outside their working environments, all other estimates were statistically significant at a standard 5% level, and with the expected sign. In this sense, improving or worsening (compared to a baseline value) individuals situation in all the six dimensions have important

sessions in order to let the sampling process be the same for all participants.

effects on what level of well-being they believe it is possible to achieve. If we interpret baseline values as threshold levels of each capability dimension, then falling below some minimum level of achievement impacts negatively well-being freedom in all six capabilities; thus, all the life instances used in this study indeed play a part in respondents' overall ability to pursue their own well-being.

The results also suggest, however, that participants give different weights to these six life domains. The most noticeable effect comes from the domestic security dimension. Profiles that indicated that the respondent had suffered from domestic violence in the past were 24-28 percentage points less likely to be chosen as the one that would allow reaching higher well-being, compared to a baseline situation in which no domestic violence has been suffered. To illustrate, when comparing two profiles that give same answers to all questions except the one that asks about domestic violence, participants will choose much less frequently the profile that has 'Yes' as an answer as the life situation that allows them to achieve a higher level of well-being. Similarly, when pointing to the inadequacy of current accommodations, profiles were 17-20 percentage points less likely to be chosen than another where accommodations were rated as adequate, what illustrates that being able to have an adequate shelter has considerable significance for well-being.

The lack of a decent situation in the family love capability indicator also proved to reduce the likelihood that a profile is chosen in our study. Compared to a baseline profile in which the respondent hypothetically signaled a neutral response (i.e., neither difficult nor easy), a life situation in which the love, care, and support of the immediate family are difficult to be enjoyed is about 13-14 percentage points less likely to be chosen from the perspective of well-being potential. On the other hand, profiles that suggest a life circumstance in which it is easy to experience family love are 9-10 percentage points more likely to be chosen. Whether one feels useful, which represents the useful role capability, also had significant influence in participants' choices: hypothetical profiles with 'Much less than usual' and 'Less than usual' as responses were less likely to be chosen in about 13 and 11 percentage points, respectively, compared to a profile with the neutral response 'Same as usual'.

In what concerns the social interaction capability - represented by one's ability to take holidays -, the adverse effect of being unable to take at least one week off during a year range between 13-14 percentage points compared to a threshold level where this capability is at a decent level. Surprisingly, even the case that the profile suggested a life situation in which having a week off is possible, but the individual decided not to have it - what signals that the capability is present - had a negative effect in choice probabilities around 5-6 percentage points. One possible explanation is that this type of choice (choosing not to take a time off) is correlated with undesirable lifestyles or other negative characteristics that are not explicitly stated in the profile used in our study.

Finally, profiles in which individuals hypothetically fall below the threshold level in the equal basis capability were 8-9 percentage points less likely to be chosen. To recall, 'Yes' as an

Table 4.4 – AMCEs (OLS estimates)

	Adequate shelter	Domestic security	Family love	Useful role	Social interactions	Equal basis
Shelter (Inadequate)	-0.179*** (0.019)					
Past domestic assault (Yes)		-0.239*** (0.020)				
Family love (Difficult)			-0.136*** (0.023)			
Family love (Easy)			0.095*** (0.024)			
Useful role (Much less than usual)				-0.135*** (0.025)		
Useful role (Less so than usual)				-0.115*** (0.026)		
Useful role (More so than usual)				0.046 (0.026)		
Takes holidays (No, because I do not want to)					-0.053* (0.022)	
Takes holidays (No, but I would like to)					-0.129*** (0.021)	
Past discrimination (Yes)						-0.082*** (0.019)
Intercept	0.589*** (0.009)	0.622*** (0.010)	0.514*** (0.014)	0.550*** (0.015)	0.561*** (0.012)	0.542*** (0.010)
<i>N</i>	2,916	2,916	2,916	2,916	2,916	2,916
<i>R</i> ²	0.032	0.057	0.036	0.023	0.011	0.007
Adjusted <i>R</i> ²	0.032	0.057	0.036	0.022	0.011	0.006
Residual Std. Error	0.492 (df = 2914)	0.486 (df = 2914)	0.491 (df = 2913)	0.495 (df = 2912)	0.497 (df = 2913)	0.498 (df = 2914)
F Statistic	96.472*** (df = 1; 2914)	177.160*** (df = 1; 2914)	54.651*** (df = 2; 2913)	22.882*** (df = 3; 2912)	16.477*** (df = 2; 2913)	19.889*** (df = 1; 2914)

Notes: *** Significant at the 0.1 percent level.

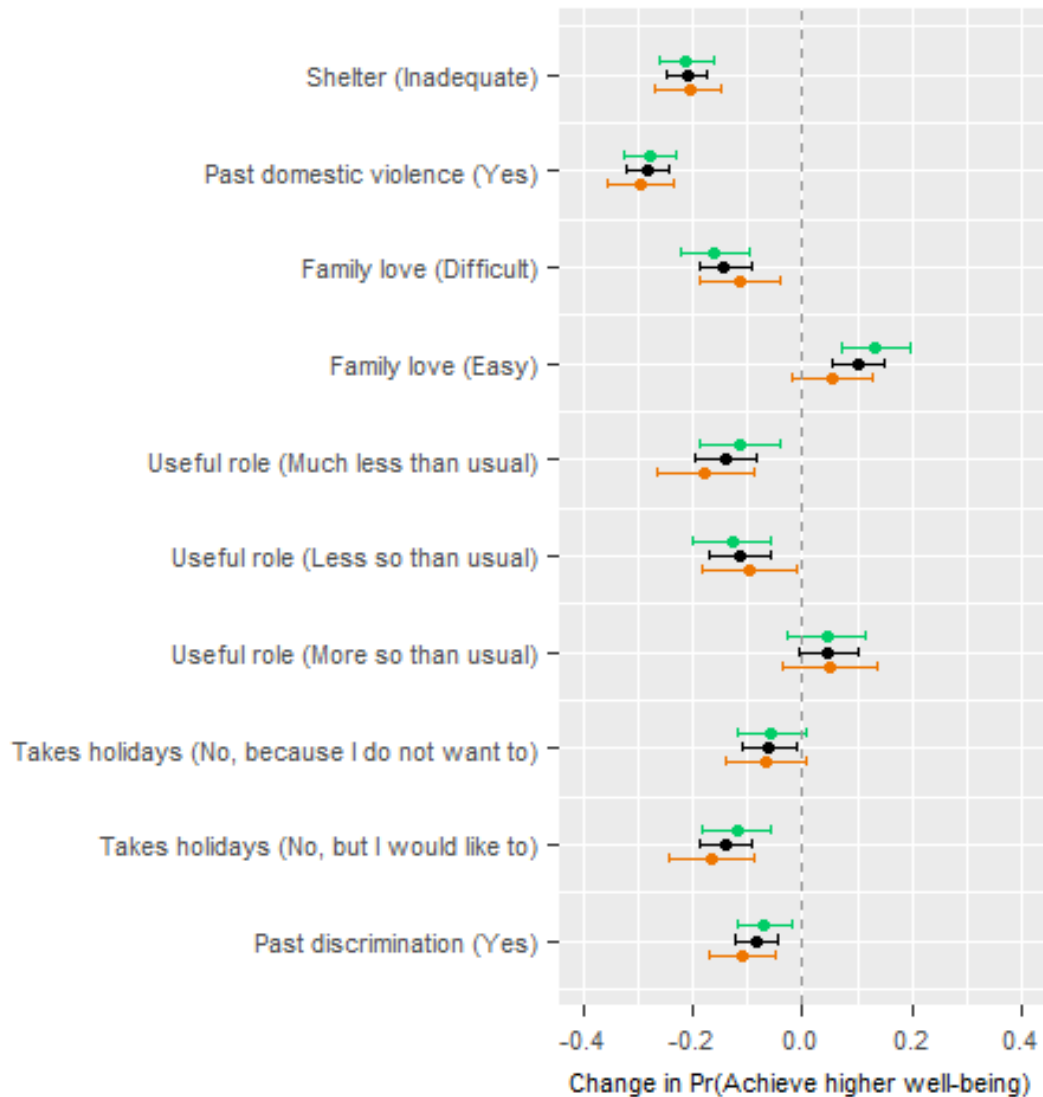
** Significant at the 1 percent level.

* Significant at the 5 percent level.

Standard errors corrected for within-respondent clustering.

Source: Elaborated by the author using the software *R*.

Figure 4.1 – Effects of attributes (subjective well-being)



(a) Notes: yellow/below = $SWB_i \leq 4$; black/center = Pooled; green/above = $SWB_i > 4$). Points represent the posterior means of the group specific AMCEs and the bars represent 95% credible intervals. Source: Elaborated by the authors.

answer indicates a life situation where the individual have suffered from discrimination when seeking employment, and thus he or she lacks a decent level of the equal basis capability. It is obvious that - as in the domestic security capability - some groups are more likely to fall below a threshold level than others in real life, and thus the negative average effect may not be reflecting the full extent in which discrimination affects well-being freedom since, for a significant share of participants, the exercise of imagining oneself suffering from any form of discrimination has almost no connection with reality.

Therefore, our results pinpoint which areas should gain prominence among areas that are already undeniably important. Among the six dimensions used in our experiment, domestic security and decent housing appear as utterly fundamental for the ability to reach high levels

Figure 4.2 – Effects of attributes (levels of capabilities)



(a) Notes: red/below = Low ; black/center = Pooled; blue/above = High. Points represent the posterior means of the group specific AMCEs and the bars represent 95% credible intervals. Source: Elaborated by the authors.

of well-being; thus, policies that eliminate – or, at least, mitigate – the risks of being a victim of domestic assault, and policies that tackle the issue of housing conditions can receive some priority when considering the most effective ways of enhancing well-being freedom.

4.4.3 AMCEs: Breakouts by participants' types

Next, we analyze the robustness of the results to variations in participants' overall level of satisfaction with life. The group-specific AMCEs of each life dimension are illustrated in Figures 4.1a, and Table 4.5 presents the values of the AMCEs estimated in each of the models, along with 95% credible intervals. Analyzing the posterior means of the AMCEs conditional on subjective well-being groups, it becomes clear that group-specific AMCEs are fairly close to the pooled estimates. In other words, the weights estimated from the choices that respondents made throughout the experiment are reasonably robust to variations in the level of well-being that participants reported in the survey stage.

The only statistical difference is found in the family love dimension. The group-specific AMCE of the value 'Easy' for individuals that reported a low level of well-being was statistically lower than the AMCE of the high subjective well-being group: 0.055 and 0.133, respectively. Thus, when evaluating two profiles of answers that are equal in every aspect except the response given to the family love question, subjects that reported higher well being in the survey stage were more than twice as likely to choose the profile that suggests a life situation in which is easy to enjoy the love, care and support of their immediate families. Moreover, the estimate for the low group is not statistically different from zero at the 5% level. It is important to note that we cannot rule out the possibility of confounds since we are not controlling for additional factors such as personality traits, or even familiar conditions. For example, if the reason for a low level of satisfaction with life is originated in one's family, then it would be natural to expect people such result. Nevertheless, the difference found between these two groups suggests that including controls for subjective well-being is necessary to some extent, at least in the family love dimension.

In what concern heterogeneities due to respondents' different circumstances in the six life dimensions studied, since sizes of L and H groups vary from one capability to another, with L individuals being less numerous than H respondents, the results of our analysis should be seen with some caution. In any case, estimates depict a similar scenario to the one found in the subjective well-being analysis. Figure 4.2a and Table 4.6 present the results, where we find a statistically significant difference at the 5% level only between the posterior means of the AMCEs of individuals that reported to have and have not suffered from domestic violence in the past. While the posterior mean of the AMCEs of the L group was estimated in -0.14, the AMCEs of the H group was calculated in -0.31, indicating that although being a victim of domestic violence diminishes, on average, both types of agents' ability to achieve a higher level of well-being, the negative effect is about twice as large for those individuals that have never experienced a domestic violence situation. This result goes in line with what we would expect

Table 4.5 – Summary of the posteriori distribution of β_i^j (subjective well-being)

	Pooled			$SWB_i \leq 4$			$SWB_i > 4$		
	2.5%	$E(\beta_i^j)$	97.5%	2.5%	$E(\beta_i^j \gamma_i = 1)$	97.5%	2.5%	$E(\beta_i^j \gamma_i = 0)$	97.5%
Adequate shelter									
Shelter (Inadequate)	-0.25	-0.211*	-0.172	-0.271	-0.203*	-0.148	-0.262	-0.212*	-0.160
Domestic security									
Past domestic assault (Yes)	-0.322	-0.283*	-0.244	-0.352*	-0.292	-0.232	-0.326	-0.276*	-0.226
Family love									
Family love (Difficult)	-0.189	-0.142*	-0.095	-0.193	-0.116*	-0.040	-0.221	-0.160*	-0.099
Family love (Easy)	0.054	0.100*	0.149	-0.020	0.055	0.129	0.071	0.133*	0.196
Useful role									
Useful role (Much less than usual)	-0.194	-0.139*	-0.084	-0.262	-0.177*	-0.090	-0.185	-0.114*	-0.041
Useful role (Less so than usual)	-0.170	-0.116*	-0.061	-0.179	-0.097*	-0.012	-0.200	-0.129*	-0.058
Useful role (More so than usual)	-0.008	0.046	0.100	-0.036	0.051	0.137	-0.026	0.043	0.112
Social interaction									
Takes holidays (Do not want to)	-0.108	-0.060*	-0.012*	-0.140	-0.065	0.009	-0.119	-0.057*	0.006
Takes holidays (Would like to)	-0.185	-0.137*	-0.089	-0.239	-0.163*	-0.087	-0.183	-0.119*	-0.057
Equal basis									
Past discrimination (Yes)	-0.124	-0.086*	-0.048	-0.171	-0.111*	-0.050	-0.118	-0.069*	-0.019

Notes: * Significant at the 5 percent level.

Source: Elaborated by the author using the software *R*.

in a situation where people adapt to unfavorable circumstances and attach less importance to a life situation where their bodily integrity is secure.

Hence, heterogeneities that result from the subjective well-being and the life background of respondents do not appear to be a severe issue in our analysis. Although we emphasize that further research is needed to evaluate the external validity of these findings, our estimates suggest that – apart from the life dimensions linked to the family love and domestic security capabilities – people with low or high levels of subjective well-being, and low or high levels of capabilities tend to be similar in terms of what elements affect most their potential to pursue their own well-being. This result supports the notion that some capabilities have indeed central and universal value for human life, which are stable across variations in individuals' life circumstances.

4.5 CONCLUDING REMARKS

In this essay, we evaluated what are peoples' priorities among different life domains that have close connections with Nussbaum's (2000; 2011) central capabilities. Using a novel methodological approach based on conjoint analysis, we carried out an online conjoint experiment where participants had to make trade-offs between life situations in which they hypothetically experienced different circumstances in six areas of life. Our analysis suggests that respondents attach importance to all dimensions of life used in our study, but being secure from domestic violence, and being able to have adequate accommodation, are amongst the most relevant ones when considering their ability to pursue and reach higher satisfaction with life.

Additionally, we also evaluate whether results vary with respondents' subjective well-being and with the situation of respondents in each of the life domains studied. Our results proved to be fairly robust even when conditioning on these potential sources of heterogeneity, except for

Table 4.6 – Summary of the posteriori distribution of β_i^j (levels of capabilities)

	Pooled			Low			High		
	2.5%	$E(\beta_i^j)$	97.5%	2.5%	$E(\beta_i^j \alpha_i^j = 1)$	97.5%	2.5%	$E(\beta_i^j \alpha_i^j = 0)$	97.5%
Adequate shelter									
Shelter (Inadequate)	-0.25	-0.211*	-0.172	-0.345	-0.238*	-0.131	-0.248	-0.206*	-0.165
Domestic security									
Past domestic assault (Yes)	-0.321	-0.282*	-0.244	-0.240	-0.141*	-0.044	-0.351	-0.310*	-0.267
Family love									
Family love (Difficult)	-0.189	-0.143*	-0.094	-0.183	-0.084	0.018	-0.213	-0.159*	-0.105
Family love (Easy)	0.053	0.100*	0.149	0.044	0.147*	0.248	0.033	0.087*	0.142
Useful role									
Useful role (Much less than usual)	-0.192	-0.139*	-0.084	-0.292	-0.181*	-0.072	-0.188	-0.124*	-0.061
Useful role (Less so than usual)	-0.171	-0.116*	-0.061	-0.286	-0.179*	-0.076	-0.157	-0.093*	-0.029
Useful role (More so than usual)	-0.008	0.046	0.099	-0.119	-0.011	0.101	0.003	0.066*	0.127
Social interaction									
Takes holidays (Do not want to)	-0.108	-0.060*	-0.014	-0.128	-0.052	0.026	-0.125	-0.066*	-0.006
Takes holidays (Would like to)	-0.184	-0.137*	-0.088	-0.199	-0.122*	-0.046	-0.207	-0.146*	-0.085
Equal basis									
Past discrimination (Yes)	-0.124	-0.085*	-0.047	-0.123	-0.026	0.072	-0.140	-0.097*	-0.055

Notes: * Significant at the 5 percent level.

Source: Elaborated by the author using the software *R*.

the relative importance attached to the domestic security capability. In our analysis, individuals that suffered any form of domestic violence in the past tend to attach less importance to this fact compared to those respondents that indicated not having suffered from domestic violence. This results might suggest some source of adaptation to the unfavorable conditions.

Future research can build upon the methodological approach used in this essay and include more - and possibly different - dimensions in the conjoint study. An interesting avenue is to pick dimensions that reflect more accurately real-life trade-offs that people face in many parts of the world. For instance, Nussbaum (2011) cites the dilemma between leisure time and decent living standard that individuals in the United States face on a daily basis, or the situation of parents in some parts of India that have to choose between either sending their children to school, or using their child's labor to help in the family's finances. Such exercises would be of great interest for the design of state policies with the specific purposes of elimination (or, at least, mitigating) the adverse effects of these specific 'tragic choices' on peoples' lives.

Second, the assessment of nation-specific capabilities can benefit significantly from employing the methodological approach used in this essay with national representative samples of individuals. As Nussbaum (2011) notes, her proposal is sufficiently abstract to make room for nations to specify central capabilities that reflect particular life domains valued by their citizens. Furthermore, replicating the study using national representative samples can bring useful insights about the extent to which some capabilities are universally valued, or their worth depend on the part of the world in which they are being evaluated.

Another avenue for further research is assessing what role public discussion has in shaping individuals priorities. Sen (2009) forcefully defends that the public debate has a crucial role in determining the relative importance of capabilities in social assessments, what in turn has a profound effect in the direction of governmental policies. In this sense, experiments can be

useful to get a better sense about the extent to which priorities are shaped by public debate. For example, before making decisions, participants of a conjoint experiment can be randomly assigned to treatment groups where they can (or cannot) debate with other participants about the issues discussed in the study. Differences in the average marginal component effects between both groups could be attributable to public reasoning.

Finally, the model used in our analysis can be expanded to take into account interactions between capabilities by estimating the average component interaction effects (HAINMUELLER; HOPKINS; YAMAMOTO, 2014), which quantifies how the causal effect of one capability varies with the values of another capability. This strategy is of particular interest in investigating the effects of *corrosive disadvantages* and *fertile capabilities*. These concepts, proposed by Wolff and De-Shalit (2007), refer to capabilities that promote or hinder capabilities in other areas of life. For example, Nussbaum (2011) argues that lacking decent protection for one's bodily integrity can constitute in a corrosive disadvantage since it impedes the development of other central capabilities; on the other hand, the affiliation capability supports the enhancement of peoples' lives in various domains and constitutes a fertile capability. But it can be reasonably argued that capabilities can be corrosive or fertile not only in their effects on what other capabilities individuals effectively enjoy, but also considering what value they give to these capabilities: the absence of decent protection for bodily integrity can be so outrageous for people that it might offset, for instance, the expected benefits that arise from enjoying an adequate accommodation. As Nussbaum (2011) suggests, identifying corrosive disadvantages and fertile functionings can be an exercise of utmost relevance for policymakers interested in achieving the best possible outcomes given their scarce resources.

Additional research is certainly needed to evaluate the external validity of our findings. Yet we argue that our results can be of some usefulness to indicate what capabilities are amongst peoples' life priorities. In addition, the methodology employed in this essay also illustrates how experiments can be useful to assess the manner in which trade-offs take place and hence inform policymakers and researchers that have interest in the human development agenda.

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4.7 APPENDIX

Figure 4.3 – An example of choice task from the conjoint phase

INSTRUCTIONS:

In this part of the study you will give your opinion in six exercises. In each exercise we will show you two different patterns of answers to some of the questions of the survey you have just taken. We are going to call these patterns as **Situation A** and **Situation B**.

Exercise 1

Imagine yourself taking the previous survey in a different moment of your life, but this time giving the answers in either Situation A or Situation B column.

Question	Situation A	Situation B
When seeking employment in the past, have you ever experienced discrimination because of your race, sexual orientation, gender, religion, age?	Yes	No
Have you ever been victim of domestic violence?	No	Yes
Do you normally have at least a week's (seven days) annual holiday away from home?	No, but I would like to	No, but I would like to
Is your current accommodation adequate or inadequate for your current needs?	Inadequate	Adequate
At present how easy or difficult do you find to enjoy the love, care, and support of your immediate family?	Difficult	Neither easy nor difficult
Outside work, have you recently felt that you were playing a useful part in things?	More so than usual	Same as usual

Imagine your capability of pursuing your own **well-being** if your answers were given by one of the profiles above.

Given your hypothetical answers above, in which situation (A or B), do you think you would be able to reach a higher level of well-being?:

- A
- B

Situation A: On a scale from 1 to 7 (1 = very low level of well-being, 7 = very high level of well-being) what is the maximum level of well-being you would be able to achieve if your answers were given by the profile in **Situation A**?

- Situation A** 1 2 3 4 5 6 7

Situation B: On a scale from 1 to 7 (1 = very low level of well-being, 7 = very high level of well-being) what is the maximum level of well-being you would be able to achieve if your answers were given by the profile in **Situation B**?

- Situation B** 1 2 3 4 5 6 7

Next

(a) Source: Elaborated by the authors.

Table 4.7 – Survey (Part 1)

Nussbaum's capability	Survey questions	Choices and Group
Bodily Health	(C) Is your current accommodation adequate or inadequate for your current needs?	1. Very Inadequate (L) 2. Inadequate (L) 3. Adequate (H) 4. More than adequate (H)
Bodily Integrity	(C) Have you ever been victim of domestic violence? Do you have sufficient opportunities to satisfy your sexual needs and desires?	1. Yes (L) 2. No (H) 3. Prefer not to answer (H) 1. Yes 2. No 3. Prefer not to answer
Emotions	(C) At present how easy do you find to enjoy the love, care, and support of your Do you find it easy or difficult to express feelings of love, grief, longing, gratitude, and anger compared with most people of your age? Have you recently felt constantly under strain?	1. Extremely difficult (L) 2. Very difficult (L) 3. Fairly difficult (L) 4. Neither diff. nor easy (H) 5. Fairly easy (H) 6. Very easy (H) 7. Extremely easy (H) 1. Extremely difficult 2. Very difficult 3. Fairly difficult 4. Neither difficult nor easy 5. Fairly easy 6. Very easy 7. Extremely easy 1. Much more than usual 2. Rather more than usual 3. No more than usual 4. Not at all

(a) Notes: *C* = Question used in the conjoint stage of the experiment; *L* = Attribute that depict an individual of type *L*; *H* = Attribute that depict an individual of type *H*. All survey questions and possible choices are from ANAND et al. (2009). Source: Elaborated by the authors.

Table 4.8 – Survey (Part 2).

Nussbaum's capability	Survey questions	Choices and Group
Practical Reason	<p>(C) Outside of work, have you recently felt that you were playing a useful part in things?</p> <p>My idea of a good life is based on my own judgment</p> <p>I have a clear plan of how I would like my life to be</p> <p>How often, if at all, do you evaluate how you lead your life and where you are going in life?</p>	<p>1. Much less than usual (L) 2. Less than usual (L) 3. Same as usual (H) 4. More so than usual (H)</p> <p>1. Disagree strongly 2. Disagree moderately 3. Disagree a little 4. Neither agree nor disagree 5. Agree a little 6. Agree moderately 7. Agree strongly</p> <p>1. Disagree strongly 2. Disagree moderately 3. Disagree a little 4. Neither agree nor disagree 5. Agree a little 6. Agree moderately 7. Agree strongly</p> <p>1. Never 2. Very rarely 3. Rarely 4. Occasionally 5. Fairly often 6. Very often 7. All the time</p>
Affiliation	<p>(C) Do you normally have at least a week's (seven days) annual holiday away from home?</p> <p>I respect, value and appreciate other people</p> <p>Have you recently been thinking of yourself as a worthless person?</p>	<p>1. No, because of lack (L) of money/finances (L) 2. No, because of lack of time (L) 3. No, because I don't want to (H) 3. No, because of other reason (H) 4. Yes (H)</p> <p>1. Disagree strongly 2. Disagree moderately 3. Disagree a little 4. Neither agree nor disagree 5. Agree a little 6. Agree moderately 7. Agree strongly</p> <p>1. Much more than usual 2. Rather more than usual 3. No more than usual 4. Not at all</p>

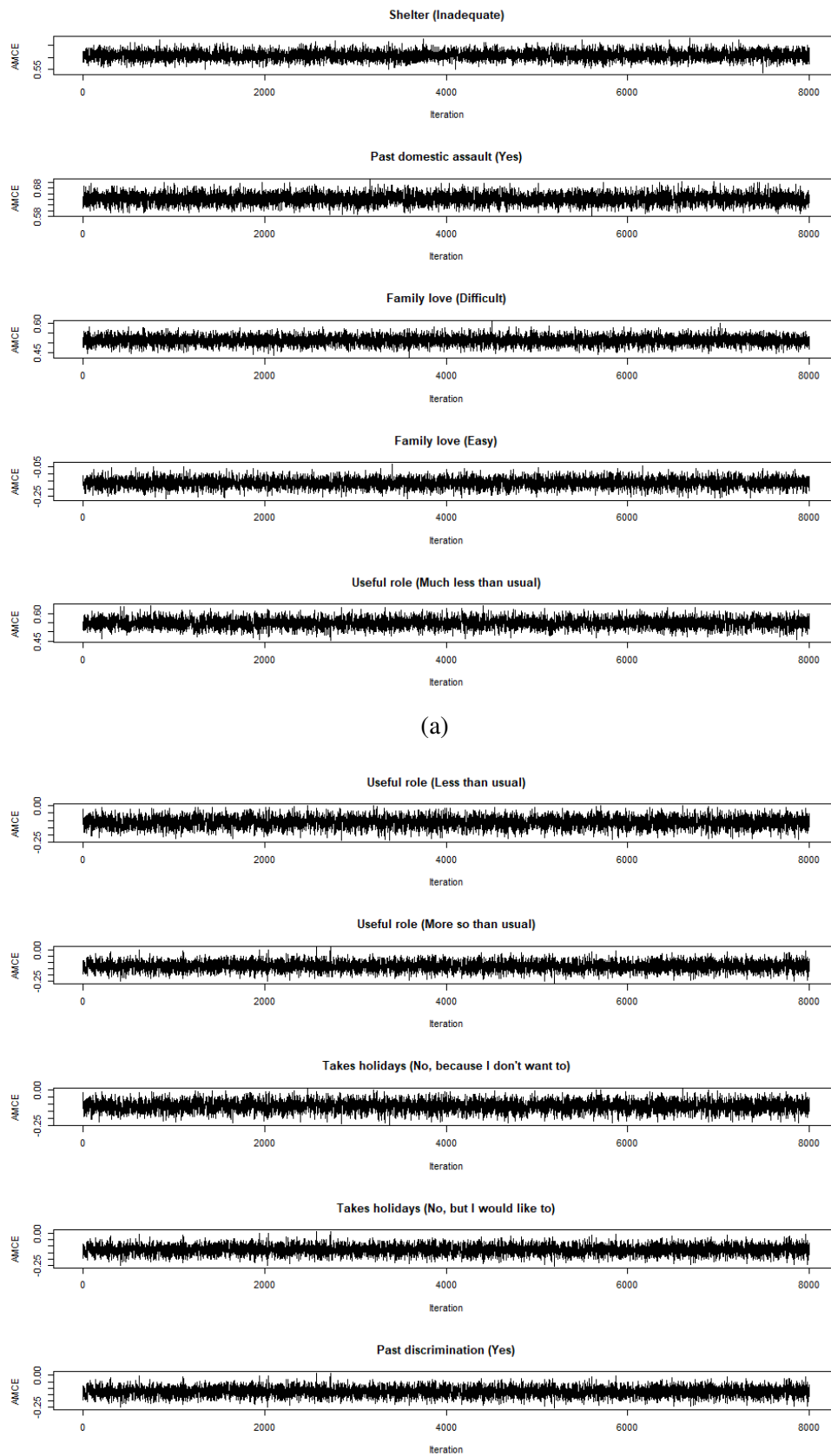
(a) Notes: *C* = Question used in the conjoint stage of the experiment; *L* = Attribute that depict an individual of type *L*; *H* = Attribute that depict an individual of type *H*. All survey questions and possible choices are from ANAND et al. (2009). Source: Elaborated by the authors.

Table 4.9 – Survey (Part 3).

Nussbaum's capability	Survey questions	Choices and Group
Control Over One's Environment	<p>(C) When seeking employment in the past, have you ever been victim of discrimination because of your race, sexual orientation, gender, religion, age?</p> <p>When seeking work in the future how likely do you think it is that you will experience discrimination because of your race, sexual orientation, gender, religion, age?</p> <p>How likely do you think it is that within the next 12 months you will be stopped and searched by the police when it is not warranted?</p> <p>To what extend does your work make use of your skills and talents?</p>	<p>1. Yes (H) 2. No (L) 3. Prefer not to answer (H)</p> <p>1. Extremely likely 2. Very likely 3. Fairly likely 4. Neither likely nor unlikely 5. Fairly unlikely 6. Very unlikely 7. Extremely unlikely</p> <p>1. Extremely likely 2. Very likely 3. Fairly likely 4. Neither likely nor unlikely 5. Fairly unlikely 6. Very unlikely 7. Extremely unlikely</p> <p>1. Never 2. Almost never 3. Rarely 4. Some of the time 5. Most of the time 6. Almost all the time 7. All the time</p>
Subjective well-being	All things considered, where 1 means and "Very Dissatisfied" and 7 "Very Satisfied", how would you evaluate your level of satisfaction with life?	1-7 Likert scale

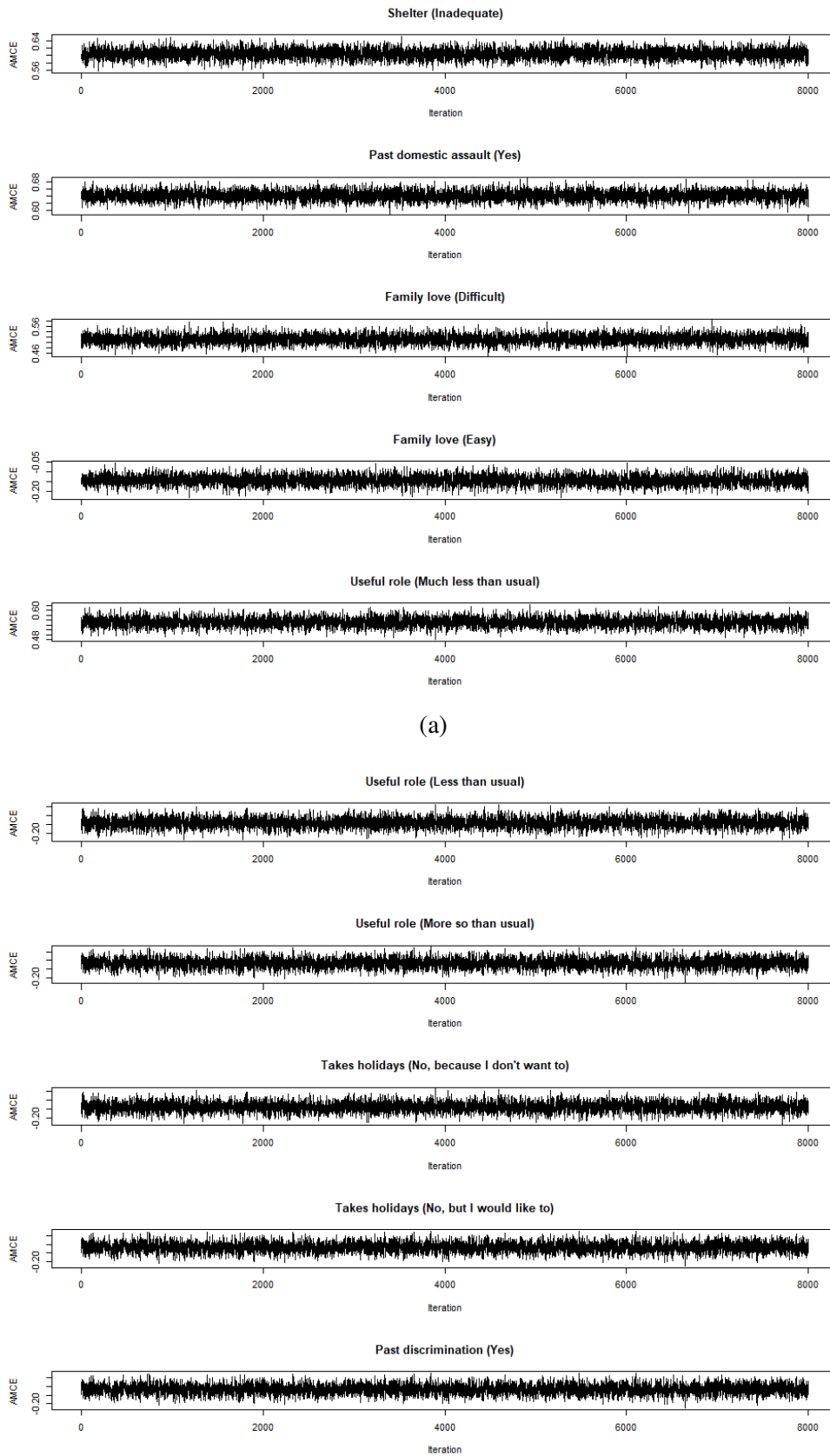
(a) Notes: *C* = Question used in the conjoint stage of the experiment; *L* = Attribute that depict an individual of type *L*; *H* = Attribute that depict an individual of type *H*. All survey questions and possible choices are from ANAND et al. (2009). Source: Elaborated by the authors.

Figure 4.4 – Traceplots of AMCEs (heterogeneity in subjective well-being)



(c) Source: Elaborated by the authors using the software *R*.

Figure 4.5 – Traceplots of AMCEs (heterogeneity in capabilities levels)



(c) Source: Elaborated by the authors using the software *R*.

5 CONCLUDING REMARKS

This thesis presented three essays that approached different topics related to freedom of choice. In the first essay, we proposed a rule to rank opportunity sets in terms of freedom that considers the richer structure of meta-preferences. Our results showed that, in a theoretical level, we could not rule out the hypothesis that freedom of choice may decrease with more options.

In our second essay, we proposed an online conjoint experiment to assess some findings of the theoretical literature on freedom empirically. We considered three elements – cardinality, diversity, and preferences – that constitute the informational basis of the majority of the theoretical literature on freedom to choose, and added two more categories that depict some insights about the influence of social norms of behavior that we have found in our first essay. Evaluating the freedom of choice that an opportunity set provides is an exercise that depends on many different dimensions, as our results suggest. Nevertheless, the complete reliance on cardinality might not fully depict what individuals understand about freedom given that expanding the number of options did not necessarily affected individuals choices in the experiment. Similarly, the lack of diversity or a decent quality of options did have negative effects on freedom, although increased diversity or quality did not necessarily increase the likelihood that a set would be chosen in the binary comparisons proposed in the study. We argue that social norms of behavior, even at a descriptive level, indeed impacted negatively freedom. Participants tended to attach higher freedom to sets where their best choices were not labeled as socially inappropriate by themselves or others. This result, coupled with our finding that women tended to be more sensitive to the influence of those social norms, may serve as a basis for future research in the field.

Our final essay approached the issue of weighting different life domains in terms of their contribution to well-being, and how trade-offs take place between dimensions that central for a life worth of living. We evaluated six capabilities that reflect particular elements of capabilities proposed in NUSSBAUM (2000, 2011); thus we contribute by indicating whether – among life domains that should already gain priority over others in terms of public policies – some have a greater bearing on individuals potential to achieve higher well-being. Indeed, we find evidence that there might still be room for establishing priorities among priorities observed the considerable importance that participants have attached to the capabilities related to their bodily integrity and bodily health. Further, we investigated whether participants' subjective well-being and participants' level of capabilities, might affect the way in which the capabilities in our study are relevant for them. Differences in weights due to respondents' subjective well-being would be an issue for the validity of the analysis given the malleability of well-being measures that rely on individuals' self-assessment, while differences due to respondents' levels of capabilities might indicate the presence of adaptive preferences for capabilities. Our results suggested that

differences in subjective well-being might affect how people evaluate the easy access to the love and support of their families positively: individuals with lower subjective well-being attach less importance to this capability. Capability levels generate differences in weights solely in the domestic security capability, where our results suggest that lacking a decent level in this capability affects with less intensity those individuals that have already suffered from domestic violence in the past. This result might suggest adaptation to unfavorable circumstances. Nevertheless, in general terms, we argue that the relative importance of these different life domains is fairly robust to variations in respondents' background circumstances.

It is important to remark that the external validity of our findings must be studied further. Future research can improve upon our experimental designs to evaluate this question, as well as other elements that remained uncovered in our analysis. In any case, we argue that our findings might be of some use for policymakers. People might experience less freedom of choice when they find themselves in situations where social norms of behavior apply; thus this element should be noted when implementing policies that expand peoples choices with alternatives that reflect to a great extent what other people expect of them given cultural or religious traditions, or even stereotyped behaviors. Also, governments might still find room to establish priorities among the life domains that are already undeniably crucial, acting upon these priorities to enhance these capabilities even though many other life domains also call for urgent action.

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